Appendix 1 B.01: THE A46 ENVIRONMETAL ASSESSMENT REPORT

A46 Coventry Junctions Upgrade Binley

PCF Stage 4 Environmental Assessment Report

Report Number: HE551486-ACM-EGN-A46_SW_000_Z-RP-LE-0002-P04 S3
January 2020

A46 Coventry Junctions Upgrade Binley

PCF Stage 4 Environmental Assessment Report

Report No: HE551486-ACM-EGN-A46_SW_000_Z-RP-LE-0002 -P04 S3

January 2020

Issue No	Current Status	Date	Prepared By	Reviewed By	Approved By
0	S3	05/02/18	Sioned Thomas	Neil Titley	John Waterman
P01	S4	27/03/18	Kachi Emezi	Neil Titley	John Waterman
P02	S4	26/04/18	Kachi Emezi	Neil Titley	John Waterman
P03	S4	08/05/18	Natalie Williams	Neil Titley	John Waterman
P04	S3	16/10/2019	Shauna Rees	Helen Yesugey	John Waterman

Highways England
The Cube
199 Wharfside Street
Birmingham
B1 1RN

AECOM Infrastructure & Environment

© 2019 AECOM Infrastructure & Environment UK Limited. All Rights Reserved.

This document has been prepared by AECOM Infrastructure & Environment UK Limited ("AECOM") for sole use of our client Highways England (the "Client") in accordance with generally accepted consultancy principles, the budget for fees and the terms of reference agreed between AECOM and the Client. Any information provided by third parties and referred to herein has not been checked or verified by AECOM, unless otherwise expressly stated in the document. No third party may rely upon this document without the prior and express written agreement of AECOM.

Copyright

© This Report is the copyright of AECOM Infrastructure & Environment UK Limited. Any unauthorised reproduction or usage by any person other than the addressee is strictly prohibited.

SCHEDULE OF REVISIONS

Revisions Issued Since Publication

Report Revision Number	Revision Date	Paragraphs amended
P02	26/04/18	Paragraph 1.3.14 Paragraph 6.4.23 Paragraph 4.5.5 Paragraph 8.8.6 Table 8-1
P03	04/05/18	Paragraph 2.3.12 added Paragraph 4.5.11 Paragraph 6.10.2 Paragraph 6.10.4 Paragraph 7.6.9 Paragraph 7.9.13 - 7.9.15 Table 7.5 and Table 7.6 Paragraph 9.9.15 Paragraph 9.9.19 Table 9-10 Table 11-20 – numbers changed Paragraph 14.6.6 Paragraph 14.9.3 (split into 14.9.3 and 14.9.4) Table 16-1 and 16-2 New paragraphs 7.9.17, 6.10.20, 8.10.2 – 8.10.4, and 13.10.1
P04	16/10/2019	Full EAR has been updated to reflect updates in policy, legislation and baseline conditions. Project is now in PCF Stage 4. Summary of updates: Chapter 1 to 4 – minor updates Chapter 5 - Air quality – added reference to Clean Air Zones Framework; Coventry Air Quality Action Plan & associated dispersion modelling used to assess air quality at A4082 Allard Way; amended methodology to reference change in human exposure to local air quality and use of TAG Unit 3A; updated quantities of earth movement; updated results with affected road network and entire modelled road network. Chapter 6 – minor updates; updated local plan references; updated monitoring section. Chapter 7 – minor updates. Chapter 8 – updates throughout to reflect updates to planning policy; updated details of baseline based on updated surveys; updated text on desk study based on updated desk study search. Chapter 9 – minor updates to policy and baseline Chapter 10 – renamed to Material Assets and Waste; complete revision to chapter. Chapter 11 – updated policy; updated assessment based on Design Manual for Roads and Bridges Volume 11, Section 3, Part 7 HD 213/11 – Revision 1 (Ref 11-1) and the associated Interim Advice Note ("IAN") 185-15. Chapter 12 – updated policy, updated assessment of human health following London Healthy Urban

		Development Unit (HUDU) Rapid Health Impact Assessment Tool Third Edition. Chapter 13 – updated policy with environmental permitting and land drainage consent references; updated NPPF; added reference to Environment Plan; updated with new EA data on pollution incidents; updated references to flood zones and climate change; added sensitivity analysis for spillage risk. Chapter 14 – completed revised chapter following Highways England's Interim Advice Note (IAN) 114/08 – Highways Agency Carbon Calculation and Reporting Requirements Chapter 15 – minor updates Chapter 16 – minor updates to reflect changes in technical chapters.

Standard codes for suitability models and documents See BS1192:2007 Table 5 for further details					
Revision	Status	Description	Revision	Status	Description
P01.01 etc. to P0n.01 etc.	S0	Initial status or WIP	P01.1 etc. to Pn.1 etc.	D1	Costing
P01.01 to P0n.01	S1	Co-ordination	P01.1 etc. to Pn.1 etc.	D2	Tender
P01 to Pnn	S2	Information	P01.1 etc. to Pn.1 etc.	D3	Contractor Design
P01 to Pnn	S3	Review & Comment	P01.1 etc. to Pn.1 etc	D4	Manufacture/ Procurement
P01 to Pnn	S4	Stage Approval	C01 to C0n	A1, A2 etc	Approved and accepted as stage complete
P01 to Pnn	S5	Manufacture	P01.01 etc. to P0n.0n etc.	B1, B2 etc	Partially signed-off:
P01 to Pnn	S6	PIM Authorization	C01 to C0n	CR	As Construction Record
P01 to Pnn	S7	AIM Authorization			

Contents

1. INTRODUCTION 7
1.1. Purpose of the Report 7
1.2. Overview of the Project 7
1.3. Legislative and Policy Framework 8

2. THE PROJECT 11
2.1. Need for the Project 11
2.2. Project Objectives 12
2.3. Project Location 13
2.4. Project Description 14
2.5. Construction, Operation and Long Term Management 18

3. ASSESSMENT OF ALTERNATIVES 19
3.1. Assessment Methodology 19
3.2. Reasonable Alternatives Studied 19
3.3. Justification for Preferred Option 24

4. ENVIRONMENTAL ASSESSMENT METHODOLOGY 26
4.1. Guidance and Assessment Approach 26
4.2. Environmental Scoping 27
4.3. Surveys and Predictive Techniques and Methods 36
4.4. General Assessment Assumptions and Limitations 37
4.5. Significance Criteria 37

5. AIR QUALITY 40
5.1. Introduction 40
5.2. Legislative and Policy Framework 40
5.3. Study Area 43
5.4. Baseline Conditions 44
5.5. Potential Impacts 45
5.6. Assessment Methodology 46
5.7. Assessment Assumptions and Limitations 54
5.8. Design, Mitigation and Enhancement Measures 54
5.9. Assessment of Effects 56

6. CULTURAL HERITAGE 67
6.1. Introduction 67
6.2. Legislative and Policy Context 67
6.3. Study Area 69
6.4. Baseline Conditions 69
6.5. Potential Impacts 76
6.6. Assessment Methodology 78
6.7. Approach 78
6.8. Assessment Assumptions and Limitations 83
6.9. Design, Mitigation and Enhancement Measures 83
6.10. Assessment of Effects 84

7. LANDSCAPE 91
7.1. Introduction 91

7.2. Legislative and Policy Framework 91
7.3. Study Area 91
7.4. Baseline Conditions 92
7.5. Potential Impacts....97
7.6. Assessment Methodology....99
7.7. Assessment Assumptions and Limitations....100
7.8. Design, Mitigation and Enhancement Measures 101
7.9. Assessment of Effects....102

8. BIODIVERSITY....107
8.1. Introduction 107
8.2. Legislative and Policy Framework 107
8.3. Study Area 110
8.4. Baseline Conditions 110
8.5. Potential Impacts....138
8.6. Assessment Methodology....139
8.7. Assessment Assumptions and Limitations....139
8.8. Design, Mitigation and Enhancement Measures 140
8.9. Assessment of Effects....144
8.10. Summary of Residual Effects....154

9. GEOLOGY AND SOILS 162
9.1. Introduction 162
9.2. Legislative and Policy Framework 162
9.3. Study Area 165
9.4. Baseline Conditions 165
9.5. Potential Impacts....184
9.6. Assessment Methodology....184
9.7. Assessment Assumptions and Limitations....192
9.8. Design, Mitigation and Enhancement Measures 193
9.9. Assessment of Effects....197

10. MATERIALS, ASSETS AND WASTE....207
10.1. Introduction 207
10.2. Legislative and Policy Framework 207
10.3. Study Area 210
10.4. Baseline Conditions 210
10.5. Potential Impacts....212
10.6. Assessment Methodology....213
10.7. Design, Mitigation and Enhancement Measures 217
10.8. Assessment of Effects....219
10.9. Monitoring 225

11. NOISE AND VIBRATION 226
11.1. Introduction 226
11.2. Legislative and Policy Framework 226
11.3. Study Area 227
11.4. Baseline Conditions 228
11.5. Potential Impacts....231
11.6. Assessment Methodology....232

11.7. Assessment Assumptions and Limitations....241
11.8. Design, Mitigation and Enhancement Measures....242
11.9. Assessment of Effects....243
11.10. Monitoring....257

12. PEOPLE AND COMMUNITIES....258
12.1. Introduction....258
12.2. Legislative and Policy Framework....258
12.3. Study Area....262
12.4. Baseline Conditions....262
12.5. Potential Impacts....265
12.6. Assessment Methodology....267
12.7. Assessment Assumptions and Limitations....271
12.8. Design, Mitigation and Enhancement Measures....272
12.9. Assessment of Effects....272

13. ROAD DRAINAGE AND THE WATER ENVIRONMENT....278
13.1. Introduction....278
13.2. Planning and Legislative Context....278
13.3. Study Area....284
13.4. Baseline Conditions....284
13.5. Potential Impacts....297
13.6. Assessment Methodology....298
13.7. Design, Mitigation and Enhancement Measures....305
13.8. Assessment of Effects....309
13.9. Magnitude of Impacts and Significance of Effect....310
13.10. Monitoring....331

14. CLIMATE....332
14.1. Introduction....332
14.2. Legislative and Policy Framework....332
14.3. Study Area....334
14.4. Baseline Conditions....334
14.5. Potential Impacts....337
14.6. Assessment Methodology....339
14.7. Assessment Assumptions and Limitations....345
14.8. Design, Mitigation and Enhancement Measures....347
14.9. Assessment of Effects....349
14.10. Monitoring....359

15. ASSESSMENT OF CUMULATIVE EFFECTS....360
15.1. Introduction....360
15.2. Cumulative Assessment Methodology....360
15.3. Type 1 effects (inter-relationship effects):....363
15.4. Type 2 effects (combined effects)....366
15.5. Summary....368

16. SUMMARY....369

17. REFERENCES AND GLOSSARY....392

GLOSSARY....406

18. FIGURES AND APPENDICES 411
18.1 FIGURES 411
18.2 APPENDICES 412

1. INTRODUCTION

1.1. Purpose of the Report

1.1.1. This environmental assessment report has been prepared for the A46 Coventry Junctions Upgrade Binley (hereafter referred to as the Proposed Scheme) and provides an assessment of the potential impacts of the Proposed Scheme on the environment, people, and communities.

1.1.2. This report outlines the approach and methodology undertaken during the assessment process, the existing conditions and characteristics of the local environment and surrounds, and the predicted impacts associated with the Proposed Scheme. Where environmental effects have the potential to be significant, these have been identified and described to characterise and understand the significance. Mitigation measures have been proposed to minimise or remove the impact of the Proposed Scheme, where relevant.

1.1.3. The main purpose of this environmental assessment report is to:

- Comply with the European Union (EU) Directive 2011/92/EU on environmental impact assessment (EIA), as amended by 2014/52/EU (Ref. 1-1) (hereafter referred to as the *EIA Directive*), which details the requirements for conducting environmental impact assessments (see section 1.3)
- Identify key environmental issues associated with the Proposed Scheme
- Describe the methodology that is employed within this environmental assessment
- Inform key stakeholders of the latest proposals including the evolution of the Proposed Scheme design
- Present the results from the environmental assessment process and explain the significance of any effects identified
- Provide details of design measures and additional mitigation measures to minimise the impact of negative effects
- Document the findings from an assessment of the potential for any cumulative effects
- Present the scope of the stakeholder consultation performed to date and the requirements for any further consultation.

1.2. Overview of the Project

1.2.1. The A46 is a non-continuous route which begins in the east of Bath and ends in Cleethorpes. It connects a number of major employment sites to the wider motorway network and forms a key element of the north to south *travel to work* area.

1.2.2. The A46 corridor also provides an alternative route for journeys between the East Midlands and the South West, avoiding the Birmingham Box, forming part of the national Strategic Road Network (SRN), linking the M6 and M69 with the M40 and the M5. The efficient and reliable performance of this corridor is therefore critical to Coventry city and the Warwickshire area.

1.2.3. The Proposed Scheme is located north of Tollbar junction and south of Walsgrave junction, running along the eastern boundary of the city of Coventry. The Proposed Scheme is situated within both Coventry City Council and Rugby Borough Council local planning administrative areas. Rugby Borough Council is situated within Warwickshire County.

1.2.4. The Proposed Scheme involves the grade separation of Binley junction by raising the A46 over the A428 Rugby Road, with entry and exit slip roads to an at-grade gyratory junction. The speed limit on the A46 mainline through the junction will be maintained at the national speed limit.

1.2.5. The site location plan and Proposed Scheme boundary are illustrated in Chapter 18: Figure 1-1.

1.3. Legislative and Policy Framework

EIA Directive

1.3.1. The Highways Act 1980 (as amended 2019) (Ref. 1-2) transposes the EU Directive 2014/52/EU (amending Directive 2011/92/EU) into UK national legislation. The transposition is achieved through *The Environmental Impact Assessment (Miscellaneous Amendments Relating to Harbours, Highways and Transport) Regulations 2017* (the EIA Regulations). The EIA process seeks to ensure that proposals for projects which are likely to have a significant effect on the environment by virtue of their characteristics (e.g. nature, size), their location or type and characteristics of potential impact are subject to a requirement for consent and an assessment of those effects before the project is permitted to go ahead. The Proposed Scheme falls under and is being consented through the Highways Act 1980.

1.3.2. All project types listed under Annex I of the Highways Act 1980 (as amended 2019) must be subject to EIA in every case. Project types listed under Annex II may need to be subject to statutory EIA depending on whether the proposal qualifies as a *relevant project* (by meeting certain criteria and thresholds defined in Annex II) and gives rise to likely significant environmental effects. The potential to generate likely significant environmental effects are described within Annex III of the Act.

1.3.3. Within the Highways Act, an Annex I project is defined as:

- The construction of motorways and express roads, or
- Construction of a new road of four or more lanes, or realignment and/or widening of an existing road of two lanes or less so as to provide four or more lanes, where such new road, or realigned and/or widened section of road, would be 10 kilometres or more in a continuous length

1.3.4. The Proposed Scheme does not meet the criteria given in Annex I; therefore, consideration has been given to determine categorisation as an Annex II project. An Annex II project is defined as:

- Constructing or improving a highway where the area of the completed works together with any area occupied during the period of construction or improvement by requisite apparatus, equipment, machinery, material, plant, spoil heaps or other such facilities exceeds one hectare or where any such area is situated in whole or in part in a sensitive area and are not included in Annex I

1.3.5. The Proposed Scheme is therefore categorised as a *relevant project* under Annex II. This requires environmental screening to be completed against the criteria set out in Annex III of the Directive. All relevant Annex II projects are required to undertake a process of determination to establish whether EIA is required. The determination process assesses whether the project is *likely to have a significant effect on the environment*, based on the selection criteria listed in Annex III of the Directive.

National Planning Policy Framework (NPPF)

1.3.6. The NPPF (Ref. 1-3) sets out the Government's planning policies for England and how these are expected to be applied. It provides a framework within which planning authorities and local people can produce their own distinctive local and neighbourhood plans, which reflect the needs and priorities of their communities.

Road Investment Strategy (RIS)

1.3.7. The Proposed Scheme was announced in the Department for Transport's (DfT) *Road Investment Strategy* (RIS). The RIS outlines a long-term programme for motorways and major roads which comprises:

- A long-term vision for England's motorways and major roads, outlining how Highways England will create smooth, smart and sustainable roads
- A multi-year investment plan that will be used to improve the network and create better roads for users
- High-level objectives for the first roads period 2015 to 2020

Highways England License

1.3.8. As well as the Proposed Scheme being regulated by EIA guidelines, the scheme also follows guidelines and practices as set by Highways England.

1.3.9. In April 2015 the Secretary of State appointed Highways England as a strategic highways company by way of an Order in accordance with section 1 of the Infrastructure Act 2015 with responsibility for the operation, maintenance, and improvement of the motorways and trunk roads in England. *The Highways England: Licence* (Ref. 1-4) was issued providing statutory directions and guidance.

1.3.10. The Highways England Licence includes the requirement for Highways England to *"minimise the environmental impacts of operating, maintaining and improving its network, and seek to protect and enhance the quality of the surrounding environment."*

1.3.11. Under the Environment Section of the License (5.23) Highways England should:

- Ensure that protecting and enhancing the environment is embedded into its business decision-making processes and is considered at all levels of operations
- Ensure the best practicable environmental outcomes across its activities, while working in the context of sustainable development and delivering value for money
- Consider the cumulative environmental impact of its activities across its network and identify holistic approaches to mitigate such impacts and improve environmental performance
- Where appropriate, work with others to develop solutions that can provide increased environmental benefits over those that the licence holder can achieve alone, where this delivers value for money
- Calculate and consider the carbon impact of road projects and factor carbon into design decisions, and seek to minimise carbon emissions and other greenhouse gases from its operations
- Adapt its network to operate in a changing climate, including assessing, managing and mitigating the potential risks posed by climate change to the operation, maintenance and improvement of the network

- Develop approaches to the construction, maintenance, and operation of the licence holder's network that are consistent with the government's plans for a low carbon future
- Take opportunities to influence road users to reduce the greenhouse gas emissions from their journey choices

Highways England Sustainable Development Strategy

1.3.12. This strategy outlines Highways England's approach and priorities for sustainable development to its key stakeholders. The strategy is designed to ensure that Highways England adheres to the principles of sustainable development in all its undertakings. In the Highways England licence to operate, sustainable development is defined as "encouraging economic growth while protecting the environment and improving safety and quality of life for current and future generations". The licence also requires Highways England to put sustainable development into practise in particular with regard to five factors; Financial, Human, Natural, Social and Manufactured which align with the five capitals of sustainability.

Highways England Environment Strategy

1.3.13. This strategy communicates Highways England's approach to improving the environment by working together with partners to help protect and improve the environment and to develop and implement solutions to environmental challenges. Through the operation, maintenance and improvement of its roads, Highways England's aspiration is: 'a strategic road network working more harmoniously with its surroundings to deliver an improved environment'.

Highways England Biodiversity Plan

1.3.14. The biodiversity plan outlines Highways England's approach to meeting the key performance indicator identified within the Roads Investment Strategy of "reduced no net loss of biodiversity by 2020". Highways England's road network includes a substantial area of land stretching to all parts of England and therefore Highways England is committed to ensuring that biodiversity is fully considered during the building of any new roads and opportunities will be sought to work with stakeholders and enhance the network for wildlife.

1.3.15. Highways England is also committed to managing its existing landholding in a more wildlife friendly manner, creating more pollinator friendly grasslands, and will seek opportunities to reduce existing barriers for wildlife, by creating underpasses and overbridges that will allow wildlife to move more freely around the road network.

Highways England Air Quality Strategy

1.3.16. This strategy outlines Highways England's approach to minimising harm and improving the environment including air quality. The strategy sets out how Highways England intends to help achieve the government's RIS commitments on improving air quality through to 2021 using a designated £100 million fund and working with partners to deliver a cleaner network and improve the health of its neighbours and customers.

2. THE PROJECT

2.1. Need for the Project

2.1.1. The proposed upgrade of the A46 Binley junction is one of a number of schemes set out under the Department for Transport Road Investment Strategy being developed by Highways England during 2015 to 2020, as announced in the 2014 Autumn Statement.

2.1.2. The Highways England *South Midlands Route Strategy Evidence Report* (Ref. 2-1) indicated that the Coventry section of the A46 suffers from congestion and poor journey time reliability issues. These are likely to be exacerbated by future housing growth and economic aspirations.

2.1.3. The A46 south of Coventry between A452 and A45 is the busiest section of the route. It operates at an average peak hourly speed for traffic of between 41 miles per hour (mph) and 50mph, dropping to between 21mph and 30mph on approaches to the A45 junction. It is listed in the worst 10% of roads for vehicle-hour delays nationally.

2.1.4. The A46 south of Coventry also experiences some safety performance issues and is in the worst 45% of strategic roads for total casualties and in the top 250 collision locations in England. The Binley junction also carries a significant volume of freight traffic and has a number of collision clusters.

2.1.5. Vulnerable road users such as pedestrians can access and cross this stretch of the A46 at any point unrestricted and unsafely. Stakeholders have raised concerns regarding the need for better crossing points on the A46 in Coventry to protect the safety of cyclists and pedestrians.

2.1.6. The Binley junction is one of only two roundabouts east of Coventry that is an at grade junction. It therefore has a lower capacity that leads to congestion, and is considered by Highways England and Coventry City Council to be a barrier to economic growth in the region.

2.1.7. Economic growth aspirations in the surrounding environment include:

- Approximately 24,000 houses that are proposed in the Coventry area and up to 75,000 new homes and 94,500 jobs in Coventry and Warwickshire combined by 2031. There is a large area of allocated development land adjacent to the west of the A46 from the existing Walsgrave roundabout to where the A46 crosses the River Sowe. This is referred to as Housing Allocation H2:3 on Coventry City Council Policies Map (Ref. 2-2) and is expected to deliver approximately 900 dwellings through future development proposals in the period to 2031;
- Prologis Ryton Sites A and B;
- Coventry University Technology Park;
- Friargate, a 30 hectare mixed use regeneration project in Coventry city centre;
- Ansty Park, a partially built high profile prestige business park site for Coventry and Warwickshire; and
- Whitley South, an extension of Jaguar Land Rover's existing site west of the A46 Tollbar junction and approximately 0.7 miles (1.1km) south of the Proposed Scheme.

2.1.8. Improvements at A45/A46 Tollbar (Tollbar End junction) to grade separate the A46 (N) to A45 (W) link are complete. Construction works to convert part of the M6 between junctions 2 and 4 into a smart motorway commenced in Spring 2018 and are due to be completed in March 2020. Both of these improvements will have a significant traffic impact, which will affect the A46 and further increase pressure on these junctions.

2.1.9. There are also concerns that without further investment to increase capacity on the A46, the benefits derived from the improvement works at Tollbar End junction would be limited. In particular the Binley junction around Coventry could undermine the existing investment being made on A46 improvements.

2.1.10. According to the Highways England Strategic Business Plan: 2015-2020 (Ref. 2-3), the Proposed Scheme is forecast to generate time savings of around 350,000 person hours in the opening year for all users. The value of the time saving is expected to be £178 million (over a 60-year appraisal period).

2.2. Project Objectives

2.2.1. Highways England (the "licence holder") is a strategic highways company in accordance with Section 1 of the Infrastructure Act 2015 (Ref. 2-4), with responsibilities as the highway authority, traffic authority, and street authority for the strategic road network.

2.2.2. Under Part 4.2g of The Highways England Licence (Ref. 2-5) and in accordance with the Infrastructure Act 2015 Highways England must *"minimise the environmental impacts of operating, maintaining and improving its network and seek to protect and enhance the quality of the surrounding environment."* Highways England is required to deliver the following conditions set out in Part 5.23 of its licence for the Proposed Scheme:

- *"Ensure that protecting and enhancing the environment is embedded into its business decision-making processes and is considered at all levels of operations;*
- *Ensure the best practicable environmental outcomes across its activities, while working in the context of sustainable development and delivering value for money;*
- *Consider the cumulative environmental impact of its activities across its network and identify holistic approaches to mitigate such impacts and improve environmental performance;*
- *Where appropriate, work with others to develop solutions that can provide increased environmental benefits over those that the Licence holder can achieve alone, where this delivers value for money;*
- *Calculate and consider the carbon impact of road projects and factor carbon into design decisions, and seek to minimise carbon emissions and other greenhouse gases from its operations;*
- *Adapt its network to operate in a changing climate, including assessing, managing and mitigating the potential risks posed by climate change to the operation, maintenance and improvement of the network;*
- *Develop approaches to the construction, maintenance and operation of the Licence holder's network that are consistent with the government's plans for a low carbon future;*
- *Take opportunities to influence road users to reduce the greenhouse gas emissions from their journey choices."*

2.2.3. In order to resolve the issues identified above the following project objectives have been identified:

- Support and facilitate economic growth, supporting employment and residential development opportunities
- Make the network safe; the target is to reduce the number of incidents at Binley
- Improve the operation and efficiency of the existing transport network

- Deliver capacity enhancements to the strategic road network and improved operation and efficiency of the existing transport network
- Support the use of sustainable modes of transport and reduce and minimise the negative impacts of the Proposed Scheme on users, local communities, and the environment
- Improve connectivity and community cohesion to balance the needs of individuals and businesses that use and rely on the strategic road network
- Ensure the road network is maintained to a safe and serviceable condition
- Consider operational maintenance on a holistic basis during the design stage and balance of cost versus disruption

2.2.4. The Proposed Scheme aligns with the key performance indicators listed in Highways England's *Strategic Business Plan: 2015-2020*.

2.2.5. The Highways England Delivery Plan 2015-2020 (Ref. 2-6) builds on the strategic business plan and provides a commitment to *ensure "…that all activity on the SRN [Strategic Road Network] is delivered in a manner that does not harm the environment; but instead delivers long term benefits to the natural and built environment, creating a sustainable future for all".*

2.3. Project Location

2.3.1. The A46 is a strategic link between the East and West Midlands, and beyond, linking the M1 junction 21 and M40 junction 15, connecting Coventry and Warwickshire to the motorway system and providing connections to the strategic road network and the rest of the country.

2.3.2. The A46 is included in the Highways England South Midlands Route Strategy (Ref. 2-7), which covers 440 carriageway miles (both directions). The South Midlands Route provides access to a number of significant traffic generators, including the National Exhibition Centre, Birmingham and the Donnington Park Motor Racing Circuit. Coventry and East Midlands airports are within the South Midlands Route and the A46 links these major international hubs with the M1 and M6. The A46 corridor also links the M1 with the M40, thus providing an alternative route to the M42 for longer distance north-east to south-west travel.

2.3.3. The A46 route section is 5.1 miles in length and consists of a dual carriageway with two at-grade junctions located between A45/A46 Tollbar End Junction to the south and M6 junction 2 to the north. The two junctions connect the A46 to the A428 at Binley roundabout (known locally as TGI junction because of the presence of TGI Friday's restaurant) and the B4082 at Walsgrave roundabout 0.62 miles (1km) north. The Binley junction is signalised.

2.3.4. The Proposed Scheme is situated within both the Coventry City Council and Rugby Borough Council administrative areas, with Coventry City located west of the A46 and Rugby Borough located to the east of the A46.

2.3.5. Chapter 18: Figure 2-1 shows the project location and application site boundary. The site of the Proposed Scheme (the *site*) comprises an area of 18.63 hectares (ha). The land topography in this area is relatively flat and ranges from 83.19m to 89.75m above ordnance datum (AOD).

2.3.6. The Proposed Scheme is located south-east of Coventry city centre, on the outer edge of the Coventry urban conurbation, east of Binley and west of Binley Woods. The Proposed Scheme includes Binley junction, a small section of the A428 east and west

of the junction, and approximately 500m of the A46 to the north and south of the junction. The Proposed Scheme also includes two rectangular shaped areas east of the A46 to accommodate the construction site compounds and laydown areas, which will be located either in the agricultural field adjacent to Greens Home & Garden Centre or within Ivor Preece playing fields, which are used by Broadstreet Rugby Club.

2.3.7. Land to the east of the A46 is used primarily as arable farmland (mapped under the Agricultural Land Classification system as Class 2 and 3) and there are three farms within 0.62 miles (1km) of the Proposed Scheme. Piles Coppice, a local wildlife site and area of ancient woodland, lies immediately adjacent to the eastern boundary of the Proposed Scheme. Binley Common Farm Wood is also classed as a potential local wildlife site and area of ancient woodland that also abuts the boundary of the Proposed Scheme to the east.

2.3.8. Immediately south-east of Binley junction is Greens Home & Garden Centre and beyond that Binley Common Farm Wood. The small settlement of Binley Woods is east of Binley Common Farm Wood and adjacent to the A428.

2.3.9. North-east of Binley junction is the Ivor Preece playing fields, used by Broadstreet Rugby Club, separated from the existing roundabout by a thin strip of woodland approximately 10-15m wide.

2.3.10. Immediately to the south-west of Binley junction is a Grade II listed building, the Cocked Hat Restaurant and Hotel. Beyond this (to the west and south) land is occupied by Binley Industrial Estate and generally used for industrial and commercial purposes. Further to the west is the residential area of Binley.

2.3.11. North-west of the Binley junction is a TGI Friday's restaurant and a Premier Inn, beyond which is Morrisons and Warwickshire Shopping Park. North of the shopping park is a residential estate, which is separated from the A46 (which is to the east) by a thin strip of woodland and grassland.

2.3.12. There are no European designated nature conservation sites (Special Protection Areas, Special Areas of Conservation, or Wetlands of International Importance (Ramsar sites)) within 1.24 miles (2km) of the Proposed Scheme and no European designated nature conservation sites with bats as a primary qualifying interest feature within 18.64 miles (30km). There are four Sites of Special Scientific Interest and three Local Nature Reserves within 1.24 miles (2km) of the Proposed Scheme. The environmental constraints surrounding the Proposed Scheme are detailed in Chapter 18: Figure 2-1.

2.3.13. A number of approved planning permissions exist within the 0.62 miles (1km) study area of the Proposed Scheme and these are detailed further within Chapter 15: Assessment of Cumulative effects.

2.4. Project Description

Description of the Development

2.4.1. The Proposed Scheme is illustrated in Chapter 18: Figure 2-2 to 2-4.4.

2.4.2. The Proposed Scheme comprises an upgrade to the A46 Binley junction. Specifically, it entails grade separation of the existing junction by raising the A46 dual carriageway over the A428 Rugby Road and providing entry and exit slip roads to an at grade gyratory junction. The elevated section of the A46 will utilise a combination of retaining walls and bridge structures and be formed of five spans. The slip roads will be constructed on embankments and retaining walls will be used where close to a property boundary. Local traffic using the A428 will continue to use the existing signalised roundabout with access to and from the A46. Customers remaining on the A46 will not need to slow down for a roundabout as they do now, and as such the national speed limit will be provided along this section of the A46.

2.4.3. The length of the Proposed Scheme is 0.96 mile (CH11+750m to CH13+300m), or 1.55km. The maximum elevation of the Proposed Scheme occurs at CH12+450, where the elevation will be approximately 93m above ordnance datum, which is approximately 7.17m above the existing elevation of 85.7m above ordnance datum.

2.4.4. The existing roundabout consists of a 15m wide circulatory carriageway and an internal island with a diameter of 50m (including mixed deciduous shrubs and small trees) which would accommodate the proposed bridge piers for the elevated section of the Proposed Scheme. The bridge spans range from 25 to 30m in length. The bridge piers will be a maximum of 6.5m in height above ground, with their supporting piles a maximum of 15m below ground. The four A46 slip roads would tie into the existing circulatory carriageway. The east to west A428 Rugby Road arms would not be significantly affected by the Proposed Scheme. Chapter 18: Figure 2-2 a-c details the profile of the Proposed Scheme.

2.4.5. Non-Motorised Users will continue to have access with two proposed toucan road crossings within the junction. These will be located along the southbound on-slip and the northbound off-slip. In addition, and to join these crossing points, there is a proposed cycle path and pavement for Non-Motorised Users that will go underneath the newly elevated A46 and connect the A428 to the east and west of the junction. It is proposed that the existing east-west footway to the south of the junction will be retained by widening the footway along the A428 to Oakdale Road. This includes a slight modification to the existing toucan crossing as to conform with the modifications to the junction configuration. The footway will be widened but will retain, as close as possible, its existing alignment. The eastern portion of the Proposed Scheme, which extends along Rugby Road, will include footway widening so as to improve access for non-motorised users.

2.4.6. Other key physical design aspects of the Proposed Scheme include:

- Re-surfacing of the existing circulatory carriageway with line markings consistent with the Proposed Scheme and existing A428 roads
- The Proposed Scheme will be lit, including the existing roundabout. New lighting will be provided along the verges of the slip roads, central reserve of the main-line and circulatory central island
- Comprehensive Closed Circuit Television (CCTV) coverage, with pan, tilt, and zoom cameras will be provided
- Vehicle detection systems will be provided as required to implement expressway standards and may include incident detection, queue protection, Variable Mandatory Speed Limits, and congestion management. If so, this would be provided using verge mounted carriageway signalling displayed on Variable Message Signs or lane specific signalling

- New road signs will be provided including modification of the existing advance direction signs to suit the new junction arrangement
- The existing drainage infrastructure will be maintained as much as possible. Sustainable Urban Drainage will be employed with attenuation ponds, to limit surface water runoff to greenfield rates at existing outfalls
- Vehicle Restraint System will be retained where possible although lengths will be replaced and additional lengths provided for new infrastructure where required

2.4.7. Earthworks will be required at some of the infrastructure locations and will generally require steepening of slopes with cut and fill to be a gradient of one vertical unit for every two horizontal units (1V:2H); where this is not possible, retaining solutions will be required including reinforced earth retaining walls.

2.4.8. The total area of land take for the Proposed Scheme is 116,470m^2, and the total proposed soft estate and the proposed total woodland area are estimated at 19,024m^2 and 17,589m^2 respectively.

Embedded Mitigation

2.4.9. All construction environmental mitigation measures will be detailed in the Environmental Management Plan.

2.4.10. A noise barrier will be built into the design of the Proposed Scheme. The barrier will be 2.5m in height and approximately 300m in length and run along the north-western boundary of the Proposed Scheme The location of the noise barrier is detailed in Chapter 18: Figure 11-1.

2.4.11. Measures to further minimise the likely operational noise impacts from the proposed viaduct passing over the junction, are to be considered as part of the detailed design.

2.4.12. A low noise Thin Surface Course Systems will be used for all areas of carriageway. This coating reduces surface-vehicle noise and provides acoustic mitigation.

2.4.13. The Proposed Scheme design includes an appropriate landscape design which incorporates tree and shrub planting. A preliminary landscape mitigation plan has been developed, as presented in Chapter 18: Figure 7-4, and will be updated during detailed design.

2.4.14. Outline landscape designs have been developed to incorporate ecological mitigation measures.

2.4.15. Balancing ponds are to be used to control any increase in the rate of flow towards the impacted watercourses resulting from increased impermeable road areas. Without these balancing ponds increased flows may result in bank erosion, increased sediment loading and greater flooding potential to the impacted watercourses.

Land Use Requirements

2.4.16. As a part of the Proposed Scheme, land acquisition will be required both temporarily during the construction phase and permanently to accommodate the Proposed Scheme.

2.4.17. In terms of temporary land acquisition, there are currently two potential options for the site compound and laydown areas. These will be located either in the agricultural field adjacent to The Greens Home and Garden Centre (Option 1) or within Ivor Preece playing fields (Option 2) which is a part of Broadstreet Rugby Club. Only one of these locations will be used for the construction compound and laydown area, but to provide for all eventualities at this stage both possibilities have been assessed in this report.

2.4.18. For the purpose of this assessment, an assumption has been made that all vegetation within the site boundary, except that shown as retained on the landscape mitigation plan, will be removed for construction. This is likely to be an overestimate and attempts will be made during detailed design after receipt of the licence to keep the back line of vegetation where possible in sensitive locations. The construction compounds are temporary; the land used will be reinstated and returned back to the land owner when construction is completed. For more information regarding the areas of land loss and reinstatement, please refer to Chapter 8: Biodiversity. Temporary and permanent land take is demonstrated in Chapter 18: Figure 2-3.

2.4.19. In terms of permanent land take for the Proposed Scheme, land will be required in order to construct the raised carriageway. Small trees and shrubs and general clearance will be required in these locations. In the signage locations, small trees and shrubs will be removed in front of proposed signs for the visibility splays. Chapter 18: Figure 2-3 illustrates the land which will be acquired as a part of the Proposed Scheme.

2.4.20. In addition, two permanent drainage ponds will be constructed as a part of the Proposed Scheme. One will be located in the agricultural field adjacent to Greens Home & Garden Centre, and the other at the rugby club. The pond located adjacent to Greens Home & Garden Centre will have a land take area of approximately 2,600m^2 (excluding maintenance requirements) with a surface water attenuation volume of 1,000m^3. The pond located at the rugby club will have a land take area of approximately 2,700m^2 (excluding surrounding ditches and maintenance requirements) with a surface water attenuation volume of 1,600m^3. These are illustrated in Chapter 18: Figure 2-4 a-b of this report.

Temporary Works

2.4.21. The construction works will require a temporary construction compound, storage area, laydown area, and access.

2.4.22. These will be located on either agricultural land adjacent to The Greens Home and Garden Centre (Option 1), which is approximately 3.4ha in size and is situated approximately 200m from the Proposed Scheme, or Ivor Preece playing fields (Option 2) which is a similar size and is located approximately 400m from the Proposed Scheme. A portion of the Option 2 construction compound is located within Environment Agency Flood Zone 2 (land having between a 1% and 0.1% annual probability of river flooding) and Flood Zone 3 (land having a 1% or greater annual probability of river flooding).

2.4.23. Access to both Option 1 and Option 2 will be via the A428 Rugby Road via private access. A total of 216 car parking spaces will be provided within the site compound for workers. This land take will be temporary, and after completion of the scheme, the site compound will be removed and reinstated.

2.4.24. For Option 1, access will be via the north of the compound with site offices situated in the north, car parking in the centre of the site, and laydown and yard areas to the south. For Option 2, access will be via the centre of the compound with laydown and yard areas to the north, car parking in the centre of the site and site offices to the south.

2.4.25. For the compounds, top soil will be stripped to a maximum depth of 250mm where compact crushed granular material will be laid with a bituminous surfacing for the access road and car parking. As required, additional soft material will be removed to a maximum depth of 500mm in order to lay foundations and slabs for temporary offices. Drainage for the compound will be installed at a maximum depth of 600mm.

2.4.26. Two on-site welfare and storage areas will also be provided. One will be located to the east of Binley junction to the south of the A428 Rugby Road. The second will be located

to the west of Binley junction again to the south of the A428. Both construction sites are within the boundary of the Proposed Scheme. Both of these welfare and storage areas will be removed following completion and reinstated.

2.5. Construction, Operation and Long-Term Management

Construction Programme and Phasing

2.5.1. The construction phase will take approximately 24 months and is planned to begin in March 2020.

Working Hours

2.5.2. Construction working hours will be as follows:

- 07:00 – 19:00 Mondays to Fridays
- 07:00 – 13:00 Saturdays
- No work on Sundays, Bank and Public Holidays unless specifically approved.

2.5.3. The Proposed Scheme will require some night time working, however, this will be kept to a minimum and permission sought in advance from Coventry City Council, initially as an informal agreement prior to seeking permission under Section 61 of the Control of Pollution Act (Ref. 2-8) where necessary. Where night time work is required, disturbance will be minimised through directional lighting.

3. ASSESSMENT OF ALTERNATIVES

3.1. Assessment Methodology

3.1.1. Several options and alternatives were considered for the Proposed Scheme before the design presented in Chapter 2 was finalised. *Design Manual for Roads and Bridges (DMRB) Volume 11, Section 2, Part 5* (Ref. 3-1) states that these alternatives and options should be discussed in the environmental assessment report.

3.1.2. In line with DMRB guidance the following types of alternatives were considered:

- Demand alternatives - This includes management techniques such as encouraging road users to use different routes or travelling at different times
- Activity alternatives - For example this may include provision of traffic calming instead of a new road
- Location alternatives - The selection of different corridors or access routes for upgrade works

3.1.3. The assessment of alternative project designs has been underway since the project inception. Alternatives to the Proposed Scheme that have been considered include:

- Alternative layout options within the site
- Alternative technologies, such as maintaining the Proposed Scheme at ground level

3.1.4. A *do nothing* alternative was also considered; however, Highways England established that if nothing is done:

- Delays along this section of the A46 would be exacerbated and safety issues will increase
- Future development may slow down or stop as the existing infrastructure will not be able to cope with the increased demand
- People may divert to other routes which may possibly lead to problems on other sections of the network

3.1.5. The *do nothing* alternative was therefore discounted because it doesn't achieve the project objectives and has not been considered further in this report.

3.2. Reasonable Alternatives Studied

3.2.1. *The Route Strategic Options Report – A46 Coventry to M6 J2 Study* dated July 2014 (Ref. 3-2) identified the following four potential options that could address the challenges and provide improvements:

- Option 1: Improvements to the Binley junction by grade separation
- Option 2: Improvements to Walsgrave junction through relocation and grade separation
- Option 3: Improvements to the M6 junction 2 and connections between Coventry and M6/M69
- Option 4: Improvements to both Binley and Walsgrave junctions

3.2.2. From mid-March to June 2016, during the pre-project strategy, shaping and prioritisation phase, the Applicant selected Option 4 for further assessment. This was later discounted in favour of upgrading only Binley junction, but not before Option 4 was further refined with a number of layout options as shown in Table 3-1 below.

Table 3-1: A46 Junction Options Considered mid-March to June 2016

Option	Description	Environmental / Other Considerations
A46 Binley Junction		
1	Grade separation raising the A46 over the A428 Rugby Road (a two bridge roundabout layout) and provision of entry and exit slips roads to an at grade gyratory junction. The elevated section of the A46 would have been retained through a combination of retaining walls and embankments.	Original design
2	Diamond arrangement - A46 maintained at grade with the A428 elevated over the A46 via a single bridge. The north and south bound off slips would have been formed on ramps through a combination of retaining walls and embankments as appropriate to mitigate land take.	The indicated layouts would have had significant impacts on existing adjacent development in order to achieve a stagger between the junctions on the A428. The vertical profile required to elevate the A428 over the A46 could have led to poor visibility on approach to the signalised junctions without commencing the approach ramps some distance back along the A428. This may have had greater transport impacts on the nearby existing junctions. The requirement to accommodate pedestrian movements within the signal phasing may have impacted on the traffic capacity of the junction.
3	Diamond arrangement - A428 maintained at grade with the A46 elevated over the A428 via a single bridge. This option would require a combination of retaining walls and/or embankments to retain the elevated section. The north and south bound on and off slips would be formed at grade.	As with Option 2, the indicated layouts for the on-slips would have had significant impact on existing adjacent development in order to achieve a stagger between the junctions on the A428 and the requirement to accommodate pedestrian movements within the signal phasing may have impacted on the traffic capacity of the junction.
4A	At grade signal controlled *hamburger* roundabouts - 2 lanes in each direction on the A46 through the junction.	This proposed arrangement was at grade but did not provide the aspiration for grade separation and would not have been appropriate for future development of the A46 corridor as an expressway.
4B	As Option 4A, but with three lanes in each direction on the A46 through the junction.	This proposed arrangement was at grade but did not provide the aspiration for grade separation and would not have been appropriate for future development of the A46 corridor as an expressway.

A46 Walsgrave Junction		
1	Replacement of the existing Walsgrave junction with a right hand bend (viewed travelling north) and a fully grade separated junction (two bridge roundabout layout over the existing A46) located approximately 0.62 miles (1km) to the north of Binley junction.	The replacement of the existing roundabout required halting the B4082 and would result in transport impacts from the re-assignment of traffic on the local road network. The radius of the right hand bend would have been 255m and would require a reduction in speed limit to 50mph. It was not possible to accommodate a larger radius without encroaching into the area of the Combe Pool Site of Special Scientific Interest[1](SSSI), and the adjacent vegetated embankment. Realignment would have moved the road closer to Hungerley Hall.
2	Replacement of existing Walsgrave roundabout with right hand bend and provide remote Left In Left Out Slips north bound only, 0.62 miles (1km) to the north of Binley junction. The stopping up of the B4082 would remove the possibility to leave or join the A46 from the local road network at this location.	The halting of the B4082 would have removed the possibility of being able to leave or join the A46 from the local road network at this location. This, combined with the reduced provision for access onto the A46 with the Left In Left Out Slips, would have transport impacts on the local road network.
3	As with Option 2 but with Left In Left Out Slips located at the existing Walsgrave junction. This proposed option would have provided a link to the existing B4082.	This proposed option would have provided a link to the existing B4082 and therefore would have reduced the re-assignment of traffic elsewhere on the local road network.
4A	A46 At-grade with Elevated Slip Roads and Offline All Movements Roundabout Junction located to the west	The southbound off and southbound on slip roads, which are elevated on bridges to pass over the at-grade A46, would have encroached and impacted upon the Combe Pool Site of Special Scientific Interest. Additionally, the elevated carriageways would have resulted in a visual impact on the grade II listed Hungerley Hall farmhouse and associated farm buildings. The northbound on slip would also have moved the carriageway and vehicles closer to Hungerley Hall. The roundabout and slip roads would be located beneath overhead high voltage power lines with the northbound off slip crossing a watercourse and associated flood plain.

[1] In accordance with the Natural England citation, the SSSI is referenced as Combe Pool. It is to be noted that it is also referenced locally by an alternative spelling as Coombe Pool.

4B	A46 At-grade with Elevated Slip Roads and Offline All Movements Roundabout Junction located to the west	The proposed option provides similar environmental considerations as Option 4A.
5	Realigned A46 At-grade with Elevated Slip Roads and Offline All Movements Roundabout Junction	This option would be required to fit between the two constraints of Hungerley Hall farm and a National grid pylon. As a consequence, the access to Hungerley Hall farm would become completely severed with the only feasible access coming via the redundant A46 / proposed roundabout and passing under the re-aligned A46. Further environmental constraints included its proximity to the River Sowe, the associated flood plain and pylons. This option was considered infeasible due to the significant environmental constraints.

Source: Highways England: A46 Coventry Junctions Environmental Study Report (Stage 1 Options Identification) HE551486-MOU-00-XX-PC-EN-0002, May 2016

3.2.3. The above options were evaluated against a number of metrics (safety, traffic throughput, impact on local network, environment, geotechnical issues, economic growth, cost and stakeholder impact) to produce the following three revised options:

- Option A: Grade separation of Binley junction only. Do nothing at Walsgrave
- Option B: As with option A above, plus minor modifications to the existing roundabout at Walsgrave junction
- Option C: As with option A above, plus relocation and grade separation of Walsgrave junction.

3.2.4. Consultation was held with the Highways England's Divisional Director and the alternative four options shown in Table 3-2 were identified and assessed.

Table 3-2: A46 Junction Options Considered June to October 2016

Option	Description
1	Two grade separated junctions at Binley and Walsgrave with a 70mph speed limit
2	One grade separated junction at Binley with a 70mph speed limit
3	One grade separated junction at Binley with a 50mph speed limit.
4	Two grade separated junctions at Binley and Walsgrave with a 50mph speed limit

Source: West Midlands Autumn Statement 2014, Business Case (SGAR3) HE551486-ACM-GEN-A46_SW_ZZ-RP-ZM—0001, August 2017

3.2.5. In October 2016 an options workshop was held and it was decided that Option 3 (one grade separated junction at Binley) should be taken forward to detailed design. Binley junction is proceeding using the Highways Act powers and has been assessed in this

environmental assessment report, whilst Walsgrave junction is placed on hold until the local authorities are in a position to unlock the surrounding development land.

3.2.6. It was decided that Walsgrave junction will be considered for funding under the proposed *Road Investment Scheme 2* submissions. A Department for Transport change control form was submitted for the change in the proposed option.

3.2.7. In terms of environmental performance, Table 3-3 details the environmental considerations for each of the four options considered in October 2016.

Table 3-3: A46 Junction Options Considered Environmental Performance

Option	Description	Environmental Considerations
1	Two grade separated junctions at Binley and Walsgrave with a 70mph speed limit	Any works around the Walsgrave junction has the potential to cause significant environmental impacts if it includes land take in Coombe Country Park or Combe Pool Site of Special Scientific Interest (SSSI) or affect the integrity of the SSSI. This may result in additional mitigation being required for biodiversity, air quality, drainage and hydrology. In addition, Traffic from the B4082 currently able to join the A46 southbound would have to divert via the M69 junction adding approximately 3 miles to the journey or encouraging more trips to divert via local roads and result in greater transport impacts; this would also lead to an increase in greenhouse gas emissions. There are also impacts in the vicinity of Binley roundabout, principally on noise, air quality and visual amenity, although these are considered less sensitive to change than the area surrounding Walsgrave junction.
2	One grade separated junction at Binley with a 70mph speed limit	This option results in less land take than options 1 and 4 and will have less impact upon Coombe Country Park or Combe Pool SSSI. It avoids any change around Walsgrave junction, and the associated environmental and social impacts.
3	One grade separated junction at Binley with a 50mph speed limit.	This option results in the least amount of land take in the surrounding area and subsequently would be inherently expected to have the least environmental and social impact.
4	Two grade separated junctions at Binley and Walsgrave with a 50mph speed limit	The impact of this option would be expected to be similar to option 1, although there would be more potential to avoid direct land take in the SSSI.

3.2.8. Options 2 and 3 were expected to result in fewer and lower environmental and social impacts on the surrounding area and the adjacent Coombe Country Park and Combe Pool SSSI due to the reduced land take required for these options, when compared to Options 1 and 4.

3.2.9. Although Option 3 was initially carried forward, resulting in the least amount of land take and environmental impacts, in December 2016 the decision was reviewed at the Stage 1 Highways England Investment Decision Committee and it was decided to proceed with a 70mph speed limit (Option 2), in order to adopt expressway standards. An expressway is an A-road that is as well-designed as a motorway and is able to offer the same standard of journey to users. At a minimum, expressways will be largely or entirely dual carriageway standard roads that are safe, well-built and resilient to delays, have junctions that are largely or entirely grade separated, include modern safety measures and construction standards and technology to manage traffic and provide better information to drivers.

3.2.10. The 70mph (Option 2) is now the option for which consent is being sought, as the greater speed limit will alleviate more of the congestion problems within the surrounding area and have a greater beneficial impact upon traffic and transport and achieve the optimum project objectives. The greater speed of 70mph for Option 2 also means the option meets future expressway requirements.

3.2.11. A range of factors were considered during the option selection which included:

- Availability of land (there is uncertainty that the required land for the Walsgrave junction would be available for development)
- Environmental considerations (particularly noise and visual constraints, proximity of ancient woodland)
- Commercial and budgetary
- Health and safety

3.3. Justification for Preferred Option

3.3.1. The purpose of the A46 Coventry Junctions Upgrade is to provide relief to the A46 Coventry Eastern Bypass traffic from congestion, improve journey times and reduce driver frustration by improving vehicular capacity at the Binley Junction (A428/A46 Coventry Eastern Bypass) and Walsgrave Junction on the A46 near Coventry, upgrading the trunk road sections of the A45 and A46 between the M6 and M40 considering future full Expressway standards.

3.3.2. During stage 1 and stage 2 of the Proposed Scheme a number of “do minimum” and “do something” options were considered. The outcome of the *Option Identification and Selection* stage concluded that the existing junction at Binley required upgrade and a do something option should be considered. With the highest business case a flyover grade separation option was selected to progress to stage 3, Preliminary Design.

3.3.3. The solution proposes an elevated flyover section to grade separate the existing A46 from the A428 and existing signalised roundabout at Binley Junction.

3.3.4. A grade separated underpass option was also considered at Binley Junction; however, it was not deemed feasible due to a number of issues and constraints.

3.3.5. Of the two options to “do something”, the dis-benefits of the underpass option outweigh the benefits. Furthermore, the key justification of adopting the flyover option over the underpass option is that the underpass requires a wider corridor and footprint which would have greater environmental impacts in comparison to the noise and visual impacts of the flyover.

3.3.6. The following benefits and relief of environmental impacts that the flyover option provides over the underpass option can be justified as follows:

- Smaller footprint and less impact on land take, existing landscaping, trees, vegetation, and potential habitat in and adjacent to the A46 highways corridor and Proposed Scheme area;
- Retention of existing roundabout at Binley Junction, such as less impact on land take and adjacent trees (some tree preservation order protected trees on the south-east corner of Binley Junction).
- Fewer utility diversion required , such as, less impact on adjacent vegetation and environment within highways corridor
- None or minimum excavation that may impact potentially contaminated land and material disposal / treatment required (or contaminated material taken off site)
- No dewatering required and minimal impact to ground water table

4. ENVIRONMENTAL ASSESSMENT METHODOLOGY

4.1. Guidance and Assessment Approach

Highways England Advice Notes and Design Manual for Roads and Bridges (DMRB)

4.1.1. An EIA Screening Determination was completed for the Proposed Scheme in January 2018, following completion of quantitative noise and air quality modelling. It concluded that likely significant effects are not anticipated, and hence a statutory EIA is not required. This report has therefore been prepared as a non-statutory environmental assessment report to present the findings of the assessment process.

4.1.2. An environmental Scoping Report (HE551486-ACM-EGN-A46_SW_000_Z-LE-001) was produced and disclosed to stakeholders on 13 December 2017, prior to finalisation of the EIA Screening Determination. The purpose of the Scoping Report was to outline the approach, methodology, and topics that will be included within the environmental assessment and consider the environmental context and potential environmental effects of the Proposed Scheme. Stakeholders were invited to comment on the report and these responses are summarised in Section 4.2, of this chapter.

4.1.3. The environmental topics covered within this report are consistent with those listed in the environmental Scoping Report, EIA Directive, Highways England's Interim Advice Note (IAN) 125/15 Environmental Assessment Update (Ref. 1-5), and guidance provided in the *Design Manual for Roads and Bridges* (DMRB) *Volume 11, Environmental Assessment* (Ref. 1- 6). The topics include:

- Air Quality
- Cultural Heritage
- Landscape
- Biodiversity
- Geology and Soils
- Materials, Assets and Waste
- Noise and Vibration
- People and Communities (including health)
- Road Drainage and the Water Environment
- Climate

4.1.4. Heat and Radiation has been scoped out of this environmental assessment as it is not considered relevant to this highway improvement scheme. For certain types of projects such as power stations and industrial developments, heat and radiation would be important considerations as these types of developments can result in large scale industrial discharges. However, the Proposed Scheme is an upgrade of an existing road and it is considered that future conditions with regards to heat and radiation would be similar to that of the baseline. No likely significant impacts are anticipated from the emission of heat and radiation associated with the Proposed Scheme.

4.1.5. Consideration of the risk of major accidents and disasters is also scoped out of this environmental assessment. The EIA Directive requires environmental assessments to consider effects deriving from the vulnerability of the project to risks of major accidents and disasters. For certain types of projects such as high-pressure gas pipelines or fuel depots, the risk of major disasters and accidents would be an important consideration,

however the Proposed Scheme is not considered to be especially vulnerable to major accidents or disasters. By its very nature, the A46 has an inherent risk of road traffic accidents and disasters, but the Proposed Scheme is expected to enhance the safety design of the junction and reduce the likelihood and severity of accidents, therefore leading to a positive impact. No likely significant impacts are expected from the vulnerability of the project to risks of major accidents and disasters. Accidents such as spillage of chemicals and fuels during construction, which may lead to the contamination of water courses for example, will be assessed within Chapter 9: Geology and Soils, Chapter 10: Materials, Assets and Waste, and Chapter 13: Road Drainage and the Water Environment.

4.2. Environmental Scoping

4.2.1. The environmental scoping report (A46 Coventry Junctions Upgrade Environmental Scoping Report HE551486-ACM-EGN-A46_SW_000_Z-RP-LE-001) for the Proposed Scheme was disclosed to stakeholders on 13 December 2017.

- Scoping is an important part of the environmental assessment process and aims to determine the extent of issues to be considered in the assessment and reported in the Environmental Assessment Report.

4.2.2. Table 4-1 below presents a summary of the environmental scoping report.

Table 4-1: Summary of Environmental Scoping Report

Topic	Nature of Impacts	Type of assessment (DMRB Volume 11)	Study Area	Scope
Air Quality	Direct, temporary, and permanent	Detailed	The air quality study area will be determined in accordance with *Design Manual for Roads and Bridges* (DMRB) *Volume 11, Section 3, Part 1* (Ref. 4-1) guidance. The local air quality assessment study area focusses on potential impacts associated with changes in pollutant concentrations within 200m of affected road links. An initial study area of 0.93 miles (1.5km) of the Proposed Scheme was considered at the options stage to be refined through the modelling exercise.	Detailed local air quality modelling will consider the impacts on the sensitive receptors of human health and ecological designated sites within the study area. Detailed air quality modelling of likely effects will be undertaken. Chapter 5: Air Quality of this report provides more information.
Cultural Heritage	Direct, temporary, and permanent	Simple	The study area includes an area spanning 0.62 miles (1km) from the Proposed Scheme, broadening where necessary to capture heritage assets within the Zone of Theoretical Visibility (ZTV). For non-designated built heritage assets the study area extends to 500m from the Proposed Scheme boundary.	A desk-based assessment supplemented by a site walkover will be carried out in accordance with DMRB guidance, national legislation, and planning policy. Chapter 6: Heritage of this report provides more information on the scope.
Landscape	Direct, temporary, and permanent	Detailed	The study area is a 0.62 miles (1km) corridor, broadening to capture areas within the ZTV sitting outside this corridor where significant effects may occur as a result of the Proposed	In accordance with guidance provided within Highways England Internal Advice Note 135/10 and the GLVIA3 (Ref. 4-3), a detailed assessment will be undertaken

Topic	Nature of Impacts	Type of assessment (DMRB Volume 11)	Study Area	Scope
			Scheme. The study area has been informed by a combination of Highways England's Interim Advice Note 135/10 guidance (Ref. 4-2), the ZTV defined by professional judgement, and a desk-based study.	to determine the extent to which landscape character is likely to be affected and the changes in visual amenity. Chapter 7: Landscape of this report provides more information.
Biodiversity	Direct, temporary, and permanent	Detailed	The desk study area includes a search for European Sites up to 18.64 miles (30km) from the Proposed Scheme boundary. The desk study also identifies national statutory and local non-statutory nature conservation designations and protected species within 1.24 miles (2km) of the Proposed Scheme site boundary. The study area varies according to the spatial characteristics of each species or habitat potentially impacted; however, it was generally up to 500m beyond the Proposed Scheme site boundary.	A detailed assessment has been carried out based upon Guidelines of Ecological Impact Assessment in the UK and Ireland by the Chartered Institute of Ecology and Environmental Management, Highways England Interim Advice Note 130/10. Chapter 8: Biodiversity of this report provides more information.
Geology and Soils	Direct, temporary, and permanent	Simple	The review of information has been confined to the following distances from the Proposed Scheme alignment: - Geology, along the route of the Proposed Scheme - Geological designated sites, within 250m of the Proposed Scheme boundary	The geology and soils assessment has been undertaken in accordance with the advice provided in DMRB. The objective of this assessment is to identify any significant impact on geology and soil and where appropriate any particular environmental issues associated with

Topic	Nature of Impacts	Type of assessment (DMRB Volume 11)	Study Area	Scope
			- Historical land uses and potential sources of contamination: within 250m of the Proposed Scheme boundary - Controlled waters, within 500m of the Proposed Scheme boundary - Agricultural land, immediately adjacent to the existing highway and within the Proposed Scheme boundary	contaminated land in regards to the construction and operation of the Proposed Scheme. Chapter 9: Soils and Geology of this report provides more information.
Materials, Assets and Waste	Direct and temporary	Simple	The study area for this topic is the construction footprint of the Proposed Scheme and any land used temporarily during construction, within which materials would be used and wastes would be generated and managed.	A simple level and qualitative assessment will be undertaken for materials, assets and waste. This is in line with Highways England's Interim Advice Note 153/11 (Ref. 4-4). Chapter 10: Materials, Assets and Waste of this report provides more information.
Noise and vibration	Direct, temporary, and permanent	Detailed	The study area for the detailed quantitative assessment comprises a 600m corridor either side of the Proposed Scheme, 600m either side of the existing junction replaced by the Proposed Scheme, and 600m either side of all affected routes within a 0.62 miles (1km) boundary.	A detailed level assessment is proposed completed in accordance with the relevant guidance in the DMRB, namely Volume 11, Section 3, Part 7 (HD213/11) (Ref. 4-5). For dwellings and other sensitive receptors that are within the study area but more than 600m from an affected

Topic	Nature of Impacts	Type of assessment (DMRB Volume 11)	Study Area	Scope
			The study area for operational phase airborne vibration annoyance impacts is defined as 40m from the Proposed Scheme.	route, a qualitative assessment of the traffic noise impacts will be carried out. For affected routes which are outside the 0.62 miles (1km) boundary, an assessment will be undertaken by estimating the Calculation of Road Traffic Noise (CRTN) Basic Noise Level (BNL) for these routes with and without the Proposed Scheme. A count of the number of dwellings and other sensitive receptors within 50m of these routes will be undertaken. Chapter 11: Noise and Vibration of this report provides more information.
People and Communities	Direct, temporary, and permanent	Simple	Effects will be considered on resources within the Proposed Scheme footprint and all such resources within a 0.62 miles (1km) buffer of the Proposed Scheme.	The assessment will consider: Non-motorised user (NMU) routes within and just outside the Proposed Scheme footprint A number of commercial premises which fall within or adjacent to the Proposed Scheme boundary The assessment is proposed to be completed in accordance with DMRB

Topic	Nature of Impacts	Type of assessment (DMRB Volume 11)	Study Area	Scope
				Volume 11, Section 3, Part 6 and Part 8 (Ref. 4-6; Ref. 4-7). Chapter 12 People and Communities of this report provides more information.
Road Drainage and the Water environment	Direct, temporary, and permanent	Detailed	The study area has been defined as the area up to 0.62 miles (1km) either side of the Proposed Scheme site boundary. A larger study area is considered where a receptor is hydraulically linked to the site and there remains the potential for significant effects.	No direct impacts to water bodies are expected and as such no hydromorphological assessment is proposed. Impact on water quality will be assessed on surface and groundwater receptors in addition to a Flood Risk Assessment and a water quality risk assessment of highway runoff and spillage. The assessment will be prepared in keeping with guidance presented within DMRB, Volume 11, Section 3, Part 10: HD45/09 (Ref. 4-8). Chapter 13: Road Drainage and the Water Environment of this report provides more information.
Climate	Direct, temporary, and permanent	Detailed	The environmental impact associated with greenhouse gas emissions is a national and global issue. The study area for the resilience assessment will be the same as that defined for the	A lifecycle approach will be undertaken, to identify the key contributing greenhouse gas emission sources and activities associated with the Proposed Scheme. This approach is consistent

Topic	Nature of Impacts	Type of assessment (DMRB Volume 11)	Study Area	Scope
			lifecycle greenhouse gas impact assessment (the entire Proposed Scheme footprint and the surrounding natural environment).	with the principles set out in British Standard EN 15804 (Ref 4-9) and publicly available specification (PAS) 2080 (Ref. 4-10). In addition, a climate change resilience assessment will be conducted of potential effects of climate change on the Proposed Scheme, considering their potential magnitude of impacts and the likelihood of occurrence. Chapter 14: Climate of this report provides more information.

4.2.3. This environmental assessment has been carried out following guidance and standards provided in DMRB Volume 11 Section 2 Parts 4 and 6 (Ref. 4-11; Ref. 4-12), and Interim Advice Note 125/15 (Ref. 4-13).

4.2.4. Other specialist methodologies and good practice guidelines have been drawn upon as necessary. Proven techniques have been used wherever possible in order to avoid developing unique and untested procedures. The methodologies for each of the topics are detailed within the technical chapters in this report.

4.2.5. Table 4-2 presents a summary of the consultation responses to scoping.

Table 4-2: Summary of Environmental Scoping Report Consultation

Stakeholder Name	Comment	Project Team Response	Location where further information is provided
Coventry City Council Public Health	No further comment regarding the scoping report.	None Required	Not Applicable
Hinkley and Bosworth Borough Council	No further comment regarding the scoping report.	None Required	Not Applicable
Historic England	Expects the environmental assessment report to consider the potential impacts on non-designated features of historic, architectural, archaeological, or artistic interest. It is advised that the scope of the assessment takes account of the potential impacts from construction, servicing and maintenance, and associated traffic. It is advised that the assessment should also take into account the likelihood of alteration to drainage arrangements and its impact on decomposition or destruction subsidence of buildings and of buildings and monuments.	The comments have been taken into account and incorporated into the heritage assessment.	Chapter 6: Cultural Heritage
Natural England	Natural England provided a generic response to scoping, outlining its expectations on	The comments have been taken into account and	Chapters 5 to 15

Stakeholder Name	Comment	Project Team Response	Location where further information is provided
	scope but without site specific requirements.	incorporated into the assessment.	
Warwickshire County Council Public Health	A comment to note that paragraph 12.3.8 of the scoping report should be amended to reflect that the existing crossing across the A46 is in fact a shared use footway and cycleway with a Toucan pedestrian crossing point as opposed to traffic lights. No comments on the scope of the assessment.	Noted	Not Applicable
Warwickshire County Council Landscape Team	The landscape assessment should consider the impact on the green belt, landscape character, setting of Coombe Abbey, the Centenary Way long distance footpath to the east, and views from surrounding areas, roads and public rights of way. Site topography and a survey of levels of surrounding footpaths, roads and settlements should form part of the study. The assessment should also include sections though the site in relation to key visual receptors. Mitigation measures should be appropriate to the Dunsmore Parklands landscape character type and take into account information contained in the Warwickshire Landscapes Guidelines.	The comments have been taken into account and incorporated into the assessment.	Chapter 7: Landscape

Stakeholder Name	Comment	Project Team Response	Location where further information is provided
Warwickshire Wildlife Trust	The survey scope for the ecology chapter is acceptable. A request has been made to improve pedestrian access into Piles Coppice woodland cluster by linking an existing footpath to the A46, therefore, creating a footpath link to/from Coventry.	Highways England is investigating the merits of a new right of way in this location; however, it does not currently form part of the Proposed Scheme.	Not applicable
Woodland Trust	The Woodland Trust requests that the current buffer zone between the A46 and Common Farm Wood remains intact and that improvements to the A46 do not result in any new encroachment of the road.	The comments have been taken into account and incorporated into the assessment.	Chapter 2: The Project and Chapter 8: Biodiversity

4.2.6. The technical chapters presented in Chapters 5 to 14 of this report are structured using common headings to provide a consistent layout across chapters, as follows:

- Introduction
- Legislative and Policy Context
- Study Area
- Baseline Conditions
- Potential Impacts
- Assessment Methodology
- Assessment Assumptions and Limitations
- Design, Mitigation and Enhancement Measures
- Assessment of Effects

4.2.7. The EAR was originally prepared in May 2018 following the scoping exercise. This EAR has subsequently been updated to reflect any updates to legislation, policy and guidance and baseline conditions effective between May 2018 and July 2019. There have been no key design changes since the original EAR was prepared.

4.3. Surveys and Predictive Techniques and Methods

4.3.1. A number of techniques and methods have been applied to the assessment, including the following:

- Site surveys and walkovers
- Online databases and records
- Online mapping tools
- Technical modelling exercises
- Site photographs
- Primary data collection including noise measurements and diffusion tube monitoring
- Reference to survey-based reports previously undertaken for the site.

4.3.2. Specific methods of assessment and techniques are detailed within each technical chapter of this report (Chapter 5-14). Details of the respective surveys and data collected to undertake the baseline and environmental assessment are provided where relevant.

4.4. General Assessment Assumptions and Limitations

4.4.1. There are a number of assumptions and limitations relevant to the assessment as set out below:

- The most recent and up to date information, reporting and data have been applied at the time of writing this report. Information provided by third parties, including publicly available information and databases is correct at the time of publication
- Only receptors which may be affected by the Proposed Scheme have been taken forward for the impact assessment. Receptors not included in the impact assessment are considered to be unaffected by the Proposed Scheme options
- Baseline conditions are accurate at the time of the physical surveys. Due to the dynamic nature of the environment, conditions may change after the survey work has been completed or during the construction and operational phases
- The cumulative assessment is limited to the information available in the public domain at the time of this assessment.

4.4.2. The technical chapters present a list of assumptions and limitations relevant to their assessment in chapters 5-15 of this report.

4.5. Significance Criteria

4.5.1. Scheme activities that may give rise to environmental impacts and effects during the construction and operational phases have been considered within the assessment. During the construction phase these may include:

- Utility diversion and advance works
- Temporary offices, compounds, storage areas and worksites
- Temporary accesses and haul routes
- Removal of some existing infrastructure
- Vegetation clearance
- Soil removal
- Ground and excavation works and
- Routing of services and utilities

4.5.2. Activities that may give rise to environmental impacts and effects during the operational phase of the Proposed Scheme will be predominantly related to changes in traffic flows on the strategic and local road network.

4.5.3. Impacts of the Proposed Scheme can be positive or negative; direct or indirect; short term or long term, and/or cumulative. Direct impacts are those that are directly attributable to the Proposed Scheme. Indirect impacts result indirectly as a consequence of the Proposed Scheme.

4.5.4. The Proposed Scheme will have two principal phases:

- Construction phase: impacts within this phase are usually short term and reversible
- Operational phase: impacts within this phase are usually long term and caused by every day operation of the Proposed Scheme. Short term impacts may also arise during maintenance works or traffic management operations

4.5.5. Operational phase effects are assessed on the basis of the following future baseline scenarios:

- Short term: opening year (2021). The conditions expected in 2021 when the Proposed Scheme is scheduled to be complete
- Long term: design year (15 years following opening – 2036). The conditions expected 15 years after the scheduled date of completion of the Proposed Scheme

4.5.6. Cumulative effects are those resulting from the accumulation of multiple impacts at a specific location or asset due to the Proposed Scheme. Cumulative effects may also arise from the combined impact of activities associated with the Proposed Scheme together with other development projects in the area.

4.5.7. The Proposed Scheme design has been and will continue to be, developed in parallel with the environmental assessment, and therefore environmental mitigation measures are being incorporated into the Proposed Scheme design. As such this assessment considers the residual effects that would remain after the proposed design mitigation measures have been implemented.

4.5.8. DMRB Volume 11, Section 2, Part 5, HA205/08 (Ref. 4-14) states that "*the significance of the effect is formulated as a function of the receptor or resource environmental values (or sensitivity) and the magnitude of project impact (change)"*. This process includes the following stages:

- Assigning environmental value
- Assigning a magnitude of impact
- Assigning a significance level

4.5.9. Significance criteria will be assigned in accordance with the DRMB Volume 11, Section 2, Part 5, HA205/08. The approach to assigning significance of effect relies on reasoned argument, professional judgement, and the advice or views of appropriate organisations.

4.5.10. The significance of effects is assigned with mitigation in place. The overall significance of an effect is calculated by use of the following matrix (see Table 4-3).

Table 4-3: Matrix for Determination of Significance of Effect

Magnitude of Impact	Value / Sensitivity of Receptor				
	Very High	**High**	**Medium**	**Low**	**Negligible**
Major	Very Large	Large/ Very Large	Moderate/ Large	Slight/ Moderate	Slight
Moderate	Large/ Very Large	Moderate/ Large	Moderate	Slight	Neutral/ Slight
Minor	Moderate/ Large	Slight/ Moderate	Slight	Neutral/ Slight	Neutral/ Slight
Negligible	Slight	Slight	Neutral/ Slight	Neutral/ Slight	Neutral
No change	Neutral	Neutral	Neutral	Neutral	Neutral

4.5.11. Effects are generally considered significant if they are Moderate, Large, or Very Large. The exception is *Chapter 7: Landscape and Visual*, where Moderate effects are generally considered to be not significant, in accordance with good industry practice.

4.5.12. Slight, Neutral/Slight and Neutral effect are not considered to be significant.

4.5.13. Slight/Moderate effects are borderline cases that would be determined based on professional judgement, taking account of whether effects are considered to be positive or negative, permanent or temporary, direct or indirect, the duration/frequency of the effect and whether any secondary effects are caused.

4.5.14. Significance criteria from DMRB Volume 11, Part 2 have been employed where specified within the environmental topic chapters. Where appropriate, the topic-specific criteria have been adopted from institute guidelines or best practice. For some disciplines, predicted effects may be compared with quantitative thresholds and scales in determining effect significance. Where quantitative measures may not be applied, qualitative criteria derived from DMRB have been utilised.

4.5.15. The suggested methodology for Chapter 5: Air Quality, Chapter 8: Biodiversity, Chapter 10: Materials, Assets and Waste and Chapter 14: Climate deviate slightly from Table 3-4, to ensure compliance with Highways England's Interim Advice Notes and Climate Change legislation, as explained in these technical chapters.

5. AIR QUALITY

5.1. Introduction

5.1.1. This chapter presents an assessment of air quality impacts associated with the Proposed Scheme. It includes a description of the relevant legislative and policy framework, determines the existing baseline conditions within the study area, and provides a rigorous assessment of the Proposed Scheme to determine the likely significance of effects on affected receptors.

5.1.2. As identified in the air quality assessment method in the *Design Manual for Roads and Bridges (DMRB) Volume 11 Section 3 Part 1* (Ref 5-1), the pollutants of most concern near roads are nitrogen dioxide (NO_2) and particulate matter with an aerodynamic diameter of 10 microns or less (PM_{10}) for the protection of human health, and oxides of nitrogen (NO_x) for the protection of vegetation and ecosystems. Concentrations of other pollutants are unlikely to exceed the air quality criteria due to traffic emissions and so have been scoped out of the assessment.

5.1.3. This chapter of the EAR has been undertaken by competent experts with relevant and appropriate experience:

- Graduate Air Quality Scientist MSc PhD AMIEnvSc AMIAQM
- Senior Air Quality Scientist MSci PhD AMIEnvSc AMIAQM
- Senior Air Quality Scientist - BSc AMIEnvSc MIAQM
- Technical Director (Air Quality) BSC (Hons), MSc, CSci, FRMetS, MIEnvSc , MIAQM

5.2. Legislative and Policy Framework

European Air Quality Legislation

5.2.1. The *Ambient Air Quality and Cleaner Air for Europe Directive 2008/50/EC (*Ref. 5-2*)* is transcribed into UK legislation by the *Air Quality Standards Regulations 2010* (Ref. 5-3), which sets legally binding limit values in the UK and have been set with the aim of avoiding, preventing, or reducing harmful effects on human health and on the environment as a whole.

National Air Quality Strategy

5.2.2. The *Air Quality Strategy for England, Scotland, Wales and Northern Ireland* (Ref. 5-4) was initially published by Defra in 2000, under the requirements of the *Environment Act 1995* (Ref. 5-5). The most recent revision of the strategy published in 2007 sets objectives for key pollutants as a tool to help local authorities manage local air quality improvements in accordance with the EU *Ambient Air Quality Directive*. Some of these objectives have been laid out within the *Air Quality (England) Regulations 2000* and later amendments in 2002 (Ref. 5-6).

5.2.3. The air quality objectives have been set down in regulation solely for the purposes of local air quality management. Under the local air quality management regime, local authorities have a duty to carry out regular assessments of air quality against the objective values and if it is unlikely that the objectives will be met in the given timescale, they must designate an Air Quality Management Area (AQMA) and prepare an Air Quality Action Plan (AQAP) with the aim of achieving the objectives. The boundary of an AQMA is set by the governing local authority to define the geographical area that is to be subject to the management measures to be set out in a subsequent action plan. Consequently, it is not unusual for the boundary of an AQMA to include within it relevant locations where air quality is not at risk of exceeding an air quality objective.

5.2.4. The UK's air quality objectives for the pollutants of relevance to this assessment are displayed in Table 5-1 along with the EU limit values. Concentrations are presented in micrograms of pollutant per cubic metre of air (µg/m^3).

Table 5-1: Air Quality Objectives and EU Limit Values

Pollutant	Averaging Period	Objective and EU limit value
Nitrogen dioxide (NO_2) for the protection of human health	Annual Average	40 µg/m^3
	1-hour average not to be exceeded more than 19 times a year which is equal to the 99.8th percentile of hourly values	200 µg/m^3
Particulate matter (PM_{10}) for the protection of human health	Annual Average	40 µg/m^3
	24-hour average not to be exceeded more than 35 times a year which is equal to the 90.4th percentile of daily values	50 µg/m^3
Nitrogen oxides (NO_x) for the protection of vegetation and ecosystems	Annual Average	30 µg/m^3

National Air Quality Action Plan

5.2.5. In July 2017, Defra and DfT released the *UK plan for tackling roadside nitrogen dioxide concentrations* (Ref. 5-7). The plan principally focuses on providing additional funding to local authorities so that local action can be taken to improve air quality in the shortest possible time with measures such as improving bus fleets, support for concessionary travel, and sustainable modes of transport and low emission buses. The national plan requires local authorities to set out plans as to how they intend to achieve the limit value in the shortest possible time.

Clean Air Zones Framework

5.2.6. Defra and Dft produced a Clean Air Zone Framework in 2017 (Ref. 5-8) that sets out the principles for the operation of Clean Air Zones (CAZs) in England. CAZs can be charging or non-charging. The Framework identifies four classes of charging CAZs, these are:

- Class A- targeting taxis and Private Hire Vehicles (PHVs), buses and coaches
- Class B- targeting taxis and PHVs, buses, coaches and HGVs
- Class C - targeting taxis and PHVs, buses, coaches, HGVs and LGVs
- Class D - targeting taxis and PHVs, buses, coaches, HGVs and LGVs and private cars

Highways England Air Quality Strategy

5.2.7. Highways England published *Our Strategy to Improve Air Quality* in August 2017 (Ref. 5-9). The strategy is designed to communicate Highway England's approach to improving air quality with a commitment to invest £100 million to improve air quality on the strategic road network between 2015 and 2021. Ten pilot studies were proposed to identify appropriate new and innovative solutions which could then be deployed on the network. In addition, Highways England will work with other transport providers and bodies to develop and deliver policies to improve air quality and will design out or mitigate poor air quality for road schemes.

Planning Practice Guidance (PPG)

5.2.8. The national PPG (Ref. 5-10) provides a web-based resource in support of the National Planning Policy Framework (NPPF) (Ref. 5-11).

5.2.9. The PPG provides a summary of the air quality issues set out in the NPPF and goes on to note that assessments of the impact of proposed developments on air quality should include the following information:

- The existing air quality in the study area (existing baseline)
- The future air quality without the development in place (future baseline)
- The future air quality with the development in place (with mitigation)

5.2.10. The guidance then advises that a planning application should proceed to decision with appropriate planning conditions or planning obligation, if the proposed development (including mitigation) would not lead to an unacceptable risk from air pollution, prevent sustained compliance with EU limit values or fail to comply with the requirements of the *Conservation of Habitats and Species Regulations* (Ref. 5-12).

National Policy Statement for National Networks (NPSNN)

5.2.11. Statements 5.3 – 5.15 of the NPSNN (Ref. 5-13) specifically relate to air quality assessment and states that the Secretary of State should refuse consent where, after taking into account mitigation, the air quality impacts of a development will:

- result in a zone or agglomeration which is currently reported as being compliant with the Air Quality Directive becoming non-compliant
- affect the ability of a non-compliant area to achieve compliance within the most recent timescales reported to the European Commission at the time of the decision

5.2.12. The NPSNN also states that *any increase in carbon emissions "is not a reason to refuse development consent, unless the increase in carbon emissions resulting from the Proposed Scheme are so significant that it would have a material impact on the ability of government to meet its carbon reduction targets".*

National Planning Policy Framework (NPPF)

5.2.13. The National Planning Policy Framework, paragraph 170, states that:

"Planning policies and decisions should contribute to and enhance the natural and local environment by: … e) preventing new and existing development from contributing to, being put at unacceptable risk from, or being adversely affected by, unacceptable levels of soil, air, water or noise pollution or land instability…"

5.2.14. There are national, regional and local policies for the control of air pollution and local action plans for the management of local air quality across the Proposed Scheme. The effect of the Proposed Scheme on the achievement of such policies and plans are

matters that may be of material consideration by planning authorities. Paragraph 181 of the NPPF states that:

"Planning policies and decisions should sustain and contribute towards compliance with relevant limit values or national objectives for pollutants, taking into account the presence of Air Quality Management Areas and Clean Air Zones, and the cumulative impacts from individual sites in local areas. Planning decisions should ensure that any new development in Air Quality Management Areas and Clean Air Zones is consistent with the local air quality action plan."

Local Policy

Coventry Air Quality Action Plan

5.2.15. Coventry was named as one of the 28 towns and cities in England where NO_2 levels are forecast to exceed legal limits in 2021.The national plan requires local authorities to set out plans as to how they intend to achieve the limit value in the shortest possible time. Coventry City Council has worked closely with the Government's Joint Air Quality Unit to develop an air quality action plan.

5.2.16. Coventry City Council has prepared a local air quality action plan (Ref. 5-14) to reduce NO_2 levels within the city (Ref. 5-14). Locations where NO_2 concentrations are forecast to be most likely to exceed the limit value include the A4053 Ring Road and arterial roads such as the A4114 Holyhead Road, A4600 Walsgrave Road, A429 Warwick Road, A4114 London Road and A4082 London Road / Allard Way. The measures being considered include promoting the use of electric vehicles (including buses, taxis and private cars), reducing travel by car by encouraging behavioural change, upgrading the city's traffic management systems to support dynamic traffic management and infrastructure improvements to ease congestion and construct cycle routes. In the air quality action plan, the Council identified a package of measures that would improve air quality without the need to have a chargeable clean air zone.

5.2.17. In response to this action plan, the Government published a direction in March 2019 which requires the Council to implement a class D clean air zone charging option, to provide further air quality monitoring and to prepare a full business case. The full business case was to be submitted by 27 September 2019. The Council is responding to this by conducting additional traffic and air quality modelling including clean air zone options. The Council's aim is to identify a package of measures that improve air quality whilst minimising the economic impact.

Local Authority Local Plans

5.2.18. This is discussed in Appendix 5-1 for each of the local authorities with roads within the study area.

5.3. Study Area

5.3.1. The assessment of construction phase traffic impacts (Heavy Goods Vehicle (HGV) assessment and traffic management assessment) and operational phase traffic impacts (local operational assessment and Transport Appraisal Guidance) use a study area of 200m around road sections likely to be affected by the Proposed Scheme. This is due to the effect of pollutants from road traffic reducing with distance from the point of release, and beyond 200m these are likely to have reduced to a concentration equivalent to background concentrations.

5.3.2. Therefore, individual sensitive receptors (within or outside Air Quality Management Areas) are studied in the local operational assessment at distances up to 200m. The local air quality study area includes the road links where the Proposed Scheme is

predicted to have an impact. Affected road links (road links are combined to give 2-way flows where appropriate) have been identified by comparing traffic data associated with the Proposed Scheme (Do Something) and without the Proposed Scheme (Do Minimum) against the local air quality screening criteria presented in DMRB and set out below:

- Road alignment will change by 5m or more
- Annual average daily traffic (AADT) flows will change by 1,000 or more
- Heavy duty vehicles (HDV) (vehicles greater than 3.5 tonnes, including buses and coaches) flows will change by 200 AADT or more
- Daily average speeds will change by 6.2 miles per hour (mph) (10 kilometres per hour) or more
- Peak hour speed will change by 12.4 miles per hour (mph) (20 kilometres per hour) or more

5.3.3. Highways England Interim Advice Note (IAN) 185/15 (Ref. 5-15) requires the use of traffic speeds bands for the assessment of air quality. Therefore, a change in the speed band for an individual road link has been used to identify an affected road link in relation to speed.

5.3.4. The above criteria are used to identify whether changes in air quality are likely. If a criterion is not met, then those road links are scoped out of further assessment as a negligible change in air quality and emissions is anticipated.

5.3.5. During the operational phase, increases in traffic flows are predicted on the M69 (M6 - M1), A46 (M6 – A45), A45 (Stonebridge Highway), A423 (A45 – Princethorpe) and northern part of CIifford Bridge Road. Decreases in traffic flows are expected in Coventry on the A444 (A45 – A4082), A4082 (A444 – Langbank Avenue) and southern part of Clifford Bridge Road. Increases in traffic speed are expected on the A46 near the Binley Junction. These affected road links comprise the affected road network and form part of the study area. An overview of these road links is shown in Chapter 18: Figure 5-1 and in more detail in Chapter 18: Figure 5-2.

5.3.6. Additional links have been included in the local operational air quality modelling where the additional emissions from these areas or links are required to describe pollutant concentrations at sensitive receptor locations. This has been carried out with regard to sensitive receptors along affected routes and adjacent to the Proposed Scheme.

5.3.7. The same affected road network was considered for regional emissions, *Transport Analysis Guidance* (TAG) local air quality impacts, and TAG regional emissions of NO_x and PM_{10}. The entire modelled road network was considered for TAG greenhouse gas emissions.

5.4. Baseline Conditions

5.4.1. The study area includes routes within five local authorities. A review of air quality within each of these boroughs is presented in Appendix 5-2. The local authorities are Coventry City Council, Warwick District Council, Rugby District Council, Hinckley and Bosworth District Council, and Blaby District Council. Affected routes within the study area pass through city or town wide AQMAs in Coventry City and Rugby Borough. Details of the AQMAs are provided in Appendix 5-2.

5.4.2. To comply with local air quality management regime reporting requirements, local authorities often collect air quality monitoring data within their administrative area. Recent and available local authority monitoring data has been used to inform this assessment. Measurements near the affected road network have been made by local

authorities using passive NO_2 diffusion tubes. All of the measured annual mean NO_2 concentrations near the affected road network were within the objective and limit value.

5.4.3. In addition, Highways England has carried out passive diffusion tube monitoring at a series of locations within the study area. These sites were chosen to supplement data available from local authorities and were sited to provide data from locations as close to sensitive receptors near the Proposed Scheme as possible. This showed that the annual average objective and limit value for NO_2 was not exceeded at the 20 monitoring locations near the A46 in 2016.

5.4.4. Details of the monitoring site locations and measured concentrations are set out in Appendix 5-2. The monitoring locations near the affected road network are shown in Chapter 18: Figure 5-2.

5.4.5. Dispersion modelling carried out for Coventry City Council's Air Quality Action Plan (Ref. 5-14) identified a number of roads that are at risk of exceeding the objective and limit value in 2021. These roads include the Ring Road and a number of radial roads. One of these roads is part of the affected road network. This road is the A4082 Allard Way (census ID 7103). This road is expected to be compliant in 2023. No air quality monitoring has been carried out near Allard Way.

5.5. Potential Impacts

Construction Effects

5.5.1. Construction activities have the potential to give rise to adverse impacts from fugitive emissions of dust due to the construction of the Proposed Scheme and road re-surfacing. These are likely to be temporary in nature and will be localised. There may also be increases in PM_{10} and NO_2 concentrations at sensitive receptors due to emissions from traffic and plant (non-road mobile machinery) and from traffic management measures, utility diversion and diversion advance works during the construction phase. The change expected in traffic flows due to the construction phase have been reviewed to identify if any roads are likely to have changes above the DMRB criteria and therefore classified as affected road links and so require assessment. Emissions from construction plant are unlikely to be significant given the distance to sensitive receptors, particularly in comparison to levels of similar emissions from vehicle movements on the road network and have been scoped out of the assessment.

5.5.2. Mitigation measures will be recorded in the Environmental Management Plan (EMP) to ensure avoidance of any significant impacts, which has been developed in parallel with this report and will be updated during the detailed design phase. These mitigation measures will be based on good industry practice such as measures from the Institute of Air Quality Management (IAQM)'s 2016 G*uidance on the Assessment of Dust from Demolition and Construction* (Ref. 5-16) that are appropriate for road schemes.

Operational Effects

5.5.3. Overall the Proposed Scheme aims to provide improvements to traffic congestion along this corridor. There is potential for effects on air quality at sensitive receptors located close to the A46 Binley junction with the Proposed Scheme. Changes in the layout of the junction may change the distance between sensitive receptors and road traffic along with changes to the traffic flows and speeds through the junction. Should the proposals lead to changes in traffic movements in the wider area, there is potential for changes in air pollution at sensitive receptors located within 200m of all affected roads.

5.6. Assessment Methodology

5.6.1. The methodology for the air quality assessment for the Proposed Scheme follows the guidance provided by the *Design Manual for Roads and Bridges* and associated *Interim Advice Notes* and is discussed below. The assessment includes the following elements:

- Construction phase dust assessment
- Construction phase HGV assessment
- Construction phase traffic management assessment
- Local operational air quality assessment for public exposure and European and nationally designated habitat sites
- Compliance risk assessment
- Change in human exposure to local air quality
- Regional assessment of pollutant emissions

5.6.2. Key methodology documents of relevance to this air quality impact assessment are as follows:

- *DMRB, Volume 11, Section 3, Part 1 'Air Quality' (HA207/07)* (Ref. 5-1)
- *IAN170/12 v3: Updated air quality advice on the assessment of future NO_x and NO_2 projections for users of DMRB Volume 11, Section 3, Part 1 Air Quality* (Ref. 5-17)
- *IAN174/13: Updated advice for evaluating significant local air quality effects for users of DMRB Volume 11, Section 3, Part 1 Air Quality (HA207/07)* (Ref. 5-18)
- *IAN175/13: Updated advice on risk assessment related to compliance with the EU Directive on ambient air quality and on the production of Proposed Scheme Air Quality Action Plans for users of DMRB Volume 11, Section 3, Part 1 Air Quality (HA207/07)* (Ref. 5-19)
- *IAN185/15: Updated traffic, air quality and noise advice on the assessment of link speeds and generation of vehicle data into 'speed-bands' for users of DMRB Volume 11, Section 3, Part 1 Air Quality and Section 3, Part 7 Noise* (Ref. 5-15)
- *Defra Air Quality Management Technical Guidance LAQM.TG(16)* (Ref. 5-20)
- *Transport Appraisal Guidance (TAG) Unit A3 Environmental Impact Assessment (Ref 5-21)*

5.6.3. Detailed methodologies applied within this assessment are described below following the consideration of key environmental receptors and pollutants.

5.6.4. Throughout this assessment, reference is made to sensitive receptors. These are locations where members of the public may be exposed to and affected by air quality impacts. In relation to the Proposed Scheme, sensitive receptors are predominantly residential properties, but can also include, for example, schools, internationally and nationally designated ecosystems and allotment gardens (construction dust only). Where sensitive receptors are anticipated to be in a location for only a short period of time, then these locations will be considered against relevant short-term air quality objectives.

Key Environmental Receptors

Construction Phase

5.6.5. Sensitive receptors identified for the construction phase dust assessment are those receptors closest to the Proposed Scheme, and existing areas which would be affected

by construction works (and potential construction compounds), up to a maximum distance of 200m from the construction work's site boundary. There are no nationally designated ecosystems (such as Sites of Special Scientific Interest (SSSIs), Special Areas of Conservation (SACs) or Special Protection Areas (SPAs)) within 200m of the anticipated construction works.

5.6.6. Sensitive receptors that may be affected by construction HGV movements are those located within 200m of the Proposed Scheme (and potential construction compounds) and existing areas which would be affected by construction HGV movements.

5.6.7. Sensitive receptors that may be affected by construction traffic management include those receptors located within 200m of existing road sections that would be affected by the traffic management measures.

Operational Phase

5.6.8. A total of 79 sensitive human receptors along the affected road network have been selected and have been subject to location-specific modelling for the local operational air quality assessment. These receptors are shown on Chapter 18: Figure 5-3. The selected sensitive receptors provide a sufficient number of representative receptor locations within the study area to undertake an evaluation of the significance of air quality effects for the operational phase of the Proposed Scheme. The sensitive receptors have also been selected to represent worst case exposure of sensitive receptors near the affected road network. The receptors modelled are predominantly residential properties, with schools and hospitals also included.

5.6.9. There are two nationally designated sites of ecological value in close proximity to the affected road network. Therefore, impacts upon designated sites have been predicted for the operational phase impact assessment at the following sites (see Chapter 18: Figure 5-2) for NO_x concentrations and nutrient nitrogen deposition:

- Herald Way Marsh SSSI
- Combe Pool SSSI

Key Pollutants

5.6.10. The key pollutants considered for the construction phase dust assessment, including any demolition works, are particulate matter with an aerodynamic diameter of less than 10µm (PM_{10}) and dust (i.e. larger particles) with the potential to settle around construction sites and cause soiling or deposition effects on surfaces. The sensitive receptors potentially affected are locations of public exposure for both PM_{10} and dust (and European or nationally designated sites for exposure to dust).

5.6.11. Emissions from motor vehicle exhausts contain a number of pollutants including nitrogen oxides (NO_x), carbon monoxide (CO), carbon dioxide (CO_2), and PM_{10}. The quantity of each pollutant emitted depends upon the type of vehicle, quantity and type of fuel used, engine size, speed of the vehicle and abatement equipment fitted. Once emitted, pollutants are diluted and dispersed in the ambient air. Pollutant concentrations in the air can be measured or modelled, and then compared with statutory air quality objectives and EU limit values.

5.6.12. The air pollutants of concern in the context of the assessment of vehicle emissions are NO_2 and PM_{10} for locations of public exposure. These pollutants are the most likely to be present at some locations in concentrations close to or above their objectives or limit values (as shown in Table 5-1). Hence, changes in the concentration of these pollutants from constructing and operating the Proposed Scheme are a key focus of the assessment.

5.6.13. The air quality objectives and limit values are outlined in Table 5-1. Some pollutants have standards expressed as annual average concentrations due to the chronic way in which they affect human health or the natural environment (that is, effects occur after a prolonged period of exposure to elevated concentrations). Other pollutants also have standards expressed as 24-hour or 1-hour average concentrations due to their acute effects on human health or the natural environment (i.e. after a relatively short period of exposure).

5.6.14. The air quality objectives have been set down solely for the purposes of local air quality management. Under the local air quality management regime, local authorities have a duty to carry out regular assessments of air quality against the objectives. If it was unlikely that the objectives would have been met by the specified timeframe, local authorities were required to designate an Air Quality Management Area and prepare an Air Quality Action Plan with the aim of achieving the objectives within the set timeframes. Similarly, Defra has prepared a national air quality action plan to achieve the EU limit values in the shortest possible time with much of the work to be carried out by local authorities.

Approach to Assessment

5.6.15. The methodologies for assessing impacts for each of these assessments are addressed in turn below. The overall evaluation of air quality is based upon the construction phase assessments, local operational assessment and the compliance risk assessment.

Construction Phase Dust Assessment

5.6.16. The *Design Manual for Roads and Bridges* construction phase assessment for air quality requires the air quality assessor to identify key sensitive receptor locations that may require mitigation to reduce the effects of dust emissions and to propose methods of mitigation. These mitigation measures will be set out in the Environmental Management Plan for the Proposed Scheme (refer to Section 5.9).

5.6.17. As such, sensitive receptors located near the Proposed Scheme that may be affected during the construction phase have been identified. These receptors are within 200m of the construction site boundary and this area is shown in Chapter 18: Figure 5-4. The potential for adverse dust effects upon these receptors has been assessed qualitatively, taking into account the mitigation measures applicable to the control of construction dust as detailed in Section 5.9 of this chapter.

5.6.18. With regard to emissions from construction plant equipment, whilst these would be in use along the Proposed Scheme, air emissions from such equipment are considered to be small when compared to background concentrations. As such, significant air quality effects are not anticipated to be associated with emissions from construction plant and equipment, and thus such emissions have been scoped out of the assessment. Nevertheless, consistent with good environmental practice, mitigation measures that aim to control emissions of pollutants from construction plant and equipment are detailed in Section 5.9.

5.6.19. With regard to amenity effects (including dust), it is the aim that developers propose schemes that include appropriate mitigation measures that avoid the potential for additional complaints to be generated (that is, statutory nuisance). UK experience indicates that good site practice mitigates construction and demolition dust effectively, so that in all but the most exceptional circumstances, the significance of effects at receptors can be reduced to acceptable levels that avoid a nuisance. As such, the approach presented within the assessment has been to define applicable dust mitigation measures that can be applied during the Proposed Scheme construction phase, that when effectively applied, have the potential to reduce effects to non-significant levels.

These measures will be set out in the Environmental Management Plan for the Proposed Scheme (refer to Section 5.9).

Construction Phase HGV Assessment

5.6.20. The construction phase HGV assessment considers the additional HGV movements introduced to the road network due to construction of the Proposed Scheme. The criteria for a potentially affected route in relation to construction HGV traffic is the same as for the operational phase, as set out in guidance note *HA207/07* (Ref. 5-1) and paragraph 5.6.2. This criteria includes a change of more than 200 HGVs per day.

5.6.21. Where HGV movements are below this threshold, significant changes in air quality are not likely. If the number of construction HGVs exceeds this threshold, then a quantitative assessment should be made of the air quality impact using the same methodology as for the local operational air quality assessment.

Construction Phase Traffic Management Assessment

5.6.22. The Proposed Scheme would require some lane closures mainly out of peak hours in order to avoid traffic re-routing and traffic would continue to use the roundabout throughout the works. There is no information available on whether queuing would increase at the roundabout during the works.

5.6.23. With regard to the significance of effects professional judgement has been applied due to the qualitative nature of the assessment undertaken.

Local Operational Air Quality Assessment

5.6.24. This section describes the general approach used to assess local operational air quality effects for the Proposed Scheme. The assessment focuses on key road traffic pollutants, NO_2 and PM_{10}.

5.6.25. Where existing monitoring data indicates that exceedances of an air quality objective or limit value are likely in the opening year of a highway scheme, or proposals cannot be adequately assessed using a simple level of assessment, a detailed level assessment needs to be undertaken. Which assessment is carried out is decided upon through an understanding of the potential for significant adverse effects based on the *Design Manual for Roads and Bridges* criteria and associated *Interim Advice Notes* and the exercise of professional judgement based on experience from other similar schemes.

5.6.26. For this local operational assessment, the affected road links have been assessed at a detailed level of assessment due to the complexity of the road network in areas that are expected to be affected by the Proposed Scheme.

5.6.27. This assessment uses dispersion modelling to estimate pollutant concentrations, taking into account additional variables (e.g. meteorological data and variations in flow across the day). The detailed assessment of local air quality reported within this chapter has used the Atmospheric Dispersion Modelling System (ADMS) Roads Extra dispersion model (version 4.1.1.0) to predict road pollutant contributions at selected sensitive receptors.

5.6.28. A baseline year of 2016 was selected for local air quality impacts to match the Highways England air quality monitoring data. Predictions have been made for the following scenarios:

- Baseline year (2016)
- Do-Minimum 2021 (DM 2021): the planned year of full opening in 2021 without the Proposed Scheme

- Do-Something 2021 (DS 2021): the year of full opening in 2021 with the Proposed Scheme in place

5.6.29. On the basis of these predictions, the change in key pollutant concentrations (NO_2 and PM_{10}) associated with the Proposed Scheme has been modelled. Predictions have been verified by comparing the baseline modelling predictions and baseline air quality monitoring data (refer to Appendix 5-3). This comparison indicates that there is a close statistical correlation between the two data sets, sufficient to have confidence in the model results (see Appendix 5-3, *Table 5-3C: Verification Details, Root Mean Square Error*).

5.6.30. A key element of the local operational detailed assessment is the rate of improvement in air quality over time as cleaner road vehicles enter the national vehicle fleet. The Gap Analysis methodology outlined within *Interim Advice Note 170/12*, on the assessment of future NO_X and NO_2 projections, has been used in this assessment. The method considers Defra's advice on long-term trends related to roadside NO_2 concentrations which suggests that there is a gap between current projected vehicle emission reductions and projections based on the annual rate of observed improvements in ambient air quality. The GAP Analysis methodology, has been applied after air quality modelling and model verification. Future year modelled NO_2 predictions are adjusted to represent the observed long-term trend (LTT) profile described in *Interim Advice Note 170/12*.

5.6.31. The Gap Analysis projections are conservative and are considered to present a realistic worst-case scenario, as only a portion of the full anticipated improvements in air quality by Defra guidance are assumed to occur in the Gap Analysis results by 2021. The adjusted results from this Gap Analysis are presented in this chapter.

5.6.32. The determination of significance for the local operational air quality assessment has been undertaken using methods set out in *Interim Advice Note 174/13*. The significance criteria comprise a series of key questions as set out in paragraph **Error! Reference source not found.**.

5.6.33. Local Air Quality Management (LAQM) guidance and tools, such as the NO_x to NO_2 conversion approach and background maps, have also been used as required by the *Design Manual for Roads and Bridges* and associated *Interim Advice Notes*. Further details of the assessment methodology including the inputs used in ADMS-Roads model (including meteorology data), model post-processing (such as NO_x to NO_2 conversion) and the approach taken to model verification (including all monitoring locations used in the verification process) are presented in Appendix 5-3.

Magnitude of Change

5.6.34. With regard to road traffic, the change in pollutant concentrations compared to Do Minimum concentrations has been quantified at selected sensitive receptors. The absolute magnitudes of pollutant concentrations in the baseline and Do Minimum scenarios have also been quantified and these have been used to consider the risk of the air quality objectives being exceeded in each scenario.

5.6.35. For a change of a given magnitude (increase or decrease) in pollutant concentrations, *Interim Advice Note 174/13* contains descriptors of the magnitude of change at individual sensitive receptors. For example, a change in predicted annual average concentrations of NO_2 or PM_{10} of less than 0.4 $\mu g/m^3$ is considered to be so small as to be imperceptible. A change (impact) that is imperceptible, given normal bounds of variation, would not be capable of having a direct effect on local air quality that could be considered to be significant. The magnitude of change descriptors is banded into four classes as defined in Table 5-2. These descriptor terms differ to the terminology suggested in Chapter 4:

Environmental Assessment Methodology of this report, to ensure compliance with *Interim Advice Note 174/13*.

Table 5-2: Magnitude of Change in Ambient Pollutant Concentrations

Magnitude of Change ($\mu g/m^3$)	Value of Change in Annual Average NO_2 and PM_{10}
Large (>4)	Greater than 10% of the air quality objective
Medium (>2 to 4)	Greater than 5% but less than 10% of the air quality objective
Small (>0.4 to 2)	More than 1% of objective and less than 5% of the objective
Imperceptible (≤0.4)	Less than or equal to 1% of the objective

5.6.36. The magnitude of the change in the predicted number of exceedances of the 24-hour objective and limit value is directly derived from the predicted annual average value using the relationship defined in LAQM.TG(16) and the DMRB. The magnitude descriptors for 24-hour average PM_{10} are equal to the percentage changes set out above.

5.6.37. LAQM.TG(16) and the DMRB advises that the hourly average NO_2 objective and limit value is unlikely to be exceeded if annual average concentrations are predicted to be less than 60 $\mu g/m^3$. Therefore, this assessment evaluates the likelihood of exceeding the hourly average NO_2 objective and limit value by comparing predicted annual average NO_2 concentrations at all receptors to an annual average equivalent threshold of 60 $\mu g/m^3$ NO_2. Where predicted concentrations are below this value, it can be concluded that the hourly average NO_2 objective and limit value (200 $\mu g/m^3$ NO_2 not more than 18 times per year) is likely to be achieved.

Significance of Effect

5.6.38. All relevant receptors that have been selected to represent locations where people are likely to be present are based on potential impacts on human health. The air quality objectives and limit values have been set at concentrations that provide protection to all members of society, including more vulnerable groups such as the very young, elderly or unwell. As such, the sensitivity of receptors was considered in the definition of the air quality objectives and limit values. Therefore, no additional subdivision of human health receptors on the basis of building or location type is necessary because the receptor sensitivity already takes account of a worst case for effects on human receptors.

5.6.39. The significance of local operational air quality effects for the Proposed Scheme is based on the guidance presented in *Interim Advice Note 174/13*, which recommends that key criteria for air quality to be considered includes:

- Is there a risk that environmental standards will be breached?
- Is there a high probability of the effect occurring?
- Will there be a large change in environmental conditions?
- Will the effect continue for a long time?
- Will many people be affected?
- Is there a risk that protected sites, areas or features will be affected?
- Will it be difficult to avoid, or reduce or repair or compensate for the effect?

5.6.40. Following the collation of information to address the above questions, an informed professional judgement on the significance of local air quality effects for public exposure and nationally designated ecosystems has been established.

5.6.41. The scope of Interim Advice Note 174/13 includes the assessment of significant local air quality effects for public exposure and European or nationally designated ecosystems only. Changes in regional emissions and the assessment of construction dust impacts continue to be assessed as described in the *Design Manual for Roads and Bridges*.

Overall Assessment of Significance

5.6.42. The questions set out in paragraph **Error! Reference source not found.** above form the basis for determining likely significant local operational air quality effects for sensitive receptors. The question of how many people would be affected has been addressed by reference to the number of receptors predicted to experience small, medium and large changes in air quality. Table 5-2 provides a basis for assessment as set out in *Interim Advice Note 174/13*. Where numbers of affected receptors are above the upper thresholds listed in Table 5-3 for locations above the air quality objective or limit value, this may suggest significant air quality effects are more likely.

Table 5-3: Guideline for Number of Properties Constituting a Significant Effect

Magnitude of Change in NO_2 or PM_{10} ($\mu g/m^3$)	Number of Receptors with:	
	Worsening of air quality already above objective or creation of a new exceedance	Improvement of air quality already above objective or the removal of an existing exceedance
Large (>4)	1 to 10	1 to 10
Medium (>2 to 4)	10 to 30	10 to 30
Small (>0.4 to 2)	30 to 60	30 to 60

5.6.43. The overall significance of predicted effects on local air quality is also evaluated in the context of relevant national (such as NPSNN and NPPF) and local air quality planning policy and the findings of the compliance risk assessment.

Compliance Risk Assessment

5.6.44. The compliance risk assessment considers the potential effect of the Proposed Scheme operation upon the future compliance of zones as reported by the Defra to the European Commission.

5.6.45. An assessment of compliance with the EU Directive on *Ambient Air Quality (2008/50/EC)* has been undertaken using *Interim Advice Note 175/13*. The assessment has used the results of the local air quality modelling overlaid on the Defra compliance network (Ref. 5-22) to establish whether, for each road, the change in NO_2 concentrations, would result in:

- A compliant zone becoming non-compliant
- A delay to Defra's date for achieving compliance for the zone, that is, the change on a road link would result in a concentration higher than the existing maximum value in the zone
- An increase in the length of roads in exceedance in the zone which would be greater than 1% when compared to the previous road length

5.6.46. This assessment enables scheme assessors to undertake and report on the risk of a scheme being non-compliant with the EU Directive. The evaluation of significance has also included information on compliance risks in relation to the EU Directive.

Change in Human Exposure to Local Air Quality

5.6.47. Some roads in the affected road network will have an increase in traffic and pollution due to the Proposed Scheme whilst other roads will have a decrease in traffic and pollution. The number of properties near each of these roads will determine whether there is an increase or decrease in human exposure to pollution overall. This overall change in human exposure has been assessed according to the local air quality appraisal guidance in the *Transport Analysis Guidance (TAG) Unit A3 Environmental Impact Appraisal (Ref. 5-21).*

5.6.48. The methodology aims to quantify the change in pollution exposure at properties in the opening and design years as a result of a scheme, through the quantification of exposure for all local air quality affected roads. The methodology follows a number of steps including:

- Identification of the affected road network, which is the same as the DMRB local air quality affected road network
- Quantification of the number of properties within 0 - 50m, 50 - 100m, 100 – 150m and 150 - 200m bands, from the affected roads
- The calculation of concentrations within each band at 20m, 70m, 115m and 175m from the road centreline using the DMRB spreadsheet tool
- Calculation of property weighted NO_2 and PM_{10} concentrations
- Calculation of the total numbers of properties that improve, worsen or stay the same for each pollutant
- Calculation of an overall assessment score for NO_2 and PM_{10}

5.6.49. An overall positive score indicates an overall worsening of air quality and an overall negative score indicates an overall improvement at properties. The results of the appraisal are presented in Section 5.9. The DMRB screening method results were not verified.

5.6.50. The output of this assessment does not contribute to the overall evaluation of significance for air quality.

Regional Assessment

5.6.51. The regional assessment provides the change in pollutant emissions as a result of the operation of the Proposed Scheme.

5.6.52. The regional assessment considers changes in annual road transport emissions of NO_X, PM_{10} and CO_2 that may be brought about by the Proposed Scheme in the opening year (2021) and the design year (that is 15 years after opening, 2036) at a regional level. The Highways England DMRBv5_EFTv7 spreadsheet that was issued to accompany *Design Manual for Roads and Bridges Volume 11 Section 3 Part 1* has been used in the estimation of these emissions.

5.6.53. Emissions of NO_x, PM_{10} and CO_2 from road links in the affected road network have been included in the regional emissions calculations. In addition, CO_2 emissions from the entire road network have also been calculated for the TAG assessment. Emissions have been calculated for the following scenarios: the existing baseline (2013) (the traffic model

base case); and the future Do-Minimum and Do-Something scenarios in the opening year (2021) and design year (2036) for the Proposed Scheme.

5.6.54. The results of the assessment (annual emissions, change in emissions with the Proposed Scheme) are presented in tabular format, together with descriptive text in Section 5.10.

5.7. Assessment Assumptions and Limitations

5.7.1. The local operational air quality assessment has used detailed modelling techniques (ADMS-Roads), a comprehensive traffic dataset, Defra local air quality management tools and guidance, Highways England tools and guidance, and predictions have been checked against local recent air quality monitoring data. This approach has minimised the assumptions and limitations of the local operational air quality assessment as far as practicable and the assessment is considered proportionate and robust on this basis.

5.7.2. Due to the large size of the traffic model the manual judgement of speed banding data has been limited in scope. Traffic data for 2013 was used for air quality modelling of the base case in 2016.

5.7.3. Traffic Forecasting Report (SGA R3)' (Ref. 15-3) has been used to inform the traffic data used for the air quality and noise and vibration chapters. This uses the Coventry Area Strategic Model (CASM) to assess the impact of the proposed scheme in combination with forecast developments on the surrounding transport infrastructure. The traffic model is currently being updated to reflect regular reviews and updates, which include updates for recent developments. It is planned for the output of this model to be included in a revised air quality and noise assessment in early 2020 to confirm the findings in this environmental assessment report remain valid.

5.7.4. The latest year for which emission factors are available is 2030 so these were used for the 2036 calculations.

5.8. Design, Mitigation and Enhancement Measures

5.8.1. Environmental considerations have been taken into account during the development of the design of the Proposed Scheme. Actions that have been taken that have contributed to avoiding or reducing potential air quality effects are as detailed in Table 3-3 of Chapter 3: Assessment of Alternatives of this report.

Construction

5.8.2. Construction work is expected to last for 24 months. During this period there is the potential for changes in air quality due to dust emissions from construction activity, emissions from site plant equipment and HGVs, and also from changes in traffic flows along the Proposed Scheme and wider road network with traffic management in place.

5.8.3. The Environmental Management Plan (EMP) has been prepared and will be implemented by the selected construction contractor. The EMP includes a range of good industry practice construction phase dust mitigation measures required in all works undertaken where there is potential for adverse effects on sensitive receptors (for example, residential properties, schools, and hospitals).

5.8.4. The types of activities with the potential to generate dust during the construction phase include:

- Movement of vehicles
- Earthworks
- Piling

- Concrete works
- Construction of abutments
- Installation of barriers
- Excavation and installation of drains and communication ducts
- Surfacing works
- Utility diversion and advance works
- Installation of verge furniture and planting vegetation
- Stock piling and storage

5.8.5. The largest potential sources of dust are expected to be the earthworks, concrete works, and vehicles travelling on up to 0.62 miles (1km) on unpaved haul roads. A large volume of earth will be handled during the earthworks, with 20,145 m^3 excavated, 2,326 m^3 disposed of off-site and an additional 79,191 m^3 imported onto site.

5.8.6. The above activities would be mitigated using the mitigation measures as presented in Table 5-4.

Table 5-4: Dust Mitigation Measures

Mitigation	Mitigation Measures
Mitigation for all site: dust management	**Monitoring**
	Undertake daily on-site and off-site inspections, where receptors are nearby, to monitor dust, record inspection results, and make the log available to the local authority when asked. Liaise with the local community, logging any issues on the complaints register.
	Preparing and Maintaining the Site
	Fully enclose site or specific operations where there is a high potential for dust production and the site is active for an extensive period.
	Keep site fencing, barriers and scaffolding clean using wet methods where there is the risk of dust accumulation.
	Remove materials that have the potential to produce dust from site as soon as possible, unless being re-used on site. If they are being re-used on-site cover as described below.
	Cover, seed or fence stockpiles to prevent wind whipping.
	Operating Vehicle, Machinery and Sustainable Travel
	Impose and signpost a maximum-speed-limit of 10mph on surfaced and 5mph on un-surfaced haul roads and work areas (if long haul routes are required these speeds may be increased with suitable additional control measures provided).
	Ensure all vehicles and plants switch off engines when stationary - no idling.
	Use well maintained plant.

Mitigation	Mitigation Measures
	Use contractors or suppliers with low emission fleet vehicles
	Operations
	Ensure equipment is readily available on site to clean any dry spillages, and clean up spillages as soon as reasonably practicable after the event using wet cleaning methods.
	Waste Management
	Avoid bonfires and burning of waste materials.
Measures specific to surfacing works	Surfacing equipment (such as planer) only to be operated with any manufacturers dust abatement measures in place.
Measures specific to construction	Avoid scabbling (roughening of concrete surfaces) if possible.
	Ensure sand and other aggregates are stored in bunded areas and are not allowed to dry out, unless this is required for a particular process, in which case ensure that appropriate additional control measures are in place.
Measures specific to trackout	Dust will be controlled via suppression using water sprinkling systems when surfaces are dry.
	Heavily used areas will be covered or paved by geotextiles and swept regularly.
	Vehicles entering and leaving the site will be covered to prevent escape of materials during transport.
	Use of road sweepers on public roads where required.
	All inspections of haul routes will be recorded and any subsequent action in a site log book.
	A wheel washing system (with rumble grids to dislodge accumulated dust and mud prior to leaving the site) will be implemented for vehicles leaving the construction site.
	Minimise use of vehicles.
	Locating access points away from receptors and controlling vehicles entering the construction compound.

Operation

5.8.7. The design of the Proposed Scheme to date does not include specific air quality mitigation measures for the operational phase.

5.9. Assessment of Effects

Value (Sensitivity of Resources)

5.9.1. All relevant receptors that have been selected to represent locations where people are likely to be present are based on potential impacts on human health. The air quality objectives and limit values have been set at concentrations that provide protection to all members of society, including more vulnerable groups such as the very young, elderly or unwell. As such, the sensitivity of receptors was considered in the definition of the air

quality objectives. Therefore, no additional subdivision of human health receptors on the basis of building or location type is necessary because the receptor sensitivity already takes account of a worst case for effects on human receptors. Receptor locations are illustrated in Chapter 18: Figure 5-2.

Magnitude of Impacts

Construction Phase

Construction Phase Dust Assessment

5.9.2. There is potential for temporary adverse impacts from dust emissions to occur at sensitive receptors located close to the Proposed Scheme and construction compounds during the construction works. Within 200m of the works, there are a number of residential and commercial properties with several buildings adjacent to the site boundary which increases the sensitivity of the surrounding area. Mitigation measures would be required to avoid potentially significant temporary effects on air quality. Adoption of such measures would minimise the risks of significant adverse dust effects and statutory nuisance issues during the construction of the Proposed Scheme.

5.9.3. The two potential locations for the construction compound are shown in Chapter 18: Figure 5-3 and described in Chapter 2: The Project of this report. Properties are slightly closer to the construction compound with Option 2 (backup) than with Option 1 (preferred) but these properties are generally commercial and less sensitive than residential properties. There are a greater number of residential properties within 200m of the construction compound with Option 1 than with Option 2. As both options for the construction compounds are to the east of the A46 away from properties, the construction work itself is likely to be a greater contributor of dust to properties than the construction compounds.

Construction Phase HGV Assessment

5.9.4. The criterion for a potentially affected route in relation to construction HGV traffic is a change of more than 200 HGVs per day. Where HGV movements are below this threshold, significant changes in air quality are not likely. The number of HGV movements per day is estimated to be 33 during the construction phase so is not expected to have any significant impacts. The HGVs would access the site from the A428 Rugby Road via private access.

Construction Phase Traffic Management Assessment

5.9.5. The Proposed Scheme would require some works to the existing road network. Traffic management would be in place to minimise traffic re-routing throughout the construction phase. The existing number of lanes on the mainline would be maintained during normal hours to minimise re-routing and delays but one lane would be closed on occasions during off peak hours when traffic flows are much lower. One lane would be closed on some of the access slips to the roundabout, but two lanes would be kept open during normal hours, however, during the quieter off peak hours, this is likely to be reduced to one lane being kept open. The access slips between the A428 and the roundabout would be occasionally closed for beam lifts and a diversion in operation at these times, but the affected traffic flows are expected to be low and the timescale short so significant impacts are not expected.

Operational Phase

Localised Assessment

5.9.6. Predicted concentrations and changes in annual mean NO_2 and PM_{10} along with the predicted number of days of exceedance of the 24-hour PM_{10} objective and limit value

are presented in Appendix 5-4 for all receptors discussed in this section. Receptor locations are illustrated in Chapter 18: Figure 5-3.

5.9.7. Annual mean concentrations of PM_{10} are predicted to be within the 40 µg/m^3 objective and limit value at all sensitive receptors within the study area, both with and without the Proposed Scheme in the opening year of 2021. Additionally, all receptors within the study area are predicted to be within the objective and limit value for the number of days of exceedance of the 24-hour PM_{10} objective and limit value.

5.9.8. Annual mean concentrations of NO_2 are predicted to be within the 40 µg/m^3 objective and limit value at all sensitive receptors within the study area, both with and without the Proposed Scheme in the opening year of 2021. Additionally, all receptors within the study area are expected to be within the objective and limit value for the 99.8th percentile of hourly means as annual mean concentrations are less than 60 µg/m^3.

5.9.9. The highest annual average concentration of NO_2 in 2021 is predicted to be 32.8 µg/m^3 in the Do-Minimum scenario, which will occur at Receptor R22 near the A4082 London Road in Coventry. Whilst the Proposed Scheme would reduce concentrations at this receptor by 0.7 µg/m^3, this would remain the receptor with the highest concentration with the Proposed Scheme.

5.9.10. Changes in concentrations due to the operation of the Proposed Scheme that are classed as being larger than imperceptible are shown in Table 5-5. No large (>4 µg/m^3) or medium (>2 – 4 µg/m^3) changes in annual mean NO_2 or PM_{10} concentrations have been predicted across the network. However, some small changes have been predicted.

Table 5-5: Changes in Concentrations (µg/m^3) that are not Imperceptible

Receptor Number	Base	Do-Minimum	Do-Something	Change	Magnitude of Change
Annual Mean NO_2					
R22	**40.3**	32.8	32.1	-0.7	Small improvement
R28	28.1	25.6	26.3	0.7	Small deterioration
R33	17.4	14.0	14.5	0.5	Small deterioration
R34	26.0	20.8	21.9	1.0	Small deterioration
R37	24.1	20.2	19.7	-0.5	Small improvement
R38	22.8	19.1	18.6	-0.5	Small improvement
R39	27.5	23.4	22.8	-0.5	Small improvement
R40	30.3	26.2	25.7	-0.5	Small improvement
R50	23.9	20.6	20.1	-0.5	Small improvement

Receptor Number	Base	Do-Minimum	Do-Something	Change	Magnitude of Change
Annual Mean NO_2					
R51	27.9	24.3	22.7	-1.6	Small improvement
R52	28.0	24.5	23.0	-1.5	Small improvement
R53	21.8	18.7	18.1	-0.6	Small improvement
Annual mean PM_{10}					
R51	17.7	17.3	16.8	-0.5	Small improvement
R52	17.8	17.4	16.9	-0.5	Small improvement

5.9.11. A small deterioration (>0.4 – 2 µg/m^3) in annual mean NO_2 concentrations is predicted at three receptors (R28, R33 and R34) across the network. These receptors are south of the A46, close to the A45 and A423, where an increase in traffic flow is expected.

5.9.12. A small improvement (>0.4 – 2 µg/m^3) in annual mean NO_2 concentrations is predicted at nine receptors (R22, R37, R38, R39, R40, R50, R51, R52 and R53) across the network. The first five of these receptors are in Coventry near roads that would have a reduction in traffic due to the Proposed Scheme. The latter four receptors are near the Binley junction and would benefit due to road realignment with traffic travelling on the route through the junction rather than around the existing roundabout which brings vehicles closer to properties.

5.9.13. A small improvement (>0.4- 2 µg/m^3) in annual mean PM_{10} concentrations is predicted at two receptors (R51 and R52) across the network. These receptors are near the Binley junction and would benefit due to road realignment with traffic travelling on the route through the junction rather than around the existing roundabout which brings vehicles closer to properties. No small deterioration in PM_{10} concentrations is predicted.

5.9.14. All other changes in NO_2 and PM_{10} concentrations are predicted to be imperceptible (< 0.4 µg/m^3).

Ecosystems Assessment

5.9.15. NO_x concentrations are predicted to exceed the critical level set to protect vegetation at the site boundary of Herald Way Marsh Site of Special Scientific Interest (SSSI), both with and without the Proposed Scheme in operation in 2021. Beyond 30m of the site boundary, concentrations would be within the critical level. The predictions indicate an increase in NO_X concentrations of 3 µg/m^3 at the site boundary which is 10% of the critical level and so is considered to be of medium magnitude. At 25m from the site boundary, the increase is predicted to be 1.4 µg/m^3 which is less than 5% of the critical level so is considered to be of small magnitude. The majority of the SSSI is expected to have concentrations within the critical level.

5.9.16. A critical level has not been set for Combe Pool SSSI.

5.9.17. The air quality predictions indicate a change in nitrogen deposition of up to 0.1 kilograms of nitrogen per hectare per year (kg N ha^{-1} yr^{-1}) near the A46 with the Do-Something

scenario at Combe Pool SSSI and Herald Way Marsh SSSI. This change is considered to be imperceptible.

5.9.18. The effects are discussed in Chapter 8: Biodiversity and Appendix 5-5. In summary, the Proposed Scheme is not considered to have a significant effect on the two SSSIs.

Compliance Risk Assessment

5.9.19. The results of the local air quality operational assessment have been used to determine compliance risks with the EU Air Quality Directive, following guidance set out within *Interim Advice Note 175/13*.

5.9.20. The results of the risk compliance assessment are shown in Appendix 5-4 (Table 5.4D). A comparison between the results of the local air quality operational assessment and those links reported by Defra to the European Commission as non-compliant has found that there are no links anticipated to be non-compliant with the limit value within the air quality study area for the Proposed Scheme.

5.9.21. However, dispersion modelling carried out for Coventry City Council's Air Quality Action Plan indicates that one of the road links in the affected road network, the A4082 Allard Way (ID 7103), will exceed the limit value until 2023. Five receptors were modelled next to this road link for this environmental assessment (R22, R23, R24, R25 and H01). All of these receptors had concentrations below the limit in 2021 with improvements in annual mean NO_2 concentrations predicted of up to 0.7 µg/m^3 due to the Proposed Scheme. The A46 Coventry Junctions Upgrade is therefore expected to be beneficial for the A4082 Allard Way.

Change in Human Exposure to Local Air Quality

5.9.22. A local air quality assessment has been completed in respect of NO_2 and PM_{10} exposure to identify changes in pollution concentration at properties across the affected road network.

5.9.23. The results of this assessment are provided in Table 5-6 for NO_2 and Table 5-7 for PM_{10}.

5.9.24. The results of the assessment show that for NO_2, there is a net improvement with a negative score, although as the overall reduction is so small, the overall reduction should be considered broadly neutral in both the opening and design years. The number of properties predicted to experience an improvement or deterioration in NO_2 concentrations is broadly equal with around 3,000 properties in each category although the average change at each of these properties is very small. Therefore, there is little change in exposure to NO_2 concentrations due to the Proposed Scheme.

5.9.25. The results of the assessment show that for PM_{10}, there is a net deterioration with a positive score, although as the overall increase is so small, the overall increase should be considered broadly neutral in both the opening and design years. The number of properties predicted to experience an improvement or deterioration in PM_{10} concentrations is broadly equal with around 3,000 properties in each category although the average change at each of these properties is very small. Therefore there is little change in exposure to PM_{10} concentrations due to the Proposed Scheme.

Table 5-6: Change in Human Exposure to NO_2

Aggregated Table	0 – 50m	50 – 100m	100 – 150m	150 – 200m	0 – 200m
Total properties across all routes (Do Minimum)	872	1553	1734	1822	5981

Total properties across all routes (Do Something)	872	1553	1734	1822	5981
Opening Year (2021)					
Do Minimum NO_2 assessment across all routes	14773	22419	24726	25653	87570
Do Something NO_2 assessment across all routes	14653	22401	24729	25658	87441
Net total assessment for NO_2, all routes (II-I)	-129				
Number of properties with an improvement	2,971				
Number of properties with no change	0				
Number of properties with a deterioration	3,010				
Design Year (2036)					
Do Minimum NO_2 assessment across all routes	11124	17385	19349	20184	68041
Do Something NO_2 assessment across all routes	11056	17375	19351	20189	67971
Net total assessment for NO_2, all routes (II-I)	-71				
Number of properties with an improvement	2969				
Number of properties with no change	10				
Number of properties with a deterioration	3002				

Table 5-7: Change in Human Exposure to PM_{10}

Aggregated Table	**0 – 50m**	**50 – 100m**	**100 – 150m**	**150 – 200m**	**0 – 200m**
Total properties across all routes (Do Minimum)	872	1553	1734	1822	5981
Total properties across all routes (Do Something)	872	1553	1734	1822	5981
Opening Year (2021)					
Do Minimum PM_{10}	13124	22151	24417	25441	85134

assessment across all routes					
Do Something PM_{10} assessment across all routes	13110	22162	24425	25447	85144
Net total assessment for PM_{10}, all routes (II-I)	10				
Number of properties with an improvement	2,971				
Number of properties with no change	0				
Number of properties with a deterioration	3,010				
Design Year (2036)					
Do Minimum PM_{10} assessment across all routes	13021	21916	24142	25145	84225
Do Something PM_{10} assessment across all routes	13010	21934	24156	25156	84256
Net total assessment for PM_{10}, all routes (II-I)	31				
Number of properties with an improvement	2,971				
Number of properties with no change	0				
Number of properties with a deterioration	3,010				

Regional Assessment

Opening Year (2021)

5.9.26. The modelling results indicate that reduced emissions of NO_X and PM_{10} are anticipated on roads between the baseline situation and the opening year (2021) without the Proposed Scheme (see Table 5-8). These emission reductions between the baseline and future situation are due to projected improvements in vehicle emissions over time. A small increase in carbon dioxide (CO_2) emissions is predicted due to an increase in road traffic on the affected road network which outweighs any improvements due to improvements in fuel efficiency. However, when the entire road network is considered, there is a small decrease in CO_2 emissions between 2013 and 2021 without the Proposed Scheme. This decrease is due to improvements from more fuel efficient vehicles outweighing the increase in road traffic across the network. This indicates that the increase in road traffic is greater in and around Coventry than across the entire modelled road network.

5.9.27. Small increases in NO_X, PM_{10} and CO_2 emissions from the affected road network are predicted due to the Proposed Scheme in the opening year. These are due to an

increase in the vehicle distance travelled across the affected road network with the Proposed Scheme in place. Similarly, increases in CO_2 emissions due to the Proposed Scheme are expected from the entire road network.

5.9.28. In comparison to national CO_2 emissions targets, increases in CO_2 from the whole of the strategic road building scheme, as noted in the NPSNN, anticipated over the next 10 – 15 years are considered to be small and the increase associated with the Proposed Scheme is considered to be part of that small increase.

Table 5-8: Opening Year Regional Assessment for the Proposed Scheme

Pollutant	Baseline (2013) (tonnes)	Without the Scheme opening year (2021) (tonnes)	With the Scheme opening year (2021) (tonnes)	With Scheme (2021) Compared with:	
				Baseline (2013) without the Scheme (tonnes)	Future (2021) without the Scheme (tonnes)
Affected road network					
CO_2	91,142	98,502	103,333	12,191	4,831
NO_X	221.8	170.4	178.4	-43.4	8.0
PM_{10}	14.6	8.6	9.1	-5.5	0.5
Entire modelled road network					
CO_2	10,108,486	9,642,847	9,643,836	-465,639	989

Design Year (2036)

5.9.29. The modelling results indicate that reduced emissions of NO_X and PM_{10} are anticipated on roads between the baseline situation and the design year (2036) without the Proposed Scheme due to improvements in vehicle emissions. An increase in CO_2 emissions is predicted due to an increase in road traffic on both the affected road network and entire road network.

5.9.30. Between the future without the Proposed Scheme (Do-Minimum) and with the Proposed Scheme (Do-Something) scenarios in the design year, an increase in all emissions is predicted as a result of an increase in the vehicle distance travelled across the affected road network with the Proposed Scheme in place.

5.9.31. Predictions for the design year have been calculated using 2030 emissions as this is the limit of the projections within the DMRB screening method spreadsheet.

Table 5-9: Design Year Regional Assessment for the Proposed Scheme

Pollutant	Baseline (2013) (tonnes)	Without the Scheme, year (2036) (tonnes)	With the Scheme design year (2036) (tonnes)	With the Scheme (2036) Compared with:	
				Baseline (2013) without the Scheme (tonnes)	Future (2036) without the Scheme (tonnes)
Affected road network					
CO_2	91,142	106,959	113,851	22,709	6,891
NO_X	221.8	124.9	132.7	-89.1	7.8
PM_{10}	14.6	9.3	10.9	-3.7	1.6
Entire modelled road network					
CO_2	10,108,486	10,538,765	10,548,598	430,282	9,833

Significance of Effects

5.9.32. The significance of the operational air quality effects as a result of the Proposed Scheme is evaluated in Table 5-10. The numbers in brackets set out the threshold for significant effect. This table focuses on key locations where concentrations of NO_2 may be greater than the air quality objective and limit value.

5.9.33. No locations would be affected by potentially significant changes in NO_2 or PM_{10} with the Proposed Scheme.

Table 5-10: Numbers of Properties Affected, Local Operational Assessment

Magnitude of change in annual average NO_2 ($\mu g/m^3$)	Total Number of Receptors with:	
	Worsening or air quality already above objective or creation of a new exceedance	Improvement of an air quality already above objective or the removal of an existing exceedance
Large (>4)	0 (1 to 10)	0 (1 to 10)
Medium (>2 to 4)	0 (10 to 30)	0 (10 to 30)
Small (>0.4 to 2)	0 (30 to 60)	0 (30 to 60)

5.9.34. Table 5-11 presents supporting information concerning the key question of whether many people would be affected.

Table 5-11: Evaluation of Local Operational Air Quality Significance

Key Criteria Question	Scheme Option Yes/ No	Supporting Information
Is there a risk that environmental standards will be breached?	No	Annual average concentrations of NO_2 and PM_{10} are within the objective and limit value in the opening year (2021), both with and without the Proposed Scheme.
Will there be a large change in environmental conditions?	No	No large changes are predicted.
Will the effect continue for a long time?	No	Not Applicable
Will many people be affected?	No	There are no receptors predicted to experience a detrimental change in pollutant concentrations above the objective and limit value.
Is there a risk that designated sites, areas or features will be affected?	No	A critical level has been set for Herald Way Marsh SSSI. The majority of the SSSI will have concentrations within the critical level in the opening year but a 30 m band near the A46 is expected to exceed with a small increase in concentrations due to the Proposed Scheme at 25 m from the SSSI boundary. A critical load has been set for Combe Pool SSSI. An imperceptible change is expected due to the Proposed Scheme. These changes are not considered to have a significant effect on the SSSIs.
Will it be difficult to avoid or reduce or repair or compensated for the effect?	No	No mitigation is required.
On balance is the overall effect significant?	No	See below.

Key Criteria Question	Scheme Option Yes/ No	Supporting Information
Evidence in support of professional judgement. A comparison between the results of the local operational air quality assessment and those links reported by Defra to the European Commission as non-compliant has found that there are no affected links within the study area that are reported by Defra as non-compliant in the Proposed Scheme opening year (2021). However, modelling carried out for Coventry City Council's Air Quality Action Plan indicates that one road link in the affected road network could exceed the limit value in 2021, this is the A4083 Allard Way. However, the Proposed Scheme is predicted to be beneficial for air quality on this road link. There is therefore considered to be a low compliance air quality risk for the Proposed Scheme. All receptors are predicted to have annual average concentrations of NO_2 and PM_{10} that are within the air quality objective and limit value in the Proposed Scheme opening year (2021), both with and without the Proposed Scheme. No receptors with concentrations above the objective and limit value are predicted to have small, medium or large changes in concentrations. It is therefore considered that there would not be a significant effect for air quality.		

5.9.35. Temporary effects due to fugitive emissions of dust during construction are not considered to be significant (with appropriate mitigation). Emissions from HGVs and traffic management are not considered to be significant.

5.9.36. The air quality assessment has presented the information required within the NPSNN and NPPF. The results of the assessment suggest that the air quality effects of the Proposed Scheme are consistent with relevant national and local planning policy. Therefore, it is considered that the Proposed Scheme would not have a significant effect on air quality.

Monitoring

5.9.37. It is not proposed that any monitoring is required to validate the predicted concentrations in this assessment.

6. CULTURAL HERITAGE

6.1. Introduction

6.1.1. This chapter identifies and assesses the potential significant environmental effects of the proposed scheme on heritage assets (archaeological remains, historic buildings and historic landscapes). It should be read with reference to the description of the proposed scheme description in chapter 2.

6.1.2. This chapter should be read in conjunction with Chapter 18: Figures 6-1 to 6-3 and Appendix 6-1 (Gazetteer of cultural heritage assets).

6.1.3. The objective of this assessment is to identify the potential effects upon cultural heritage receptors that are likely to arise from construction and operation of the proposed scheme.

6.1.4. The assessment has been prepared in accordance with the *Design Manual for Roads and Bridges (DMRB), Volume 11, Section 3, Part 2, Cultural Heritage* (Ref. 6-1).

- This chapter of the EAR has been undertaken by competent experts with relevant and appropriate experience: Senior Archaeological Consultant BA Hons, MA, MCIfA
- Built Heritage Consultant MEng, MSc
- Associate Director, Archaeology & Cultural Heritage, MA Hons, MA MCIfA MCIL CL

6.2. Legislative and Policy Context

6.2.1. National legislation relevant to archaeology and cultural heritage comprises:

- H.M. Government, *Ancient Monuments and Archaeological Areas Act 1979* (Ref. 6-2)
- H.M. Government *Planning (Listed Buildings and Conservation Areas) Act 1990* (Ref. 6-3)

6.2.2. The *Ancient Monuments and Archaeological Areas Act 1979* deals with the designation and statutory protection of Scheduled Monuments, which are of national importance. The Secretary of State maintains the schedule of monuments. As work within a Scheduled Monument is illegal without appropriate consent, the Act also deals with the consent process. Consents are applied for through Historic England.

6.2.3. The *Planning (Listed Buildings and Conservation Areas) Act 1990* deals with work to listed buildings and to areas designated as Conservation Areas. Section 66 of the Act states that in considering whether to grant permission for development which affects a listed building or its setting, the local planning authority or, as the case may be, the Secretary of State shall have special regard to the desirability of preserving the building or its setting or any features of special architectural or historic interest which it possesses. By virtue of *Section 1(5)* of the Act, a listed building includes any object or structure within its curtilage.

6.2.4. Conservation areas are areas of special architectural or historic interest, the character or appearance of which is desirable to preserve or enhance. Section 72 requires that special attention should be paid to the desirability of preserving or enhancing the character or appearance of conservation areas.

6.2.5. The Act also deals with required consents. Work to alter or extend listed buildings and

certain works within Conservation Areas is restricted without appropriate consents.

6.2.6. The Department for Communities and Local Government *National Planning Policy Framework* (Ref. 6-4) provides the guiding principles for conserving and enhancing the historic environment. It sets out criteria which should be considered when assessing the significance of cultural heritage assets.[2]

6.2.7. The Department for Communities and Local Government Planning Practice Guidance provides a web-based resource in support of the NPPF, with particular guidance on matters relating to protecting the historic environment in the section *Conserving and Enhancing the Historic Environment* (Ref. 6-5).

6.2.8. Local planning policy comprises the Coventry Local Plan 2011 – 2031 (Ref. 6-6),the *Rugby Borough Council Local Plan 2011 - 2031* (Ref. 6-7), and the *Coombe Abbey Conservation Area Appraisal 2010* (Ref. 6-8). These policies deal with minimising impact upon assets and their setting, as well as proposals to enhance parks and gardens where possible.

Coventry City Council Local Plan 2011 - 2031

6.2.9. The Coventry City Council Local Plan, adopted in September 2019, outlines policies and guidance for the historic environment. Policy HE1 outlines the Councils commitment to reviewing their existing Conservation Areas and the designation of new ones.

6.2.10. Policy HE2 'Conservation and Heritage Assets' states that in order to help sustain the historic character, sense of place, environmental quality and local distinctiveness of Coventry, development proposals will be supported where they conserve, and, where appropriate, enhance those aspects of the historic environment which are recognised as being of special historic, archaeological, architectural, artistic, landscape or townscape significance.

The Rugby Borough Council Local Plan 2011 - 2031

6.2.11. The Ruby Borough Council Local Plan was adopted in June 2019 and outlines policies and guidance for the historic environment. Policy SDC3 'Protecting and Enhancing the Historic Environment' details that development proposals will be supported that sustains and enhances the significance of the Borough's heritage assets including listed buildings, conservation areas, historic parks and gardens, archaeological, historic landscapes and townscapes. Development proposals affecting the significance of a designated or non-designated heritage asset and its setting will be expected to preserve or enhance its significance.

Coombe Abbey Conservation Area Appraisal

6.2.12. This document is an appraisal of the Coombe Abbey Conservation Area. The principal objectives of the document are to define and record the special interest of the Conservation Area to ensure there is understanding of what is worthy of preservation,

[2] The term significance is defined in NPPF, 2019 as 'The value of a heritage asset to this and future generations because of its heritage interest. The interest may be archaeological, architectural, artistic or historic. Significance derives not only from a heritage asset's physical presence, but also from its setting. For World Heritage Sites, the cultural value described within each site's Statement of Outstanding Universal Value forms part of its significance.'

and to assess the action that may be necessary to safeguard this area and put forward proposals for its enhancement.

Other Guidance

6.2.13. This appraisal follows relevant elements of key guidance, including the following:

- *Design Manual for Roads and Bridges (DMRB) Volume 11 Environmental Assessment Section 3 Part 2 Cultural Heritage*
- *Design Manual for Roads and Bridges Volume 10, Section 6, Part 1: HA 75/01 – Trunk Roads and Archaeological Mitigation (*Ref. 6-9*)*
- *Historic England Good Practice Advice Note GPA3, The Setting of Heritage Assets (2nd edition, Historic England 2017) (*Ref. 6-10*)*
- *Chartered Institute for Archaeologists, Code of Conduct (CIfA 2014) and Standard and Guidance for Historic Environment Desk-Based Assessment (*Ref. 6-11*)*

6.2.14. In addition, the Department for Transport's *National Policy Statement for National Networks* (Ref. 6-12) contains guidance pertaining to the decision making process for the Secretary of State when there is a potential for substantial harm to designated heritage assets.

6.3. Study Area

6.3.1. The study area has been designed to inform the potential for archaeology, historic buildings and historic landscape to be present and therefore extends beyond areas of physical impact.

6.3.2. The study area for non-designated heritage assets, including buried archaeology, comprises a 300m radius surrounding the proposed scheme boundary and including compound locations. This is in line with the *Design Manual for Roads and Bridges* cultural heritage guidance, and professional judgement, which took into account the size of the proposed scheme, the density of heritage assets in the vicinity, and the likely potential for archaeological preservation. This study area was set out in section 6.1 of the A46 Coventry Junction Upgrade Environmental Scoping Report (HE551486-ACM-EGN-A46_SW_000_Z-LE-001), and was judged as appropriate to provide the context of and potential for surviving archaeological remains on and within the vicinity of the proposed scheme.

6.3.3. In accordance with the findings of the Landscape and Visual section of the scoping report, the study area for designated cultural heritage features, which includes listed buildings has been extended to incorporate the Zone of Visual Influence of the proposed scheme. This comprises a larger 0.62 miles (1km) study area surrounding the proposed scheme, in order to assess the potential effects on designated heritage assets.

6.4. Baseline Conditions

6.4.1. This section presents a description of the existing conditions, with reference to Chapter 18: Figures 6-1, 6-2, and 6-3, which illustrate the archaeological assets, built heritage assets, and historic landscape, respectively.

6.4.2. The numbers in brackets within the text refer to the assets shown in Chapter 18: Figure 6-1 and detailed in Appendix 6-1. Non-designated assets recorded within the Warwickshire or Coventry HERs are given numeric references prefixed by MWA or MCT

respectively, and designated assets are prefixed by their National Heritage List for England (NHLE) numeric reference.

6.4.3. Within the 300m study area there are 23 non-designated assets, one listed building and one registered park and garden, as illustrated in Chapter 18: Figure 6-1. A total of 16 previous archaeological investigations (events) have also been recorded, as detailed in Appendix 6-1.

6.4.4. There are no world heritage sites, scheduled monuments, or registered battlefields within the study area. The grounds of Coombe Abbey are designated as a Grade II* Registered Park and Garden, and Coombe Abbey Conservation Area is located within the eastern extents of the study area. Although not within the archaeological study area, the grounds of Coombe Abbey encompass a single scheduled monument comprising a mound located to the south of the abbey, approximately 0.93 miles (1.5km) to the east of the 300m study area (NHLE 1005765). It is not anticipated that the proposed scheme would have any impact upon this feature, which is screened by distance and intervening topography and has therefore been scoped out of the assessment.

Topography and Geology

6.4.5. The land topography is relatively flat at approximately 85m above ordnance datum (AOD) in the centre of the study area, around the Binley junction roundabout. Moving north, the land undulates, falling gently in height from the Binley junction to approximately 75m above ordnance datum before rising again and then falling to approximately 75m above ordnance datum at the Walsgrave roundabout, which is located approximately 0.62 miles (1km) to the north of Binley junction.

6.4.6. The study area is underlain entirely by deposits of the Mercia Mudstone Group. Superficial deposits are present throughout the study area, except in the low lying areas around Coombe Pool and locally to the south of Brinklow Road overbridge. The superficial geology comprises a sequence of interbedded fluvial deposits and glacial till (Ref. 6-13). The majority of the study area comprises topsoils classified as slowly permeable, freely draining slightly acid soils (Ref. 6-14).

Archaeology

6.4.7. There are no sites of prehistoric date recorded within the study area. The scheduled monument (1005765) located within the grounds of Coombe Abbey (outside of the 300m archaeology study area for non-designated assets) is tentatively recorded as a possible Bronze Age round barrow. However, it may also have post-medieval origins as a gazebo mound. Overall, its provenance is uncertain.

6.4.8. The earliest activity in the archaeological record is Roman in date (AD 43 to 410) and comprises two records located to the south-west of the Binley junction, in close proximity to the edge of the carriageway. Two of these assets are recorded on opposing sides of the carriageway approximately 450m south-west of the junction. These comprise a gully, linear feature and a pit (MCT16604), which were identified during a 2002 watching brief relating to pipeline works (to the west of the carriageway), and a pit containing pottery and loom weights (MCT205; MWA8279), which was identified to the east of the carriageway in 1987, during works relating to the original construction of A46.

6.4.9. There are two sites of early medieval date (AD 410 to 1066) recorded in the study area. These are both areas of managed woodland located adjacent to the current A46. Piles

Coppice (MWA8763) is located directly to the east of the A46 carriageway and consists of wood banks, a deer park bank, and evidence of ancient coppicing. Binley Common Wood (MWA8764) is located adjacent to the Binley junction and was likely a former grazed common wood. The woodland has wood banks, a possible medieval *trench* (a ditch and cleared strip to deter highway robbers on the Rugby Road), an area of ridge and furrow, and evidence of ancient coppicing.

6.4.10. No sites of a medieval date (1066 to 1500) are recorded within the study area although the management of the aforementioned woodlands would have extended throughout this period, and the presence of ridge and furrow at Binley Common Wood (MWA8764) indicates medieval arable farming. There is a site of ridge and furrow recorded just to the south of the study area (MWA12051) near Lower Farm.

6.4.11. Fifteen assets of a post-medieval date (1500 to 1900) are also recorded. These include one listed building which is discussed below. Other than extant buildings, the post-medieval assets largely comprise landscape and industrial activity, including features recorded within the landscape park of Coombe Abbey (MWA3733), located at the north-eastern extent of the study area. Other notable sites recorded include a disused brickworks, a kiln and several clay pits (MWA3732; MWA2848) which are depicted on the 1888 Ordnance Survey (OS) map, west of the present Binley junction (A428/A46 roundabout). The 1778 Craven Estate Map of Binley records this area as an enclosure called Homeward Claylands Field, suggesting that clay extraction was taking place here from at least the late 18th century. The presence of the northernmost of these features (MWA3732) is apparent through analysis of Light Detection and Ranging (LiDAR) imagery, which shows a number of large hollows, likely associated with clay extraction, directly to the south of the Coombe Abbey boundary.

6.4.12. A gravel pit (MWA3733) is also recorded within Coombe Abbey Deer Park. Big Rough Wood (MWA8765), an area of managed woodland in use during this period, and containing semi-natural and possibly ancient coppiced tree communities, is recorded approximately 40m to the east of the Binley junction.

6.4.13. There are a number of records related to past transport infrastructure in the study area. These include a Victorian road illustrated on the 1888 OS map (MCT15374) and the turnpike road from Coventry to Market Harborough (MWA4788). The railway line (still extant) that crosses the survey area on an east-west orientation is also recorded. Originally named the London and North Western Railway line (MCT16533; MWA7563), the line was opened in 1838.

6.4.14. The modern period (1900 to present) is represented by a single archaeological site. This comprises 20th century building remains (MCT16483) encountered during 1994 pipeline works (ECT93).

6.4.15. The remaining sites are of unknown date and include a group of ditches (MWA12053) identified on aerial photographs. The southern-most may be the remains of a field boundary, while the others could be post-medieval drainage ditches. Two further sites comprise an undated charcoal deposit (MCT16484) encountered during 1994 pipeline works (ECT93), and a ditched and banked enclosure (MWA7179), visible as an earthwork, which was identified within the boundary of Piles Coppice (MWA8763) during a walkover survey prior to proposed water pipeline works (ECT327).

6.4.16. A total of 16 previous archaeological investigations (events) have also been recorded.

These comprise five watching briefs, two programmes of field-walking, three desk-based assessments, an excavation, and five other assessments including an assessment of the historic landscape of Coombe Abbey Country Park (EWA9683).

6.4.17. The previous intrusive investigations are largely associated with the construction of the A46 road in the late 1980s and include the two watching briefs (ECT294; ECT294) that identified Roman remains located at the southern extent of the site.

6.4.18. Ground investigation works carried out in May 2017 (Ref. 6-16) have identified, through window samples, that significant areas of the central part of the site comprise made ground. Either side of the Binley junction, layers of made ground have been encountered at depths of between 0.20m and 2.0m below the ground surface. The presence of these layers, in the area of where the intrusive groundworks for the graded section of the road will be carried out, considerably limit the potential for encountering previously unknown archaeological remains.

Archaeological Potential

6.4.19. There is potential for previously unrecorded archaeological remains to be present along the route. While remains of any period cannot be discounted, remains associated with Roman settlement activity and post-medieval landscape management and industrial activity are considered to be most likely to be encountered.

Historic Buildings

6.4.20. Designated assets have been considered within this report within a study area of 0.62 miles (1km) from the proposed scheme boundary, where they fall within the Zone of Visual Influence presented in Chapter 18: Figures 7-2 a-d. Non-designated assets have been considered within 300m.

6.4.21. A site visit was undertaken on 23 October 2017 in order to assess the setting of the assets. This was extended beyond the 0.62 miles (1km) area where there was potential for a key relationship to be affected.

6.4.22. Within the 1km study area there are one Grade I, two Grade II*, and 18 Grade II listed buildings, one registered park and garden and one conservation area, as illustrated in Chapter 18: Figure 6-2. There are ten additional listed buildings that, although do not fall within the study area, are associated with Coombe Abbey Registered Park and Garden so have been considered as part of that asset. The built heritage assets are included in Appendix 6-1.

Coombe Abbey

6.4.23. The Grade II* Coombe Abbey Registered Park and Garden (NHLE 1000408) encompasses Coombe Abbey Conservation Area. Although the park extends beyond the conservation area boundary to include agricultural land to the east, the significance and setting of the assets are largely the same and have been discussed as one. In addition, a number of listed buildings, including the Grade I listed Coombe Abbey (NHLE 1233485), lie within the designated area. Due to the relationship between the assets, their significance has been discussed below, alongside the contribution they make to the wider Coombe Abbey.

6.4.24. The current form of the park survives from the late 18th century when Capability Brown (birth name Lancelot Brown) undertook major landscape works around the existing

abbey. The formal gardens to the west of the abbey date from the mid and late 19th century as they were laid out by William Andrews Nesfield and William Miller. They incorporate elements of the original late 16th and early 17th century formal gardens. The park was designed to form an appropriate setting for Coombe Abbey.

6.4.25. The main access to the park is through two Grade II listed gate piers (NHLE 1276599 and NHLE 1233488) marking the beginning of a formal avenue of trees leading to the abbey. A mid-19th century bridge (NHLE 1233485) over a medieval-style moat to the south of the abbey leads to a circular driveway set within a courtyard. The moat continues to the west where it meets the Italian-style formal gardens to the west of the abbey and ends up into a late 18th century lake designed by Capability Brown. Coombe Abbey, a Grade I listed building, is a former Cistercian Abbey of 12th century origins with late alterations and additions, constructed of sandstone ashlar with tiled and slate roofs. Coombe Abbey comprises three ranges arranged around a courtyard. The west elevation was rebuilt in the 17th century, the north part is seven windows wide with a 20th century hipped roof and a central pediment while the south part comprises three gable elevations, two storeys with attics. Neo-Norman arches survive on the ground floor of the east elevation.

6.4.26. The lake dominates the landscape and at its west end encircles a small group of buildings comprising a former menagerie and its associated buildings. The most prominent building in this group is the Grade II* The Woodlands, a former Menagerie viewing lodge that was built in the late 18th century with 19th century additions. The Woodlands (NHLE 1233533) is two storeys, constructed of sandstone ashlar with brick under a slate roof. The plan of this building is quite complex with an octagonal tower to the south, surmounted by a dome, a central range and a projecting cross-wing to the north.

6.4.27. Individual buildings are not common within the park. Where present, they illustrate the different phases of the park's development. These include the Boat House (NHLE 126492, Grade II) located to the south of the lake which is a single storey building attributed to Capability Brown. The Grade II* West Lodge (NHLE 1233532) belongs to the same development phase. It is two storeys high and was built in the form of a triumphal arch as a lodge, but has been converted into a house.

6.4.28. Within the extended area of the registered park is a pair of listed farm buildings associated with Coombe Abbey situated in the southern part of the western avenue. These include a Grade II listed Old Lodge Farmhouse (Grade II, NHLE 1034896) and associated barn (NHLE 1034897) to the south. They both date from the 17th century with 19th century additions and alterations. At the easternmost point of the park sits the former East Lodge to Coombe Abbey (NHLE 1233489). It dates from the 1770s and was built in Gothic Revival style probably designed by Capability Brown.

6.4.29. Historically, the setting of the conservation area was entirely rural as it was surrounded only by fields, with the hamlet of Binley located to the south-west. Coombe Abbey has retained most of its rural setting however, modern development at Binley and more significantly, the construction of A46, has disrupted to a certain extent the original setting.

6.4.30. The *Coombe Abbey Conservation Area Appraisal* (RBC 2010) identifies a series of key views and vistas in the park (ibid., p. 22). These include views of the abbey, particularly the view of the abbey from the south gate piers framed by tree avenues, views of the abbey and the moat from the south as well as views of the abbey and the formal west

gardens. Views of the lake within the park are of importance and specifically distant views towards the west part of the lake and the park that draw the attention away from the abbey. Views of the Menagerie and surrounding farm buildings are of significance and can be experienced from within the Old Deer Park. Views of the gatehouse to the West Lodge, a previous grand entrance into the site help our understanding of the site and its history.

Assets beyond Coombe Abbey

6.4.31. A single Grade II listed building, the Cocked Hat Restaurant and Hotel (NHLE 1365086), is located just to the west of Binley junction. This is a late 17th century farmhouse (known as Binley Common Farm) with mid to late 19th century additions and alterations as well as 20th century alterations. It is two storeys with attics, constructed of brick and sandstone dressings. The historic setting of the asset has been completely lost due to the extensive redevelopment of its surroundings, the development of Binley Common (now Binley Woods), the extension and development of Binley, and most importantly the construction of A46 to the immediate east of the asset.

6.4.32. A group of three listed buildings associated with Hungerley Hall Farm are located approximately 80m to the north-west of the proposed scheme. The group consists of Hungerley Hall Farmhouse (NHLE 1265694), a barn approximately 50m to the north of the farmhouse (NHLE 1226789) and a granary, cowshed and stable range approximately 15m north-west of the farmhouse (NHLE 1265638). All the farm buildings including the farmhouse are grade II listed. They are all constructed of brick and have tiled roofs, the farmhouse dates from the late 17th or early 18th century while the other farm buildings were constructed a bit later in the 18th century. Historically, the setting of this farm was mainly agricultural, located just north-west of the Coombe Abbey Registered Park and Garden. However, the construction of Coventry Eastern Bypass and the development of Stoke and Binley has had a considerable impact upon the setting of the farm such that the original setting has been reduced significantly and the farm is now separated from the Registered Park and Garden by the bypass.

6.4.33. Eight listed buildings are located in the settlement of Binley in the north-west of the study area, approximately 0.62miles (1km) to the west of the A46, as illustrated in Chapter 18: Figure 6-2. These can be further divided into three groups. Four Grade II listed buildings are located on Brinklow Road. Numbers 1 and 2 Brinklow Road (NHLE 1076631) are of timber frame construction with whitewashed brick nogging that was refaced with whitewashed brick in the 18th century. Numbers 6 and 8 Brinklow Road (NHLE 1076632 and 107633) form one timber frame building that dates from the late 16th or early 17th century. Numbers 10 and 12 Brinklow Road (NHLE 1076634) is probably the oldest building of this group as it dates from the 16th century. It is single storey with attics constructed of timber frame and re-fronted with red brick and number 10 with whitewashed pebbledash.

6.4.34. Two Grade II listed buildings stand on the western side of Brandon Road. Number 22 (NHLE 1342904) dates from the 18th century; it is two storeys, constructed of red brick with a tiled roof. Number 34 (NHLE 1342922) dates from the 17th century or earlier. It is of timber frame construction with whitewashed pebbledash and an old tiled roof. The north elevation is two storeys while to the South the building appears single storey with gabled dormers in the roof.

6.4.35. Further west stands the only Grade I listed building with the study area, the Church of St Bartholomew (NHLE 1076629). The church forms a group with the Grade II Vicarage (NHLE 1076630) to the north-west. The church was built between 1771 and 1773 for William, Lord Craven of Coombe Abbey. It is constructed of ashlar that has now been washed over with cement. There is a Doric portico at the north entrance and an octagonal cupola on the roof.

6.4.36. The setting of these buildings has been changed over the years and they are now surrounded by modern development. The proposed scheme does not form part of the setting of these listed buildings and there are no views towards and from the heritage assets.

Non-designated Heritage Assets

6.4.37. Coventry City Council has produced a list of locally listed heritage assets. There are no locally listed non-designated heritage assets within the 300m study area. A pair of cottages, at the entrance of The Woodlands, has been identified in the Coombe Abbey Conservation Area Appraisal as an important unlisted building that makes a positive contribution in the conservation area.

Historic Landscape

Coventry

6.4.38. Coventry City Council published its Coventry Historic Landscape Characterisation (HLC) in 2013 (Ref. 6-15). Five HLC Areas have been identified in the report that fall within the study area. These include the following:

- HLC Area 7 Willenhall Character Area
- HLC Area 8 Binley Character Area
- HLC Area 9 East Binley Character Area
- HLC Area 28 South Sowe Character Area
- HLC Area 43 Dorchester Way Character Area

6.4.39. The historic landscape of Coventry is dominated by post-medieval landscape features. The most prominent of these is a series of 18th century enclosed fields. In addition to these, there are numerous 19th century arable fields. The woodlands in the area include ancient managed woodland, including Willenhall Wood, three Victorian plantations and two areas at Piles Coppices. Other features include the River Sowe, as well as numerous meadows and post-medieval ponds throughout the area. Built landscapes consist of post-medieval roads, two bridges and a farm settlement and homestead plot at Hungerley Hall Farm.

6.4.40. Modern development including the construction of the A46 has affected the historic landscape of Coventry to a great extent. Industrial and commercial development within HLC Area 7 as well as residential development in HLC Areas 8, 9 and 43 has eroded most of the historic landscape features. The north of the HLC Area 28 comprises large, irregular-shaped agricultural fields bounded by hedgerows creating a field pattern that has survived since the mid-18th century Sowe Inclosure.

Warwickshire

6.4.41. Most of the historic landscape in this area comprises field systems. These range from medieval piecemeal enclosures, post-medieval irregular fields, as well as very large post-war fields and other later 20th century re-organised fields. Historical woodland is also well represented. There are ancient woodlands, a post-medieval coppice and three plantations. In addition, the post-medieval designed landscape of Coombe Abbey wood and Country Park are a significant part of the historic landscape of the area. Built features include the Rugby to Coventry railway, the post-medieval farm which has become the Cocked Hat Restaurant and Hotel, and three modern settlements at Binley Woods.

6.4.42. The historic landscape to the east of the A46 has remained mostly rural except for the modern development at Binley Woods. However, the construction of the existing A46 has destroyed most of the historic landscape features near the proposed scheme.

6.5. Potential Impacts

Construction

6.5.1. Pre-construction and construction stage proposed scheme-related impacts upon archaeology, built heritage and historic landscape may be related to:

- Ground investigations
- Site clearance stage (for example, removal of trees and vegetation; fencing; traffic movement)
- Road construction (for example: topsoil stripping; excavations for demolition, drainage, shallow foundations, borrow pits, decontamination etc.; construction traffic movement; siting of construction sites; piling; drainage and recharge; landscaping and earth-mounding; spoil disposal; signage, fencing etc.; installation of lighting scheme; road alignment; and planting)
- Other environmental mitigation, such as ecological pond creation, landscape planting and other screening, and noise reduction measures

6.5.2. Desk-based research indicates evidence of Roman settlement and industrial activity, as well as medieval landscape management and agricultural activity in the vicinity of the proposed scheme, and it is possible that remains relating to this activity may survive below the proposed scheme footprint.

6.5.3. Any intrusive groundworks related to the proposed scheme have the potential to damage or remove previously unknown buried archaeological remains. Construction traffic movement may result in the rutting or compaction of archaeological deposits. Excavations may lead to the desiccation of waterlogged archaeological deposits. Damage may also be caused by changes to hydrology and chemical alteration. The setting of archaeological sites may also be impacted by the proposed scheme.

6.5.4. Built heritage assets may be impacted by intrusion on setting, vibration damage to historic structures and foundations, and damage to building fabric by pollutants. The proposed scheme may also introduce the screening of intrusive elements and improved lighting scheme systems which can impact less on the night time ambience.

6.5.5. The historic landscape may experience intrusion on setting. The historic landscape has already experienced removal of historic landscape features, truncation, and severance related to the existing A46 and peripheral industrial development which have disrupted the integrity of the historic landscape, changed historic land-use patterns, and introduced

urban features.

6.5.6. Two locations for temporary construction compounds have been proposed directly to the east of the A46, on either side of the Binley junction. Although the preferred location has not been confirmed at present, it will be situated within the 300m study area. Medieval and post-medieval landscape use is recorded on both sides of the Binley junction. The stripping of these areas for use as a compound have the potential to physically impact on any near-surface archaeological remains and earthworks. Due to the temporary use of the compound, there will be no discernible effect on the setting of other nearby heritage assets.

6.5.7. The potential compound locations will also encompass permanent drainage ponds, in proximity to the eastern extent of the carriageway. Within the proposed northern compound, the depth of the bottom of the pond would be at a reduced level of 73.4m above ordnance datum, while the bottom of the pond within the proposed southern compound would be located at 82.75m above ordnance datum. These will both necessitate significant excavation works during their construction, and therefore have the potential to disturb any previously unrecorded archaeological remains.

6.5.8. The setting of heritage assets located within the vicinity of the site could also be altered following the construction of the proposed scheme. The proposed scheme includes plans for a graded (raised) section of carriageway over the Binley junction. There are five Grade II listed buildings within the study area and the Grade II* listed parkland and Conservation Area of Coombe Abbey is located at the north-eastern extent of the study area. The inter-visibility of the site from these assets needs to be assessed. At present, Coombe Abbey, and the surrounding parkland and Conservation Area are well screened from the area of the proposed scheme by dense layers of trees. These are largely deciduous however, and screening may be reduced during the autumn and winter months.

6.5.9. There is also likely to be an impact on the setting of the Cocked Hat Restaurant and Hotel, which has been located in a setting adjacent to the A46 since the construction of the road in the late 1980s. The height of the above grade section of carriageway may lead to a greater visual impact on these sensitive receptors than the road does in its present configuration.

Operation

6.5.10. Operational impacts of the proposed scheme may include:

- Impact of expanded road infrastructure (tarmacked areas, earth banks etc.) on the setting of the listed parkland, conservation area and listed building
- Impact of graded (raised) section of the road surface in the vicinity of the Binley junction upon the setting and character of heritage assets
- Impact of traffic movement on the setting of the listed parkland, conservation area, and listed building
- Impact of changes to lighting on the setting of the listed parkland, conservation area, and listed buildings
- The maintenance of drainage ditches and the establishment and growth of any planting may impact upon buried archaeological remains

6.6. Assessment Methodology

Consultation

6.6.1. An environmental scoping report was disclosed to stakeholders in December 2017, welcoming feedback on the proposed methodology and approach for this assessment.

6.6.2. In its consultation response, the Conservation and Archaeology Officer for Coventry City Council agreed that the potential for remains within the area of the existing highway is limited, and that the stripping of the proposed compound locations has a far greater potential for exposing archaeology, and any monitoring should concentrate on these areas.

6.6.3. At the time of writing, no consultation response had been received from a representative of Warwickshire County Council.

6.6.4. Historic England responded to the scoping report and outlined that the development could potentially impact upon designated heritage assets and their settings in the area around the site. It was also advised that the assessment (this document) should consider, where appropriate, the likelihood of alterations to drainage patterns that might lead to in-situ decomposition or destruction of below ground archaeological remains and deposits.

Data Collection

6.6.5. The baseline has been informed by collating data on known designated and non-designated heritage assets from the following sources:

- Historic England's National Heritage List for England (NHLE) (designated heritage assets)
- Warwickshire Historic Environment Record (HER) (non-designated heritage assets and historic landscape character) – updated data (Warwickshire HER Search reference 19/217) received on 13.08.2019
- Historic Environment Archive Service
- Warwickshire County Council, Coventry City Council and Rugby Borough Council (details of locally listed buildings and Conservation Areas)
- Data was ordered from the Coventry Historic Environment Record (HER) in 2017 however due to technical issues within the HER, an updated 2019 data search has been unable to be conducted and it was agreed with the Historic Environment Record Office (via email on 19.08.2019) that update via an online resource search using Heritage Gateway would be sufficient.

6.7. Approach

6.7.1. A high level assessment approach has been used in this report, similar to a *Design Manual for Roads and Bridges* simple assessment. The assessment approach combined the simple assessment methodology as prescribed in the *Design Manual for Roads and Bridges* and the Environmental Assessment Report criteria presented in the Highways England approved guidance template. The assessment has been undertaken following the guidance in *Design Manual for Roads and Bridges Volume 11, Section 3, Part 2* including the method for establishing the significance of heritage resource, the method for understanding the level of potential scheme impact upon the resource, and the method for understanding the resultant significance of effects. Mitigation measures have

been put forward as set out in *Design Manual for Roads and Bridges Volume 10, Section 6, Part 1*.

6.7.2. The value (or sensitivity) of heritage assets, magnitude of impacts, and predicted significance of effect have been assessed using the criteria set out in the *Design Manual for Roads and Bridges*.

6.7.3. The methods for assessing the potential effects of road schemes on cultural heritage are set out in the *Design Manual for Roads and* Bridges, Volume 11, Section 3, Part 2. Factors for assessing the value of archaeological, built heritage and the historic landscape are described in Tables 6-1 to 6-3 below.

Table 6-1: Criteria for Determining the Value of Archaeological Assets

Category	Definition
Very High	- World Heritage Sites (including nominated sites) - Assets of acknowledged international importance - Assets that can contribute significantly to acknowledged international research objectives
High	- Scheduled Monuments (including proposed sites) - Undesignated assets of schedulable quality and importance - Assets that can contribute significantly to acknowledged national research agendas
Medium	- Designated or undesignated assets that contribute to regional research objectives
Low	- Designated and undesignated assets of local importance - Assets compromised by poor preservation and / or poor survival of contextual associations - Assets of limited value, but with potential to contribute to local research objectives
Negligible	- Assets with very little or no surviving archaeological interest
Unknown	- The importance of the resource has not been ascertained

Source: DMRB Vol 11, Section 3, Pt 2 HA208 / 07, table 5.1.

6.7.4. With regards to built heritage, the importance of a building, structure or conservation area is judged on an individual basis. It is assessed in relation to architectural and historic importance, statutory and non-statutory designations, and contribution to local character. Table 6-2 presents the criteria for determining the value of historic buildings.

Table 6-2: Criteria for Determining the Value of Historic Buildings

Category	Description
Very High	- Structures inscribed as of universal importance as World Heritage Sites - Other buildings of recognised international importance
High	- Scheduled Monuments with standing remains - Grade I and Grade II* Listed Buildings

	- Other listed buildings that can be shown to have exceptional qualities in their fabric or historical associations not adequately reflected in the listing grade - Conservation Areas containing very important buildings - Undesignated structures of clear national importance
Medium	- Grade II Listed Buildings - Historic (undesignated) buildings that can be shown to have exceptional qualities in their fabric or historical associations - Conservation Areas containing buildings that contribute significantly to its historic character - Historic Townscape or built-up areas with important historic integrity in their buildings, or built settings (e.g. including street furniture and other structures)
Low	- 'Locally Listed' buildings - Historic (undesignated) buildings of modest quality in their fabric or historical association - Historic Townscape or built-up areas of limited historic integrity in their buildings, or built settings (e.g. including street furniture and other structures)
Negligible	- Buildings of no architectural or historical note; buildings of an intrusive character
Unknown	- Buildings with unknown (i.e. inaccessible) potential for historic significance

Source: DMRB Vol 11, Section 3, Pt 2 HA208 / 07, Table 5.1.

6.7.5. Table 6-3 presents the criteria for determining the value of historic landscape character areas.

Table 6-3: Criteria for Determining the Value of Historic Landscape Character Units

Category	Description
Very High	- World Heritage Sites inscribed for their historic landscape qualities - Historic landscapes of international value, whether designated or not - Extremely well preserved historic landscapes with exceptional coherence, time-depth or other critical factor(s)
High	- Designated historic landscapes of outstanding interest - Undesignated landscapes of outstanding interest - Undesignated landscapes of high quality and importance, and of demonstrable national value - Well preserved historic landscapes, exhibiting considerable coherence, time-depth or other critical factor(s)
Medium	- Designated special historic landscapes - Undesignated historic landscapes that would justify special historic landscape designation, landscapes of regional value - Averagely well-preserved historic landscapes with average or reasonable coherence, time-depth or other critical factor(s)
Low	- Robust undesignated historic landscapes - Historic landscapes with importance to local interest groups

	- Historic landscapes whose value is limited by poor preservation and / or poor survival of contextual associations
Negligible	- Assets with very little or no significant historical interest

Source: DMRB Vol 11, Section 3, Pt 2 HA208 / 07, table 7.1.

6.7.6. Tables 6-4, 6-5 and 6-6 present the criteria for determining the magnitude of impact on archaeological, built heritage and historic landscape assets.

Table 6-4: Criteria for Determining the Magnitude of Impact on Archaeological Remains

Category	Description
Major	- Change to key archaeological elements, such that the resource is totally altered - Comprehensive changes to setting
Moderate	- Change to many key archaeological elements, such that the resource is clearly modified - Considerable changes to setting that affect that character of the asset
Minor	- Change to key archaeological materials, such that the asset is slightly altered - Slight changes to setting
Negligible	- Very minor changes to archaeological materials, or setting
No Change	- No change

Source: DMRB Vol 11, Section 3, Part 2 HA 208 / 07, table 5.3.

Table 6-5: Criteria for Determining the Magnitude of Impact on Historic Buildings

Category	Description
Major	- Change to key historic building elements, such that the resource is totally altered - Comprehensive changes to setting
Moderate	- Change to many key historic building elements, such that the resource is significantly modified - Changes to the setting of an historic building, such that it is significantly modified
Minor	- Change to key historic building elements, such that the asset is slightly different - Change to the setting of an historic building, such that it is noticeably changed
Negligible	- Slight changes to historic buildings elements or setting that hardly affect it
No Change	- No change to fabric or setting

Source: DMRB Vol 11, Section 3, Part 2 HA 208 / 07, table 6.3

Table 6-6: Criteria for Determining the Magnitude of Impact on Historic Landscapes

Category	Description
Major	- Change to most or all key historic landscape elements, parcels or components - Extreme visual effects - Gross change or noise or change to sound quality - Fundamental changes to use or access, resulting in total change to historic landscape character unit
Moderate	- Changes to many key historic landscape elements, parcels or components - Visual change to many key aspects of the historic landscape - Noticeable differences in noise or sound quality - Considerable changes to use or access, resulting in moderate changes to historic landscape character
Minor	- Changes to few historic landscape elements, parcels or components - Slight visual changes to few key aspects of historic landscape - Limited changes to noise levels or sound quality - Slight changes to use or access, resulting in limited changes to historic landscape character
Negligible	- Very minor changes to historic landscape elements, parcels or components, virtually unchanged visual effects - Very slight changes in noise levels or sound quality - Very slight changes to use or access, resulting in a very small change to historic landscape character
No Change	- No change to historic landscape elements, parcels or components - No visual or audible changes - No changes arising from amenity or community factors

Source: DMRB Vol 11, Section 3, Part 2 HA 208 / 07, table 7.3

6.7.7. To determine the significance of effects on heritage assets, the value of each asset is combined with the magnitude of impact. This is undertaken following the methodology presented in Table 4-3 from Chapter 4: Methodology. This is presented in Table 6-7 below.

Table 6-7: Determining the Significance of Effect

Magnitude of Impact	Value / Sensitivity of Receptor				
	Very High	**High**	**Medium**	**Low**	**Negligible**
Major	Very Large	Large/ Very Large	Moderate/ Large	Slight/ Moderate	Slight
Moderate	Large/ Very Large	Moderate/ Large	Moderate	Slight	Neutral/ Slight
Minor	Moderate/ Large	Slight/ Moderate	Slight	Neutral/ Slight	Neutral/ Slight

Negligible	Slight	Slight	Neutral/ Slight	Neutral/ Slight	Neutral
No change	Neutral	Neutral	Neutral	Neutral	Neutral

6.7.8. Impacts of moderate, large and very large are considered to be significant. Where a choice of two impact significance descriptors is available, only one has been chosen. This allows for professional judgement and discrimination in assessing impacts. This approach is based on the author's professional judgement and is in line with the *Design Manual for Roads and Bridges* methodology.

6.8. Assessment Assumptions and Limitations

6.8.1. Heritage data has been obtained from third party sources and the assessment of effects is dependent on the accuracy of this information. Although data from historic environmental records and the National Heritage List for England are generally reliable, on occasion asset data may be omitted, incorrectly named, or have incorrect coordinate data. In the unlikely event that third party data is incorrect, it could result in the incorrect prediction of impacts.

6.8.2. This assessment of previous impacts from the original construction of the A46 and the resulting potential for the survival of archaeological remains within the site has been limited by the lack of existing ground investigation data. Although a Ground Investigations Report (HE551486-ACM-VGT-XX-RP-GE-00001) (Ref. 6-16) has been undertaken, the extent and findings of the report did not improve the level of archaeological data.

6.8.3. Due to the nature of archaeological remains, their extent, survival, and even the precise location, of buried archaeological remains are often uncertain. Assessments of the value of archaeological assets rely on professional judgement, informed extrapolation from limited data, and comparison with similar heritage assets in comparable contexts.

6.8.4. Reference to historical Ordnance Survey (OS) maps and data provides invaluable information regarding the land use history of a site. However, it should be noted that historical evidence will be incomplete for the period pre-dating the first edition and between the release of successive maps and data.

6.9. Design, Mitigation and Enhancement Measures

6.9.1. It is anticipated that it will be possible to mitigate any direct physical impacts of the proposed scheme through avoidance or by *preservation by record* (archaeological excavation or historic building recording) prior to the start of construction works.

6.9.2. The horizontal and vertical alignment of the proposed scheme has taken into consideration the aim to minimise its visual prominence, and careful siting of lighting or signage.

6.9.3. There is the possibility that any intrusive groundworks may damage previously unknown archaeological remains, as indicated by the identification of Roman settlement activity during groundworks for the road's construction in 1987, and adjacent pipeline works in 2002. This will be mitigated through archaeological monitoring of any intrusive groundworks (including for the temporary construction compound) within the study area,

and the preservation by record of any remains identified. In places, however, it may also be that previous landscaping and made ground relating to the road's construction will have removed any traces of archaeological activity.

6.9.4. Potential mitigation measures for effects on heritage assets include:

- Installation of physical protection or screening measures abutting the A46 carriageway
- Archaeological investigations in advance of, or during, construction
- Dissemination of the results of all surveys in an appropriate format and supporting archive

6.9.5. The proposed locations for the temporary construction compounds, to the east of the carriageway may have escaped significant landscaping during the initial construction of the road, and therefore as the ground is not known to have previously been disturbed there is a higher potential for encountering previously unrecorded archaeological remains. With this considered, archaeological monitoring of any soil stripping will be carried out in these areas.

6.9.6. These compound areas will also encompass permanent drainage ponds. The locations of these drainage ponds will be covered by the initial (archaeologically monitored) strip of the compound areas, although any archaeological activity identified within the footprint of the ponds will likely require focused archaeological excavation due to the depth of the proposed pond excavations and their permanent nature.

6.9.7. A staged archaeological evaluation and mitigation programme will be undertaken, particularly in proposed compound and drainage locations. Mitigation will involve the stripping of the compound and drainage areas under archaeological supervision, followed by the targeted archaeological excavation of any features identified during the stripping works.

6.9.8. Details of appropriate mitigation for direct physical impacts along with the methodology for carrying out this mitigation will be presented in a Written Scheme of Investigation (WSI). The WSI will be referenced in the Environmental Management Plan (EMP) which has been prepared in parallel with this report and will be updated during the detailed design phase.

6.9.9. The outstanding key issues regarding cultural heritage and archaeology include:

- Identification of the presence, date, character, condition, extent and significance of any previously unknown archaeological remains
- Determination and assessment of the impact areas of any proposed intrusive works
- Determination and assessment of the impact of the proposed scheme upon the setting and character of designated heritage assets located in the vicinity
- Monitoring of any further ground investigation works is recommended to determine the likely presence, depth and condition of any archaeological remains or preserved palaeo-environmental deposits.

6.10. Assessment of Effects

Construction Phase

Archaeology

6.10.1. The construction phase of the proposed scheme is considered to have the potential to impact upon seven archaeological assets, detailed in Table 6-8. These comprise the site of a post-medieval road (MCT15374) and farmstead (MCT15363), a bridge (MCT15632) and brickworks (MWA2848) dating to the same period, two records of Roman settlement activity (MCT205; MWA8279 and MCT16604) and an undated charcoal deposit (MCT16484).

Table 6-8: Impacts on Archaeology during Construction

Asset ID	Description	Heritage Value	Magnitude of Impact	Significance of effect
MCT15374	Road as shown on the 1888 OS map; no Tithe Map available.	Negligible	Minor	Neutral
MCT15363	Farmstead on the 1888 OS map; no Tithe Map available.	Low	No change	Neutral
MCT205 MWA8279	Finds recovered during fieldwalking and features discovered in a subsequent excavation suggest that this was a Roman occupation site. A pit was excavated which contained 2nd century AD pottery sherds and seven loom weights.	Low	Minor	Slight adverse
MCT16604	Three archaeological features of Roman date were discovered during a watching brief. These were a linear gully, a small pit and a further linear feature.	Low	Minor	Slight adverse
MCT16484	Deposit of charcoal, Coventry Pipeline Phase 2.	Negligible	Negligible	Neutral
MCT15632	Colliers Bridge at Binley on the 1746 Craven estate map.	Negligible	Negligible	Neutral
MWA2848	The site of a brickworks which is marked on the Ordnance Survey map of 1886.	Negligible	Negligible	Neutral

6.10.2. The road (MCT15374) is a post-medieval asset, shown on late 19th century OS mapping. There are no visible remains. Its archaeological and historic significance lies in its ability to provide information on the connections between places in this landscape. It is considered to be of no more than negligible value. The road follows the route of the current A428 Brandon Road. Any buried remains relating to this asset may be physically

impacted by the proposed scheme, although the survival of any remains below the existing road surface is uncertain. This results in a minor magnitude of impact. The significance of effect is neutral due to the absence of any noticeable value for this asset.

6.10.3. A farmstead (MCT15363) is also recorded on 19th century OS mapping, and the site of the asset is now occupied by the Cocked Hat Restaurant and Hotel (1365086; MCT732). Formerly known as Binley Common Farm, the farmhouse now forms part of the hotel and restaurant. Some remaining elements of the structure date to the late 17th century, and there are also mid to late 19th century additions and later 20th century alterations. The farmhouse is considered to have archaeological and historical significance because of the information it conveys about the agricultural development and land management of the area, as well as local vernacular architecture of the period. The asset is, however, considered to be of only local importance, and there is poor survival of contextual associations (the adjacent agricultural landscape). Therefore, the asset is considered to be of low value. The intrusive groundworks associated with the proposed scheme will not physically impact on the structure of the asset and therefore there is considered to be no change in terms of impact. Based on no change upon an asset of low value, the effect is neutral.

6.10.4. Two assets, of a Roman date, located on opposing sides of the A46 carriageway are recorded within the site boundary. A pit containing pottery sherds and loom weights was excavated to the west of the carriageway (MCT205; MWA8279) while linear features and a pit were identified at the eastern extent of the site boundary during watching brief works (MCT16604). Both assets are undesignated, but of local importance, although their isolated locations within a much-altered landscape results in poor survival of contextual associations. The assets were also subject to archaeological excavation prior to the original construction of the road, which will have limited their survival and archaeological interest. The assets are therefore considered to be of no more than low value. The assets are located towards the south of the proposed graded (raised) section of the carriageway, and although they have been previously impacted by both archaeological works and road construction, there persists the possibility that buried remains relating to these assets may be further physically impacted by the proposed scheme. Due to the nature of any remains likely surviving, the impact of the proposed scheme is likely to bring about a change to the key archaeological materials resulting in a slight alteration to the assets, and the magnitude is therefore considered to be minor. Based on the minor impact on assets of low value, the significance of effects are considered to be slight adverse.

6.10.5. An undated asset comprising a deposit of charcoal (MCT16484) is located to the east of the carriageway, within the boundary of the proposed construction compound location. The asset was identified during a 1994 pipeline watching brief (Birmingham University Field Archaeology Unit 1994) directly to the east of the A46, and comprised a deposit measuring 10m x 5m, exposed during topsoil stripping. Being undated, and with no associated assets recorded in the vicinity, this asset is considered to have very little surviving archaeological interest and is therefore regarded as being of negligible value. This asset has already been archaeologically recorded, and although it falls within an area of potential impact from the construction of a temporary compound, its preservation has likely already been compromised by the 1994 pipeline works and there will therefore only be very minor changes to the archaeological materials. The magnitude of impact

from the proposed scheme upon the asset is therefore considered to be negligible. On an asset of negligible value, this results in a neutral significance of effect.

6.10.6. A post-medieval asset comprising Colliers Bridge at Binley (MCT15632), shown on the 1746 Craven estate map, is recorded at the eastern extent of the proposed scheme, in the vicinity of the proposed temporary construction compound location. The asset, comprising a bridge, is no longer visible on 1886 OS mapping and it is not apparent as to what watercourse it crossed, as none (other than a possible ditched field boundary and small pond) is visible in the vicinity. The asset is located within the rugby fields of Broadstreet Rugby Club, and no remains survive above ground. No archaeological features were identified close to the location during 1994 pipeline works, although the stripped corridor for the pipe trench did not extend further than 25m from the edge of the carriageway. The change to the landscape during the 19th and 20th centuries, from which the asset derives its value, has left the asset without any contextual associations, and with no evidence of the asset recorded since the mid-18th century, it is considered to have little or no surviving archaeological interest. The asset is therefore regarded as being of negligible value. Although located at the extent of the proposed scheme, intrusive works on the carriageway are unlikely to extend into the bounds of the rugby club, and at present, the location for the temporary construction compound (which will likely require intrusive groundworks) is located to the north of the asset. It is therefore considered that the magnitude of impact upon the asset will be negligible. The significance of effect is considered to be neutral.

6.10.7. The site of a brickworks (MWA2848) is marked on the Ordnance Survey map of 1886, adjoining the proposed scheme boundary to the west. The brickworks are marked as disused on 1886 OS mapping, although pits and hollows were still extant on the site of the kiln (which was by this point overgrown, with the rest of the site under crop) in 1983 (Warwickshire Historic Environment Records). Subsequent development work has resulted in the entirety of the location being occupied by a retail development and associated parking and infrastructure. No archaeological investigation is recorded within the Warwickshire Historic Environment Records prior to the construction work, so it unclear as to whether the remains survived up until the date of construction. Analysis of satellite imagery shows that the Morrisons supermarket occupying the west of the brickworks site was extant by 1999, while construction work on the remainder of the area had begun by 2012. The significance of the former brickworks derives from the information it provides regarding local industrial processes. However, despite remains still being extant in the 1980s, the asset has likely been entirely removed during the retail development and it is considered that the asset now has very little or no surviving archaeological interest and is therefore only of negligible value. Although the boundary of the proposed scheme adjoins the asset to the east, no intrusive works are anticipated within the footprint of the asset and the impact is therefore considered to be negligible. On an asset of negligible value, this results in a neutral significance of effect.

6.10.8. The intrusive groundworks that will form part of the construction of the graded section of the A46 dual carriageway would have the potential to damage or destroy any archaeological remains preserved below the ground surface. It is possible that unknown archaeological remains may survive below the impact layer of the road's construction, although ground investigation works carried out in May 2017 have identified, through window samples, that significant areas of the central part of the site comprise made

ground. Either side of the Binley junction, layers of made ground have been encountered at depths of between 0.20m and 2.0m below the ground surface. The presence of these layers, in the area of where the intrusive groundworks for the graded section of the road will be carried out, considerably limit the potential for encountering previously unknown archaeological remains.

6.10.9. These layers may also limit the potential for near-surface archaeological remains to have been preserved within the vicinity of the proposed construction compound and drainage pond locations, although the areas further to the east of the carriageway may have escaped significant landscaping during the initial construction of the road. The potential location for the southernmost construction compound and drainage pond falls between Binley Common Wood and Piles Coppice, and although no heritage assets are recorded within the site boundary, it is possible that the medieval agricultural and landscape management activity recorded within both woods extended to within this area. Any intrusive works associated with the construction of these compounds (such as soil stripping prior to deposition of hardcore) has the potential to disturb previously unrecorded near-surface archaeological remains, while the deeper excavation of the proposed drainage ponds has the potential to disturb or destroy deeper remains.

6.10.10. The installation of new signage at four locations within the proposed scheme boundary (but remote from the main proposed scheme) (as detailed in Chapter 18: Figure 1-1) is unlikely to result in significant intrusive groundworks. However, if during their installation, excavations below the present impact layer of the road are required, then there remains a limited potential for previously unrecorded archaeological remains to be encountered. However, due to the location of the proposed signage within the footprint of the existing A46 carriageway, along with a lack of recorded archaeological assets located in the direct vicinity, any asset encountered is likely to be damaged or disturbed, with poor survival of contextual associations. It is therefore considered that any asset encountered in these locations would be of negligible significance (heritage value). Due to the isolated nature and likely low impact of the intrusive groundworks, it is therefore considered that the magnitude of impact upon any asset encountered would also be negligible. Based on a negligible impact on an asset of negligible significance, the significance of effect of the proposed scheme in relation to the proposed signage locations is considered be neutral.

Historic Buildings

6.10.11. The construction phase of the proposed scheme is considered to have potential to impact upon designated heritage assets including the Grade II listed Cocked Hat Restaurant and Hotel (NHLE 1365086) and Coombe Abbey Registered Park and Garden (NHLE 1000408), including Coombe Abbey Conservation Area and associated buildings. The associated buildings include the heritage assets that fall within the boundaries of the Registered Park and Garden and the conservation area (see Chapter 18: Table 6-9 and Figure 6-2). Some of these buildings are located outside the study area, but it is considered that the proposed scheme may still have an impact upon their setting.

6.10.12. The Cocked Hat Restaurant and Hotel (NHLE 1365086) is located approximately 40m to the south-west of the proposed scheme. The proposed scheme will result in works adjacent to the site with the addition of an elevated section of road comprising a combination of retaining walls and bridge structures. Construction traffic movement will

take place next to the asset which will result in visual intrusion to views from and towards the asset alongside aural intrusion. However, due to existing impacts from the A46 Binley junction, the proposed scheme will have only a minor adverse impact on people's ability to understand the significance of the asset. The asset is of medium value thus the significance of effect will be slight adverse.

6.10.13. Coombe Abbey Registered Park and Garden and Coombe Abbey Conservation Area are located approximately 800m from the proposed scheme. The rural setting of the park contributes to its significance; however, mature trees and planting to the western boundary of the park offer screening from the road and the built environment and create a sense of enclosure. The proposed scheme will add an elevated section of road just south-west of the park. The elevated stretch of road will be visible from a small part of the park, where existing planting does not provide enough screening; however, it will not interrupt any key views or vistas. The proposed temporary construction compound locations will be located to the east of A46 and they will result in some further temporary visual intrusion when seen from the park. The works will be concentrated around the existing infrastructure and it is considered that the construction of the proposed scheme will result in a slight change to the setting of the asset. Therefore, the magnitude of impact of the proposed scheme is considered to be negligible**.** As assets of high value, the significance of effect is slight adverse.

6.10.14. The listed buildings within the Registered Park and Garden form part of its significance. Individually, the buildings will not be affected by the proposed scheme as their significance lies in their physical form and their relationship to the park. While the park will be impacted, the impact of this on the understanding and appreciation of the assets is no change, resulting in a neutral effect.

6.10.15. A summary of the impacts on historic buildings is presented in Table 6-9.

Table 6-9: Impacts on Historic Buildings during Construction

Asset ID	Description	Heritage Value	Construction Impact	Significance of effect before mitigation
NHLE 1365086	The Cocked Hat Restaurant and Hotel	Medium	Minor adverse	Slight
NHLE 1000408	Coombe Abbey Registered Park and Garden	High	Negligible	Slight
-	Coombe Abbey Conservation Area	High	Negligible	Slight

Operational Phase

Archaeology

6.10.16. Although the maintenance of drainage ditches and the establishment and growth of any planting may impact upon buried archaeological remains, it is considered that this is likely

to impact areas that have either been previously disturbed in the course of the original construction of the A46, or will have been recorded in the course of any construction-phase mitigation works.

6.10.17. Therefore, it is not considered that any archaeological assets will be impacted during the operation of the proposed scheme.

Historic Buildings

6.10.18. The Cocked Hat Restaurant and Hotel (NHLE 1365086) is located approximately 40m south-west of the proposed scheme. The asset currently experiences high levels of traffic noise as well as lighting from the existing road network. New lighting will be added to the junction which has the potential to increase existing impacts on the asset; however, it is not considered that these will be at a level to cause any effect on the significance of the asset. There will, therefore, be no change as a result of the proposed scheme, resulting in a neutral effect.

6.10.19. Coombe Abbey Registered Park and Garden (NHLE 1000408) and Coombe Abbey Conservation Area are located approximately 800m from the proposed scheme. During the operation phase, there may be a small increase in the noise experienced from within the park. Increased lighting in the upgraded junction may result in minor visual intrusion to some views experienced within the park. However none of these views are key views or contribute to the significance of the assets and the change is not considered to impact on the significance of the asset. The impact on both assets is therefore considered to be no change resulting in a neutral effect.

Monitoring

6.10.20. Monitoring is not required as there are no residual significant effects.

7. LANDSCAPE

7.1. Introduction

7.1.1. This chapter presents an assessment of landscape impacts associated with the Proposed Scheme.

7.1.2. This chapter of the EAR has been undertaken by competent experts with relevant and appropriate experience:

- Principal Landscape architect BA PG DipLA CMLI
- Associate Landscape BA MA CMLI

7.2. Legislative and Policy Framework

7.2.1. Landscape and visual's importance is recognised at all levels: locally (in policy making), nationally (for example in large scale infrastructure development), and internationally (the *European Landscape Convention* 2000 (Ref. 7-1)). The European Landscape Convention helps promote best practice in the planning, protection, and management of landscapes.

7.2.2. The definition of *landscape* takes account of the European Landscape Convention, which regards landscape as a resource in its own right, resulting from the interplay of its physical, natural, and cultural components:

"Landscape is an area, as perceived by people, whose character is the result of the action and interaction of natural and/or human factors"'

7.2.3. It is also recognised that landscapes are changing and evolving as a result of a range of pressures, and will continue to do so, creating new landscapes. There is a need to accommodate such changes in a sustainable manner and landscape and visual impact assessment has an important contribution to make in achieving this.

7.2.4. Landscape within the local planning policy remains an important consideration for Coventry City Council and Rugby Borough Council, as well as at the regional level to Warwickshire County Council.

7.2.5. Although now formally revoked, Warwickshire Structure Plan (1996-2011) (Ref. 7-2) saved policies highlights landscape in Policy ER.4 *Protection and Enhancement of the Landscape*, stating that *"Local plans should seek to protect and enhance landscape character and quality in all areas of Warwickshire's countryside. In particular, criteria should be established for the assessment of the sensitivity of each local landscape type to different categories of development."* This has yet to be replaced within formal policy.

7.2.6. Warwickshire County Council has also produced a suite of landscape character assessments reports for the whole of Warwickshire.

7.2.7. Coventry City's *The New Coventry Local Development Plan (2011-2031)* (Ref. 7-3) provides key design criteria and considerations regarding landscape design within new developments.

7.2.8. Rugby Borough Council's *Local Plan 2011-2031 Draft publication (2016)* (Ref. 7-4) highlights landscape policy within *NE4:- Landscape Protection and Enhancement* ensuring landscape character is protected and enhanced through new developments.

7.3. Study Area

7.3.1. The guidance provided in the *Design Manual for Roads and Bridges (DMRB) Volume 11 Section 3 Part 5 (Annex III)* (Ref. 7-5) (although superseded by Highways England *Interim Advice Note (IAN) 135/10* (Ref. 7-6), suggests that landscape assessments should utilise a 0.62 miles (1km) study area around the boundary of the Proposed Scheme. The study area broadens to capture areas within the Zone of Theoretical Visibility (ZTV) sitting outside of the 0.62 miles (1km) corridor with capacity to experience significant effects as a result of the Proposed Scheme. This approach is commonly adopted for highways projects and is adopted in this chapter.

7.3.2. In the case of the Proposed Scheme, the study area of the assessment has been defined by a combination of Highways England Interim Advice Note 135/10 Guidance, Landscape Institute and Institute of Environmental Management and Assessment *Guidelines for Landscape and Visual Impact Assessment 3 (GLVIA3)*, the Zone of Theoretical Visibility, refined by professional judgement, and desk-based study.

7.4. Baseline Conditions

7.4.1. The study area lies within the National Character Area 96: Dunsmore and Feldon, and the north-western fringes of the study area are adjacent to National Character Area 97: Arden. One of the key characteristics identified within the Dunsmore and Feldon profile is the influence that busy roads and large industrial estates have on the wider landscape, which is particularly relevant to the Coventry conurbation.

7.4.2. Warwickshire County Council has produced a suite of landscape character assessment reports for the whole of Warwickshire. This suite includes the borough of Rugby's landscape character assessment which is relevant to this chapter (Ref. 7-7).

7.4.3. The Warwickshire landscape character assessment report identifies the Dunsmore Parklands character type within the study area. This is an extensive character type that extends from the fringes of Coventry, eastwards to the edge of Rugby. Its key characteristics are a gently rolling landscape, well wooded character with large undefined field patterns.

7.4.4. The Dunsmore Parklands is further sub-divided into three Local Character Areas (LCAs) within the initial Stage 1 Landscape and Visual Assessment (Ref. 7-8), as detailed below. Although these LCAs contribute to the character of the broader landscape type, at the scale of this assessment, these can be distinguished as separate landscapes which are more appropriate to the size of the study area. These LCAs have been verified during further site visits. Figure 7-1 shows the locations of these LCAs.

Local Character Area 1 Dunsmore Open Parkland

7.4.5. This character sub-zone area consists of the gently undulating rural farmland and large scale field patterns of the wider Dunsmore Parkland but generally displays a more open character (refer to Figure 7-1). Woodland is not a common feature with the most significant instances found at Hill Park Wood and alongside transportation corridors, such as the A46. Field margins vary in scale and condition, from unmanaged broken hedges to mature hedgerows. Due to the combined effect of large scale fields and inconsistent vegetation patterns associated with field boundaries, the landscape lacks the cohesive wooded nature of the landscape that exists to the south.

7.4.6. The urban features that exist nearby and within the LCA itself are more apparent in this open landscape, and this further influences the perception of the landscape. The A46 and M6 corridors are more open to view and as a result highway infrastructure can be readily seen, as well as the large scale buildings to the east of Coventry. In addition to these views of urban elements, there is an apparent shift in land use, from the arable nature of the wider area, with both established and new industrial and commercial developments situated within the arable farmland. These sites lack significant vegetation or landform capable of providing screening and as such are conspicuous elements within the landscape. The LCAs key characteristics are described as mainly open arable farmland with poorly structured vegetation patterns, situated within a Green Belt and there are urban influences from both within and without the character area.

7.4.7. Overall, this character area shows signs of degradation from urban expansion and encroachment and features a less unified vegetation structure. Therefore, its value is low, its susceptibility to highway modifications is low, and hence sensitivity is low in relation to the type of development proposed. It is considered that susceptibility would be broadly the same between these construction and operation assessment phases due to the nature of the LCA and its degradation by the existing highways and urban expansion.

Local Character Area 2 Dunsmore Wooded Parkland

7.4.8. This character sub-zone is formed of the same undulating arable farmland as the Dunsmore Parkland but supports a significantly more established wooded character, primarily as a result of several large blocks of woodland and woodland belts (refer to Figure 7-1). Field sizes are slightly smaller in scale with margins that are generally more intact. These feature an increased number of hedgerow trees, which, together with the woodlands, create a more enclosed and visually contained landscape where the nearby urban features associated with Coventry are much less apparent. The character is designated as Green Belt.

7.4.9. Coombe Abbey and its grounds, which includes Coombe Pool, is a significant feature in the area, designated for its cultural, ecological and recreational value through the historic buildings and grounds, varied habitats and extensive paths, which suggest a landscape of inherent quality and value. The large stands of ancient woodland around the small outlying suburb of Binley Woods, in the south of the LCA, are perhaps the most defining feature. In combination with the smaller woodland blocks and vegetation framework within the wider landscape, this creates the cohesive enclosed wooded character of this part of the Dunsmore Parklands. The LCAs key characteristics include large blocks of woodland, some of which are ancient, creating a visually contained landscape. The LCA has some designated landscapes including a Green Belt

7.4.10. Overall, this character area demonstrates some of the valued woodland and mature wooded landscapes of the wider Dunsmore Parkland landscape type, therefore it would be of a value which is medium, its susceptibility to highways modification is medium, and hence sensitivity is medium in relation to the type of development proposed. It is considered susceptibility would be broadly the same between the construction and operational phases.

Local Character Area 3 Coventry Urban Edge

7.4.11. This character sub-zone is formed of mixed development extending out to the east of Coventry up to the A46. The majority of the townscape is twentieth century residential housing which is generally comprised of two storey semi-detached properties. These properties are mostly arranged along a series of closes or interconnected local roads in small contained pockets, each of which presents its own style or period and creates a sense of small but distinct areas within the residential grain of this urban expanse.

7.4.12. There are also significant commercial and industrial parts of the townscape which are located along arterial routes and towards the interchanges of the major transport corridors. These areas are typically of a greater scale in both height and volume but are generally not out of scale with the surrounding townscape. The Coventry University Hospital however is a significant feature in the area, introducing a large and prominent seven storey building on the eastern edge of Coventry which is exaggerated by the surrounding scale of the two storey homes.

7.4.13. There are scattered listed buildings and scheduled monuments within the townscape, but these are more dispersed historic remnants within the twentieth century development, rather than a cohesive historic core or area. The River Sowe and floodplain wind through this part of Coventry providing some green infrastructure within the urban character area which supports recreational use and areas of wooded cover.

7.4.14. The LCA's key characteristics are recent 20th century urban development, including large areas of commercial or industrial zones around main transport corridors.

7.4.15. Overall this character area is typical of recent urban expansion and contrasts with the way in which the broader agricultural landscape and parkland is perceived within the wider landscape, therefore its value is low, susceptibility to highways modification is low, and hence sensitivity is low in relation to the type of development proposed. It is considered susceptibility would be broadly the same between the construction and operational phases due to the nature of the LCA and its degradation by existing highways and urban expansion.

Landscape Value

7.4.16. There are no National Parks or Areas of Outstanding Natural Beauty associated with the study area. Statutory designations around the Proposed Scheme with an influence on the landscape and visual amenity include:

- Registered Park and Garden at Coombe Abbey (Grade II*) that lies approximately 0.75 miles (1.2km) to the north of the Binley junction

7.4.17. The following woodlands situated adjacent to the propose scheme are allocated Tree Protection Orders (TPO):

- Brandon Woods - woodland at the rear and east of the BP service station alongside Public Right of Way (PRoW) 145 on the A46
- Piles Coppice - woodland to the east of the A46 located between Greens Home & Garden Centre and Binley Wood residential area

7.4.18. There are further TPOs in the wider study area, including individual trees along the Rugby Road, within the Binley Wood residential area and woodland to the east of Broad Street Rugby Club.

7.4.19. The landscape receptors identified from the baseline study that have been assessed for their sensitivity and value as part of this assessment are presented in Table 7-1.

Table 7-1: Landscape Receptor Value

Landscape Receptors	Value	Susceptibility	Sensitivity
Local Character Area 1 Dunsmore Open Parkland	Low	Low	Low
Local Character Area 2 Dunsmore Wooded Parkland	Medium	Medium	Medium
Local Character Area 3 Coventry Urban Edge	Low	Low	Low
Registered Park and Garden at Coombe Abbey	High	Medium	High

Visual Context

7.4.20. The visual context of the study area can be divided into two distinct sections, the urban fringe farmland to the east of the A46 corridor and the urban expanse of Coventry to the west.

7.4.21. To the east the visual amenity is formed of the arable farmland set upon the undulating topography. In the south and east of this area the views are often restricted or enclosed by a combination of the treed landscape and landform, creating a more intimate landscape where urban features are less apparent, despite the physical proximity to Coventry. However, urban features to the west of the A46 including church spires, tower blocks, electricity pylons, and highway lighting columns are visible from some areas above the vegetation cover. To the north and west of this area, the landscape cover becomes less dominated by woodland and a more open aspect develops, with the urban influences of Coventry and nearby highway corridors much more apparent. Industrial estates and the large hospital buildings become dominant features as they are easily seen, often in isolation against the skyline.

7.4.22. To the west of the A46 within the townscape of Coventry and given the urban environment, the visual context is much more contained. The tighter residential layout of the road network further restricts views and within these areas there is a sense of containment, with few opportunities to view beyond the immediate housing. More expansive views and a sense of openness are afforded by the broader arrangement of building layouts and arterial roads in the commercial and industrial areas. However, long distant views are not readily available other than from elevated areas or the fringes of the urban edge, where views of the vegetated A46 corridor and beyond may exist.

7.4.23. Overall the visual context of the study area is mixed with distinct areas of urban and rural character which is defined by the A46 corridor itself.

Zone of Theoretical Visibility

7.4.24. The Zone of Theoretical Visibility has been generated by placing points along the Proposed Scheme at intervals not exceeding 50m and assigning levels of 1.5m, 4.5m, and 12.5m high to represent visibility of cars, HGVs, and lighting columns respectively within the digital terrain model (DTM) based on the OS Terrain 5 dataset. With regard to modification of the DTM, built form and vegetation from the National Woodland dataset has been incorporated into the terrain model at heights of 7.5m and 12.5m respectively. The Zone of Theoretical Visibility has then been refined using professional judgement.

7.4.25. The Zone of Theoretical Visibility can be described as being generally limited to the north by the M6 corridor running east to west, and the large industrial estate around the junction with the A46 and the M6. To the north-east a combination of topography, High Park Wood, and the Coombe Fields road industrial estate limits views in this direction. The Zone of Theoretical Visibility is illustrated in Chapter 18: Figure 7-2a, 7-2b, and 7-2c.

7.4.26. To the east the extensive woodlands of Coombe Abbey combine with the treed landscape of Birchley Woods and New Close Woods further south to provide effective screening from the wider landscape eastwards.

7.4.27. To the south, the suburb of Binley Woods and the woodland of Brandon Wood and Piles Coppice screen views from further south and to the west the urban edge of Coventry acts as a visual barrier.

7.4.28. Views penetrate within the urban areas to a small degree, depending on the elevation and type of property, but generally direct views of the A46 corridor are restricted to those properties on the edge of Coventry.

Viewpoints

7.4.29. The value of views is typically more subjective than landscape value and may vary from viewer to viewer. Factors to be considered will include views of or from heritage assets, Public Rights of Way, designated landscapes or views, or named or promoted views found in guidebooks or tourist literature.

7.4.30. Representative viewpoints taken from previous assessments and verified through the scoping exercise are listed below, with their locations illustrated in Chapter 18: Figure 7-1 and Figures 7-3a to Figure 7-3l.

7.4.31. The viewpoints have been assessed for their sensitivity and value as part of this assessment and are as detailed in Table 7-2. Appendix 7-A contains more detail on the reasons for the allocated sensitivity.

Table 7-2: Viewpoint Value

Viewpoint	Distance from Scheme	Value	Susceptibility	Sensitivity
1. Cocked Hat Restaurant and Hotel	10m	Low	Construction: Medium Operation: Low	Low
2.Premier Inn	50m	Low	Construction: Medium Operation: Low	Low
3.Broad Street Rugby Club	100m	Low	Construction: Medium Operation: Low	Low
4.Greens Home & Gardens	100m	Low	Construction: Medium Operation: Low	Low
5.A428 Rugby Road	200m	Low	Construction: Medium Operation: Low	Medium
6.Binley Woods	400m	Low	High	High
7.PRoW R145	500m	Medium	Medium	Medium
8.A428 Brandon Road	200m	Low	Low	Low
9.Kings Park Drive	300m	Low	Low	Low
10.Play area off Twickenham Road	550m	Low	Construction: Medium Operation: Low	Medium
11.Binley Wood Recreation Ground	650m	Medium	Construction: Medium Operation: Low	Medium
12.Coombe Country Park/ Centenary Way long distance footpath	900m	Medium	High	Construction: High Operation: Medium

7.5. Potential Impacts

Landscape

7.5.1. This section broadly discusses the potential of the Proposed Scheme to give rise to adverse effects discussed in section 7.8.

7.5.2. Construction activities will give rise to short term impacts which are relatively localised, such as the appearance of construction works. The works at height to create the at-grade junction would result in similar impacts to the operational scheme, which would be visible to the same receptors.

7.5.3. The main potential effects of the Proposed Scheme during operation can be summarised as:

- Increased awareness of the A46 corridor due to the raising of the carriageway up to approximately 7m height above the ground level;
- Loss of existing vegetation that currently provides visual screening within the existing highway boundary;
- Clearance of all existing vegetation clearance within the redline boundary; and
- Broadening of the associated footprint of the A46 corridor due to the required earthworks, resulting in the encroachment towards commercial properties and some land within the rugby ground.

Designated Sites

7.5.4. It is possible that the Proposed Scheme would be visible from within the grounds of the Coombe Abbey Country Park to the north-east. The existing A46 corridor can currently be seen from these areas. However, increased awareness as a result of the raised carriageway at a distance of 400m would not have a significant effect on perception of landscape character. Adjacent to the Proposed Scheme are woodlands that are protected by tree preservation orders; these woodlands may be affected through loss of adjacent highway vegetation.

Local Character Area 1 Dunsmore Open Parkland

7.5.5. There would be no direct impact or any visual connections to LCA 1 Dunsmore Open Parkland. Consequently there would be no effect on this LCA.

Local Character Area 2 Dunsmore Wooded Parkland

7.5.6. The predicted effects on LCA 2 would arise from the increased footprint and awareness of the A46 corridor due to the raised carriageway and the loss of established screening vegetation which would further expose traffic movements to view and hence influence perception of landscape character. The majority of the proposed works would be visually contained by the woodland structure to the east of the junction and would not have significant impacts to the wider character area that already features views of urban elements at the edge of Coventry. While there would be locally adverse effects in the immediate area as a result of the raised carriageway, which would introduce a significant new element to the A46 corridor and restrict views towards Coventry, there is a low likelihood that the Proposed Scheme would have significant adverse effects to the wider LCA 2.

Local Character Area 3 Coventry Urban Edge

7.5.7. The predicted effects to LCA 3 would result from the significant increase in scale and awareness of the A46 corridor and its junction with the A428. There would also be an expansion of the highway corridor into commercial land and the loss of highway vegetation along and adjacent to the A46 corridor. Any potential views or awareness of the landscape to the east of the A46 would be curtailed and replaced by retaining structures and elevated views of traffic movements, enclosing and further urbanising this

part of Coventry, which is generally comprised of the larger scale commercial urban grain. This will limit the influence on landscape character of the Proposed Scheme further afield in this character area. It is likely that the Proposed Scheme would result in local adverse effects to the immediate townscape but would result in no significant effects to the wider character of the eastern edge of Coventry.

Visual

7.5.8. This section discusses the potential for the Proposed Scheme to lead to adverse effects on the identified visual receptors within the study area.

7.5.9. Existing views of the A46 Binley Junction are constrained by buildings and blocks of woodland that bound the junction and connecting roads. As a result, the visual context is confined to the commercial outlets that bound the A46 corridor to the north-west, which include the Cocked Hat Restaurant and Hotel, TGI Friday's restaurant, and the recently constructed retail units off Kynner Way. These outlets are immediately adjacent to the highway boundary and substantially limit views to the north-west of the roundabout.

7.5.10. To the south-east of the A46 corridor the visual context is noticeably less developed, with the open space associated with the Broad Street Rugby Club, contrasting with the extensive woodland that exists to the south of the A428. Binley Woods which comprises several local roads and housing lies to the east of the Binley junction and south of the A428. There are several rights of way to the south and east of the junction, with the Twelve O-clock Way forming part of the Centenary Way approximately 0.93 miles (1.5km) to the east.

7.5.11. The level of visual intrusion arising from the existing A46 corridor has been recorded and categorised in respect of the existing inherent level of visual sensitivity for receptors identified through the assessment process and as defined in Annex 2, Table 1 of Interim Advice Note 135/10.

7.6. Assessment Methodology

7.6.1. This appraisal has been carried out in accordance with the Landscape Institute and Institute of Environmental Management and Assessment *Guidelines for Landscape and Visual Impact Assessment 3 (GLVIA3)* (Ref. 7-9) with special relevance to townscape assessment practices, and *Highways Agency Interim Advice Note (IAN) 135/10 Landscape and Visual Effects Assessment (2010)*.

7.6.2. This assessment has assessed likely effects of the Proposed Scheme on the landscape character of the LCAs and on the townscape character of each of the wards within the study area and on representative viewpoints.

7.6.3. The landscape and visual effects of the Proposed Scheme have been assessed at the following stages of the development:

- During Proposed Scheme construction period
- At year 1 of Proposed Scheme opening
- At 15 years after Proposed Scheme opening, allowing time for the contribution of planting or other landscape mitigation to take effect and taking into account future planned development

7.6.4. An assessment of the visual sensitivity of the identified receptors has previously been recorded in the options phase, as defined in *IAN 135/10, Annex 2, Table 1* and categorised in respect of the existing inherent level of visual sensitivity for receptors.

These, along with the Zone of Theoretical Visibility have formed the basis for the selection of a number of key viewpoints, agreed with the relevant consultees, which are representative of the groups of receptors where potential views have previously been identified.

7.6.5. The viewpoints are drawn from publicly accessible locations chosen to cover the range of effects on visual amenity from receptors such as residential areas, public rights of way, highways, commercial, and leisure locations, although not all categories may be present. The viewpoints will represent grouped effects of multiple receptors from settlements but will take the GLVIA3 approach to representative viewpoints rather than listing all locations.

7.6.6. The Zone of Theoretical Visibility allows for the verification of representative viewpoint locations which have been visited and form the basis of the assessment of effects on visual amenity within the chapter. The chapter also assesses changes in visual amenity as a result of effects arising from additional land areas associated with the Proposed Scheme.

7.6.7. This chapter has assessed each viewpoint susceptibility and value to inform the sensitivity of the view point as in the GLVIA 3 guidance, then goes on to assess likely effects of the Proposed Scheme on each of these representative viewpoints and, by extension, the additional similar viewpoints which may also be similarly impacted by the Proposed Scheme.

7.6.8. The GLVIA3 and *IAN 135/10* methodology have been used to determine sensitivity and magnitude of effects, which are combined using the terminology in Table 7-3 below, derived from IAN 135/10. In accordance with *DMRB IAN 135/10* and GLVIA3 methodology, the matrix will be used as a guideline to define landscape and visual effect significance rather than a prescriptive or inflexible process. It deviates from the approach presented in Chapter 4: Environmental Assessment Methodology of this report by omitting the *Negligible* and *Very High* categories when defining receptor sensitivity (on the basis that receptors considered negligible sensitivity would have been scoped out and there are no international landscape designations relevant to the study area).

Table 7-3: Matrix for determining Significance of Landscape and Visual Effects

Landscape Sensitivity	**Magnitude of Impact**				
	No Change	**Negligible**	**Minor**	**Moderate**	**Major**
High	Neutral	Slight	Slight/ Moderate	Moderate/ Large	Large/ Very Large
Medium	Neutral	Neutral/ Slight	Slight	Moderate	Moderate/ Large
Low	Neutral	Neutral/ Slight	Neutral/ Slight	Slight	Slight/ Moderate

7.6.9. Moderate, Large, and Very Large effects are considered significant. Professional judgment will be used to determine if Moderate effects are significant, however generally these are likely to be considered not significant, especially for short-term construction impacts. Slight and Neutral effects are considered to be not significant.

7.7. Assessment Assumptions and Limitations

7.7.1. This assessment has been based on, and limited to, the baseline conditions observed at the time of the survey. Surveys covered the summer and winter seasons, but not other

seasons. This is not considered a major limitation to the assessment however and it is considered that two seasons is sufficient to determine the baseline conditions and likely impact of the Proposed Scheme.

7.7.2. The year 15 effects are based on the design principles and assumptions presented in Chapter 2: The Project of this report. It takes account of the trees and shrubs planted as an integral component of the Proposed Scheme. This planting will have grown to provide a more effective screen than provided in year 1. It has been assumed that this planting would, by year 15, have achieved a height of at least 4.5m. This assumption is based on predicted growth rates of 0.3m per annum which, given the application of appropriate planting and management techniques, is considered to be a conservative estimated height. This predicted growth rate is also based on experience from comparable highway schemes. The screening effect of vegetation would be less effective in winter in comparison to the summer months.

7.8. Design, Mitigation and Enhancement Measures

7.8.1. Environmental considerations have been taken into account during further development of the Proposed Scheme design, including consideration of minimising building demolition requirements and minimising land take.

7.8.2. An assumption has been made that all vegetation within the site will be removed to allow for construction space. This is likely to be an unrealistic worst case and in reality not all vegetation will need to be removed, and attempts will be made during detailed design after receipt of the licence to keep the back line of vegetation where possible in sensitive locations, such as residential areas and in proximity to the Public Right of Way R145.

7.8.3. The planting design of the replacement and additional trees and shrubs and their integration with the existing landscape will be carried out in accordance with the best practice guidance included in *DMRB Volume 10 Section 0 Environmental object Part 3 HA 88/01 Landscape elements* (Ref. 7-10).

7.8.4. The proposed new woodland and tree and shrub planting along the route corridor will filter views from adjacent sensitive visual receptors. The new planting will integrate the Proposed Scheme within existing landscape features, so as not to create a visual disturbance within the area, including when viewed from upper storeys of buildings.

7.8.5. Proposed planting on the remodelled and new embankments and cuttings will be designed to reinforce the existing vegetation and to complement the species composition found locally, using native plant species. A preliminary landscape mitigation plan is presented in Chapter 18: Figure 7-4.

7.8.6. Careful design and siting of new lighting and signage has been achieved to minimise visual intrusion and light spill into the surrounding area.

7.8.7. An Environmental Management Plan (EMP) has been prepared and will be updated during detailed design and implemented by the selected construction contractor. This includes a range of good industry practice measures associated with mitigating potential environmental impacts, for example limiting construction lighting and signage to that which is absolutely necessary to reduce additional visual clutter and minimise effects on both landscape character and visual amenity.

7.8.8. The Proposed Scheme design includes an appropriate landscape design which incorporates tree and shrub planting. A preliminary landscape mitigation plan has been developed, as presented in Chapter 18: Figure 7-4, and will be updated during detailed design.

7.9. Assessment of Effects

Construction Phase

7.9.1. The construction works associated with the Proposed Scheme are likely to be considerably more intrusive than the operational phase of the Proposed Scheme and this is attributable to the following:

- Construction compounds
- Removal of screening highway vegetation
- Localised demolition, material stockpiles and earthworks
- Site signage, traffic control (pedestrian, vehicular and plant), fencing, hoarding and overhead gantries
- Construction traffic and working machinery
- Site compounds and offices, storage units, and stored materials
- Cranes
- Scaffolding, hoardings, and partly completed structures

7.9.2. This is anticipated to result in a direct major adverse impact on the local landscape and views from nearby visual receptors at six receptors, the Cocked Hat Restaurant and Hotel and Premier Inn to the west of Binley junction, and the rugby club, garden centre, and viewpoints along Rugby Road to the east. This is due to the proximity of these receptors to the working area within the site, where unsightly construction plant will be present, along with temporary fencing and occasional dust emissions.

7.9.3. A further three receptors will experience a moderate adverse magnitude of impact: the footpath along the A428 Rugby Road, Public Right of Way R145, and the footpath along Kings Park Drive. The impact at other receptors is less, and therefore minor or negligible.

7.9.4. Taking into account sensitivity of these receptors, no large or very large effects are predicted. A moderate effect is predicted at the A428 Rugby Road, the footpath along the A428 Rugby Road, Public Right of Way R145, Broad Street Rugby Club, Greens Homes & Garden, Cocked Hat, and Premier Inn. This effect is not considered to be significant given the impact is short term, meaning that is would only occur during and last for the duration of the construction period, after which the impact would be reversed. A number of slight and neutral effects are predicted at the other receptors.

7.9.5. The construction phase is therefore not anticipated to lead to significant landscape effects on local receptors.

Table 7-4 Construction Effects at Viewpoints

Receptor	Sensitivity	Magnitude of Impact	Effect
1. Cocked Hat Restaurant and Hotel	Low	Major adverse	Moderate
2. Premier Inn	Low	Major adverse	Moderate
3. Broad Street Rugby Club	Low	Major adverse	Moderate
4. Greens Home & Gardens	Low	Major adverse	Moderate

Receptor	Sensitivity	Magnitude of Impact	Effect
5. A428 Rugby Road	Medium	Moderate adverse	Moderate
6. Binley Woods	High	Negligible	Slight
7. PRoW R145	Medium	Moderate adverse	Moderate
8. A428 Brandon Road	Low	Minor adverse	Neutral
9. Kings Park Drive	Low	Moderate adverse	Slight
10. Play area off Twickenham Road	Medium	Minor adverse	Slight
11. Binley Wood Recreation Ground	Medium	Negligible	Neutral
12. Centenary Way long distance footpath /Coombe	High	Minor adverse	Slight

Operational Phase

Landscape Designations

7.9.6. The Proposed Scheme has some potential to change the perception of Coombe Park and Garden, although given the distance from the Proposed Scheme, intervening dense vegetation, and the existing presence of the A46 and associated infrastructure, this is likely to be minor. There is likely to be a minor adverse magnitude of impact on this receptor, which is anticipated to cause a slight adverse effect.

Landscape Character

7.9.7. The introduction of the Proposed Scheme and associated changes to the junction have the potential to be visible within the local landscape and change the way in which the landscape character of the western fringes of the Dunsmore landscape character type is perceived.

7.9.8. The proposals are not anticipated to remove large significant areas of vegetation; however, a new elevated section of road has the potential to increase awareness of the A46 corridor locally, leading to an increased sense of urbanisation.

7.9.9. The Proposed Scheme has the potential to change the perception of LCA 1 through the introduction of new traffic movements and associated highways infrastructure within the landscape, leading to the fragmentation and further urbanisation of this landscape. There is the potential for this moderate magnitude of impact to cause a slight adverse effect.

7.9.10. There would be no physical alterations to LCA 2, however, potential remains for changes to the perception of the landscape in some areas due to the increased visual presence of the surrounding motorway network. There would be no direct physical effects to the components of LCA 3 as a result of the Proposed Scheme and any visual connections of the works are likely to be limited by woodland and building pattern. Therefore, there

is likely to be a negligible magnitude of impact and effect is therefore considered to be slight adverse for both of these LCAs.

Visual Effects

7.9.11. The Proposed Scheme would affect a number of receptors as described in section 7.5 above. These are:

- Residential - local residents close to the Proposed Scheme footprint
- Recreational – non-motorised users of the trunk road and local road network, cycle ways, footpaths, and recreational grounds
- Employment - workers and users of the surrounding industrial areas
- Educational – schools and Educational facilities

7.9.12. The elevated nature of the Proposed Scheme will inevitably increase the associated footprint and relative height and lead to an increased awareness of the road and associated traffic. As a result, visual effects are likely to occur to:

- Adjacent visual receptors of variable sensitivity, some of which have existing views of the A46 corridor but which will have substantial changes as a result of new retaining structures, slip roads and additional lighting
- Local roads, footways, and cycleways which currently have existing views of the junction at grade and which would be the subject of variable changes to their view as a result of changes to the existing layout

7.9.13. Table 7-5 shows the effects at viewpoint associated with the operational Proposed Scheme, which are considered long-term, direct impacts. Professional judgment has been used to determine the magnitude of effect where it falls between two categories.

7.9.14. Major adverse visual magnitudes of impacts are predicted at Greens Home & Gardens, with moderate adverse magnitudes of impacts at Cocked Hat Restaurant and Hotel, and Premier Inn as a result of views of the Proposed Scheme. The low sensitivity to change at these receptors (to an operational scheme) results in the predicted impact leading to a moderate adverse at Green Homes & Gardens, and slight adverse effect on these other receptors; the former is not considered significant given that it is short-term, based on the magnitude of impact in the first year of operation and before planting has taken hold and fully developed. The impact on other receptors is less, given their context and further views of the Proposed Scheme, and combined with the sensitivity are not anticipated to give rise to any significant effects during operation.

Table 7-5: Operational Effects at Viewpoints

Viewpoint	Sensitivity	Year 1		Year 15	
		Magnitude of Impact	Effect	Magnitude of Impact	Effect
1.Cocked Hat Restaurant and Hotel	Low	Moderate adverse	Slight adverse	Moderate adverse	Slight adverse
2.Premier Inn	Low	Moderate adverse	Slight adverse	Moderate adverse	Slight adverse
3.Broad Street	Low	Minor adverse	Neutral	Negligible	Neutral

Viewpoint	Sensitivity	Year 1		Year 15	
		Magnitude of Impact	Effect	Magnitude of Impact	Effect
Rugby Club					
4.Greens Home & Gardens	Low	Major adverse	Moderate adverse	Moderate adverse	Slight
5.A428 Rugby Road	Medium	Minor adverse	Slight adverse	Minor adverse	Slight adverse
6.Binley Woods	High	Negligible	Slight adverse	Negligible	Slight adverse
7.PRoW R145	Medium	Minor Adverse	Slight adverse	Negligible	Neutral
8.A428 Brandon Road	Low	Minor Adverse	Slight adverse	Negligible	Neutral
9.Kings Park Drive	Low	Minor Adverse	Slight adverse	Minor adverse	Neutral
10.Play area off Twickenham Road	Medium	Negligible	Slight adverse	Negligible	Neutral
11.Binley Wood Recreation Ground	Medium	Negligible	Slight adverse	Negligible	Neutral
12.Centenary Way long distance footpath /Coombe	Medium	Negligible	Slight adverse	Negligible	Neutral

7.9.15. By year 15 once the landscape mitigation has established, the magnitude of change is reduced at several receptors. The significance of effect at Greens Home & Gardens is reduced from moderate adverse significance to slight. The significance of effect at public right of way R145, A428 Brandon Road, Kings Park Drive, the play area of Twickenham Road, Binley Woods Recreation Ground, and Centenary Way long distance footpath, is reduced from slight adverse to neutral adverse.

7.9.16. The operational phase of the Proposed Scheme is therefore not anticipated to lead to any significant effect on landscape or visual amenity, either with or without the proposed landscaping strategy.

Monitoring

7.9.17. The planting will be monitored following implementation to check it is growing successfully and adequately mitigating the predicted effects. A monitoring regime and frequency will be outlined in the Environmental Management Plan.

8. BIODIVERSITY

8.1. Introduction

8.1.1. This chapter provides an assessment of the impact of the Proposed Scheme on biodiversity.

8.1.2. This chapter of the EAR has been undertaken by competent experts with relevant and appropriate experience:

- Senior Ecologist BA (Hons), PGCE, PgCert, MSc Ecology
- Principal Ecologist BSc (Hons), MCIEEM, PIEMA

8.2. Legislative and Policy Framework

8.2.1. Table 8-1 provides a summary of key biodiversity legislation and policy in relation to protected and notable sites, habitats, and species relevant to the Proposed Scheme and considered as part of the assessment.

Table 8-1: Key Biodiversity Legislation and Policy

Key Legislation and Policy	Description
The Wildlife and Countryside Act 1981 (as amended) (Ref. 8-1)	The Wildlife and Countryside Act (as amended) is the principal piece of UK legislation relating to the protection of wildlife.
The Countryside and Rights of Way Act 2000 (Ref. 8-2)	The Countryside and Rights of Way Act increases measures for the management and protection for Sites of Special Scientific Interest (SSSI) and strengthens wildlife enforcement legislation.
The Conservation of Habitats and Species Regulations 2017 (Ref. 8-3)	The Conservation of Habitats and Species Regulations is the principal means by which the European Habitats Directive is transposed in England and Wales. The regulations provide for the designation and protection of a network of European Sites (that is, Natura 2000), the protection of European protected species and other controls for the protection of European Sites.
The Natural Environment and Rural Communities Act 2006 (Ref. 8-4)	Section 41 (S41) of the Natural Environment and Rural Communities Act requires the Secretary of State to publish a list of habitats and species which are of principal importance for the conservation of biodiversity in England. The list reflects the habitats and species in England identified as requiring action in the (now withdrawn) UK Biodiversity Action Plan (UK BAP) and continue to be regarded as

Key Legislation and Policy	Description
	conservation priorities in the subsequent UK Post-2010 Biodiversity Framework (Ref. 8-5).
The Protection of Badgers Act 1992 (Ref. 8-6)	Badgers and their setts (burrows) are protected under the Act. Licences to permit otherwise prohibited actions may be granted under Section 10 of the Act for various purposes.
The Hedgerows Regulations 1997 (Ref. 8-7)	The intention of the Hedgerow Regulations Act is to protect important countryside hedges from destruction or damage.
The Water Environment (Water Framework Directive) (England and Wales) Regulations 2003 (Ref. 8-8)	The purpose of the Water Framework Directive is to prevent deterioration, enhance status of aquatic ecosystems and associated wetlands, whilst promoting sustainable water use.
The National Planning Policy Framework (NPPF) (Ref. 8-9)	The NPPF sets out the government's view on how planners should balance nature conservation with development and helps ensure that government meets its biodiversity commitments with regard to the operation of the planning system.
The National Planning Practice Guidance (NPPG) (Ref. 8-10)	The NPPG provides further guidance for local planning authorities on assessing the significance of nature conservation and biodiversity effects and pursuing the NPPF requirements to conserving and enhancing the natural environment and reducing pollution
The National Policy Statement for National Networks (NPSNN) (Ref. 8-11)	The NPSNN states that as a general principle, and subject to specific policies, development should avoid significant harm to biodiversity and geological conservation interests, including through mitigation and consideration of reasonable alternatives.
Coventry Local Plan 2016 (Ref. 8-12)	The Coventry Local Plan contains policies, designations and allocations which will be used to shape development and to determine planning applications in Coventry. Green environment policies applicable to biodiversity include: Policy GE1 Green infrastructure and Policy GE3: Biodiversity, Geological, Landscape and Archaeological Conservation.

Key Legislation and Policy	Description
Rugby Borough Council Draft Local Plan 2011-2031 (Ref. 8-13)	The Rugby Borough Council Draft Local Plan 2019 sets out the Council's policies and proposals to support the development of the Borough through to 2031. This includes a number of natural environment policies applicable to biodiversity including: NE1 Protecting designated biodiversity and geodiversity areas; NE2: Biodiversity; and NE3: Blue and green infrastructure policy.
Warwickshire, Coventry and Solihull Local Biodiversity Action Plans (LBAP) (Ref. 8-14)	The LBAP which covers the Proposed Scheme is the Warwickshire, Coventry and Solihull LBAP. It provides action plans for local priority habitats and species.
Warwickshire, Coventry and Solihull Green Infrastructure Strategy (Ref. 8-15)	Biodiversity offsetting, as set out in the Warwickshire, Coventry and Solihull Green Infrastructure Strategy, to be implemented where development proposals cannot avoid negative impacts on existing biodiversity.
Highways England Biodiversity Plan 2015 (Ref. 8-16)	The Highways England Biodiversity Plan provides a framework for identifying how Highways England intends to take biodiversity initiatives forward within the Road Investment Strategy (RIS) period. Its objectives are that by 2020, Highways England aims to reduce no net loss of biodiversity, and that by 2040 it must deliver a net gain in biodiversity.
Highways Agency (now Highways England) Biodiversity Action Plan 2002 (Ref. 8-17)	Although now out of date, and superseded by the 2015 Biodiversity Plan, the 2002 Highways Biodiversity Action Plan version still carries some relevance as it refers to specific species and habitats of conservation value associated with the existing road network.
Road Investment Strategy for the 2015/16 – 2019/20 Road Period (Ref. 8-18)	The Road Investment Strategy for the 2015/16 – 2019/20 states that the Future Strategy 2040 aims for improved environmental outcomes, including a net gain in biodiversity from Highways England's activities.
Highways England Delivery Plan (2015 – 2020) (Ref. 8-19)	The Highways England Delivery Plan (2015 – 2020) states that Highways England will identify works to fix deep-seated environmental problems and halt

Key Legislation and Policy	Description
	net biodiversity loss to contribute to Biodiversity 2020 outcomes.

8.3. Study Area

8.3.1. The desk study area includes a search for European Sites (specifically Special Areas of Conservation (SACs) and Special Protection Areas (SPAs)) up to 18.64 miles (30km) from the Proposed Scheme boundary to identify those sites where bats are a primary reason for designation, or where potential impact pathways are present with regard to birds. The desk study also identified national statutory and local non-statutory nature conservation designations and protected species within 1.24 miles (2km) of the Proposed Scheme boundary.

8.3.2. The desk study also allows for determination of an appropriate study area within which all important ecological features requiring assessment would be subject to field survey. Important ecological features are considered to be ecological features (that is, habitats, species or ecosystems) of notable quality or extent (Ref. 8-20). Important ecological features are otherwise referred to or known as *ecological receptors*.

8.3.3. The study area varies according to the spatial characteristics of each species or habitat potentially impacted; however, it was generally up to 500m beyond the Proposed Scheme boundary. Appendix 8-1 details the ecological study areas used for each species.

8.4. Baseline Conditions

8.4.1. This assessment has drawn upon the results of biodiversity studies and surveys for the Proposed Scheme, summarised in Table 8-2 and included in Appendix 8-2 (a to n) where applicable.

Table 8.2 Summary of field surveys conducted at the A46 Binley Junction

Designated Sites / Habitat / Species Group	Survey	Appendix
Assessment of Implications on European Sites	Updated desk study review in 2019	Not applicable – results presented in the EAR
	Report in 2016	Appendix 8-2(a)
Designated Statutory and Non-Statutory	Desk study in 2019	Not applicable – results presented in the EAR
Habitats	Preliminary Ecological Appraisal (PEA) in 2019	Appendix 8-2(b)
	Extended Phase 1 Habitat Survey in 2017	Appendix 8-2(c)
	Extended Phase 1 Habitat Survey in 2016	Not included – relevant information was updated in 2017 and 2019; up to date habitat descriptions are provided in the EAR and the recommended species-specific surveys have been reported

Designated Sites / Habitat / Species Group	Survey	Appendix
		separately and included in the EAR where applicable.
Other Fauna	Preliminary Ecological Appraisal (PEA) in 2019 – general appraisal for the site to support protected / notable species	Appendix 8-2(b)
Amphibians	Great Crested Newt Presence / Absence Survey 2018	Appendix 8-2 (d)
	Habitat Suitability Index Assessment 2017	Appendix 8-2(b) – reported in the Extended Phase 1 Habitat Survey Report 2017
	Habitat Suitability Index Assessment of Pond 4 in 2017	Appendix 8-2(e)
	Habitat Suitability Index Assessment in 2016 – this was updated in 2017 and 2018, however the 2017 and 2018 results refer to 2016 data where there is no change in the results of assessment.	Appendix 8-2(f)
Bats	Updated Potential Roost Feature Assessment in 2019	Appendix 8-2(b) – reported in the 2019 PEA and Appendix 8-3.
	Potential Roost Feature Assessment in 2017	Appendix 8-2(c) reported in the Extended Phase 1 Habitat Survey Report 2017
	Bat Activity Surveys (Spring / Summer) in 2018	Appendix 8-2(g)
	Bat Activity Surveys in 2017	Appendix 8-2(h)
	Bat Preliminary Roost and Habitat Assessment	Not included – updated in 2017 and 2019
Birds	Ornithological Walkover in 2019	Appendix 8-2(i)
	Ornithological Walkover Survey in 2017	Not included – updated in 2019
Badgers	Badger Survey in 2019	Appendix 8-2(j)
	Badger Survey 2017 – includes a survey of historical badger sett records up to 500m from the Proposed Scheme boundary	Appendix 8-2(k)
Riparian mammals – water vole and otter	Riparian Mammal Survey in 2019	Appendix 8-2(l)
	Riparian Mammal Survey in 2017	Not included – updated in 2019
Aquatic Macroinvertebrate	Aquatic Macroinvertebrate Spring Survey in 2018	Appendix 8-2(n)

Designated Sites / Habitat / Species Group	Survey	Appendix
	Aquatic Macroinvertebrate Walkover and Autumn Survey in 2017	Appendix 8-2(m)

8.4.2. The results of the desk study and field surveys are summarised below, with details given on those ecological features scoped in or out of the next stage of assessment.

Statutory Designated Sites

8.4.3. There are no European sites or proposed European sites (SPAs, SACs or Wetlands of International Importance (Ramsar sites)) within 1.24 miles (2km) of the Proposed Scheme and no European Sites with bats as a primary qualifying interest feature within 18.6 miles (30km). Ensor's Pool SAC is the nearest European site located approximately 7.46 miles (12km) to the north-west of the site (and is the only European site within 18.6 miles (30km) of the Proposed Scheme) (see Figure 8-1). The SAC site is designated for white-clawed crayfish (*Austropotamobius pallipes)*[3] and the pool is isolated from any river systems. Given there are no potential impact pathways present between the designated site and the Proposed Scheme (no habitat or hydrological links), Ensor's Pool SAC is scoped out of the assessment. This reaffirms the results of the Assessment of Implications on European Sites Report prepared in 2016 (Appendix 8-2(a)).

8.4.4. There are seven national or local statutory designated sites within 1.24 miles (2km) of the Proposed Scheme boundary. Refer to Figure 8-2 (Chapter 18) and Table 8-3 for details. These statutory designated sites have been further investigated, following receipt of further design information and water and air quality data, to determine requirements for assessment within the biodiversity chapter. Three statutory designated sites have been scoped into the assessment, while four of these sites have been scoped out as detailed in Table 8-3 below.

Table 8-3: Statutory Designated Sites within the Study Area

Site Name / Designation	Reason for Designation	Relationship to the Site	Scoped In / Out of the Assessment
Combe Pool SSSI	The pool is fed by Smite Brook and includes 36 hectares of reed beds, the pool, and woodland. It is one of the most important ornithological sites in Warwickshire for herons (*Ardea cinerea*), and other breeding birds, and for wintering wildfowl.	Located approximately 300m to the north-east of the Proposed Scheme boundary.	**Scoped In** Rationale: Due to proximity to the Proposed Scheme and hydrological links. Direct road drainage outfalls exist from the A46 into this SSSI.

[3] Although monitoring surveys by Natural England in 2015 did not confirm the presence of white-clawed crayfish in Ensor's Pool SAC: http://publications.naturalengland.org.uk/publication/5756899955834880 accessed 07.10.19

Site Name / Designation	Reason for Designation	Relationship to the Site	Scoped In / Out of the Assessment
Herald Way Marsh SSSI	This SSSI contains a range of wetland communities which are scarce in the county. They range from open water through swamp and fen to marsh, as well as areas of grassland, scrub and woodland. However, the site has been selected for its assemblage of invertebrates, a number of which are nationally rare.	Located 220m adjacent to the south-western boundary of the Proposed Scheme.	**Scoped In** Rationale: Due to proximity to the Proposed Scheme and hydrological links. Direct road drainage outfalls exist from the A46 into this SSSI.
Herald Way Marsh (Claybrook Marsh) Local Nature Reserve (LNR)	One of the most important areas for rare invertebrates in the county. Overlaps with Herald Way Marsh SSSI.	Located adjacent to the Proposed Scheme boundary.	**Scoped In** Rationale: Due to proximity to the Proposed Scheme and hydrological links. Direct road drainage outfalls exist from the A46 into this SSSI.
Brandon Marsh SSSI	Diverse complex of flooded gravel pits, fen and scrub lying adjacent to the River Avon. Also of regional importance for several species of breeding and wintering birds.	Located approximately 630m to the south-east of the Proposed Scheme boundary.	**Scoped Out** Rationale: The drainage from Herald Way Marsh heads south to meet the River Avon. This is further west of the Brandon Marsh SSSI and therefore not considered to be impacted. Refer to Chapter 13: Road Drainage and the Water Environment.
Ryton and Brandon Gravel Pits SSSI	A geological SSSI showing important fluvial sequence.	Located approximately 510m to the south-east of the Proposed Scheme site boundary.	**Scoped Out** Rationale: The geological SSSI is distant from the Proposed Scheme and would not be sensitive to indirect impacts.
Stoke Floods LNR	The reserve has a large lake, reed beds and scrub next to the River Sowe. The lake is the	Located approximately 815m to the north-west of	**Scoped Out**

Site Name / Designation	Reason for Designation	Relationship to the Site	Scoped In / Out of the Assessment
	result of mining subsidence and supports many wetland plants such as yellow flag and reed canary grass. Bird life is varied from many species of duck, seven species of warbler in the summer and occasional unusual migratory visitors such as black tern and yellow wagtails.	the Proposed Scheme boundary.	Rationale: There is hydrological connectivity through Smite Brook and the River Sowe, however the LNR is considered to be a sufficient distance away from the road drainage outfall not to be impacted (0.8 km, more than 0.6 miles) and mitigation will be included for road pollutants. Refer to Chapter 13: Road Drainage and the Water Environment.
Willenhall Wood LNR	A mixed deciduous, ancient and semi-natural woodland covering 9 hectares. Shrub layer. Dead trees are left where possible to provide nest sites for woodpeckers. Also contain insects which birds feed on.	Located approximately 250m west of the Proposed Scheme boundary	**Scoped Out** Rationale: There are no hydrological links to the LNR. The habitats within the LNR are also not considered to be highly sensitive to changes in air quality due to the distance away (≥250m) and the types of habitats present (for example, no wetland habitats, acid grasslands, lichens).

Non-Statutory Designated Sites

8.4.5. From the 2019 biological records data search there are approximately 63 non-statutory designated sites within 1.24 miles (2km) of the Proposed Scheme boundary comprising Local Wildlife Sites (LWSs), potential LWSs (pLWSs), and Ecosites.

8.4.6. Non-statutory designated sites with the potential to be impacted by the development due to potential habitat or hydrological pathways are considered to be located up to 0.62 miles (1km) of the Proposed Scheme boundary, as shown in Figure 8-3 and detailed in Table 8-4. Ten of these sites have been scoped in and further investigated to determine requirements for assessment within this chapter.

Table 8-4: Non-statutory Designated Sites in the Study Area

Site Name / Designation	Reason for Designation	Relationship to the Site	Scoped In / Out of Assessment
Combe Abbey Pool	Designated for its ornithological interest,	Located approximately	**Scoped In**

Site Name / Designation	Reason for Designation	Relationship to the Site	Scoped In / Out of Assessment
(part SSSI) SSSI Ecosite (Site code: 07/37)	particularly large heronry. Water vole (*Arvicola amphibius*) and otter (*Lutra lutra*) are known to be using the site. The site is good for invertebrates (butterflies and moths). Tormentil (*Potentilla erecta*) (noted in the Ecosite citation as a near threatened plant; however current distribution and conservation status is common (Ref. 8-21) was recorded within the site in 2010).	85m to the east of the Proposed Scheme boundary.	Rationale: Due to proximity to the Proposed Scheme and hydrological links. Direct road drainage outfalls exist from the A46 into Combe Abbey Pool.
Claybrookes Marsh LWS / Herald Way Marsh (part SSSI) Ecosite (Site code: 39/37)	The majority of the site is designated as Herald Way Marsh nationally important SSSI. The remainder of the site is designated as Herald Way Marsh (Claybrookes Marsh) LWS. Site is also Herald Way Marsh statutory LNR. The site contains a range of wet communities which are scarce in the county. One of the most important areas for rare invertebrates in the county. Comprises broadleaved semi-natural woodland and swamp.	Located adjacent to the Proposed Scheme boundary.	**Scoped In** Rationale: Due to proximity to the Proposed Scheme and hydrological links. Direct road drainage outfalls exist from the A46 into this LWS/Ecosite.
Willenhall Wood and Meadow LWS / LNR Ecosite (Site code 46/37)*	Designated as Willenhall Wood and Meadow LWS. The site is also Willenhall Woods LNR. It contains ancient woodland and is not only valuable for its botanical interest but is of interest for birds and invertebrates, with at	Ecosite part located approximately 250m west of the Proposed Scheme boundary. The LWS part of the site is located adjacent to the	**Scoped In** Rationale: Located adjacent to the Proposed Scheme boundary. There is potential for direct and indirect effects which need to be assessed.

Site Name / Designation	Reason for Designation	Relationship to the Site	Scoped In / Out of Assessment
	least five nationally scarce insects recorded.	Proposed Scheme site boundary.	
Piles Coppice LWS / Ecosite (Site code 17/37)*	On Natural England's Ancient Woodland Inventory. The site includes ponds to the east which has a number of dragonfly records. The Lobster (*Stauropus fagi)* and orange footman *(Eilema sororcula)* moths which were considered extinct in Warwickshire were found here in 2018.	Located adjacent to the Proposed Scheme boundary.	**Scoped In** Rationale: Located adjacent to the Proposed Scheme boundary. There is potential for direct and indirect effects which need to be assessed.
Grassland adjacent to Brandon Wood LWS / Area between Brandon Wood and Piles Coppice Ecosite (Site code: 92/37)	Designated as Grassland Adjacent to Brandon Wood LWS. Semi-improved grassland.	Located adjacent to the Proposed Scheme	**Scoped In** Rationale: Due to proximity to the Proposed Scheme there is potential for direct and indirect effects which need to be assessed.
Binley Common Farm Wood pLWS / Ecosite (Site code: 42/37)*	On Natural England's Ancient Woodland Inventory.	Located adjacent to the Proposed Scheme	**Scoped In** Rationale: Located adjacent to the Proposed Scheme boundary. There is potential for direct and indirect effects which need to be assessed.
The Pools, Black Spinney and Long Spinney pLWS / Black Spinney and Long	The middle part is designated as part of the River Avon LWS. The remainder is identified as The Pools, Black Spinney and Long Spinney pLWS. It contains woodland with wet areas and pools	Located approximately 40m to the south of the Proposed Scheme boundary.	**Scoped In** Rationale: Due to proximity to the Proposed Scheme and hydrological links. Direct road drainage outfalls exist from the A46 which lead into this pLWS/Ecosite.

Site Name / Designation	Reason for Designation	Relationship to the Site	Scoped In / Out of Assessment
Spinney Ecosite (Site code: 66/37 and 86/37)	along a stream valley. Part of the site includes a section of The Bogs on the east side of the A46.		
Smite Brook, headwater and tributaries. Tributary of the River Sowe. Ecosite. (Site code: 95/37)	Includes a small area of Smite Brook. A linear site which runs through Combe Pool SSSI. A tributary of the River Sowe with historical records of white-clawed crayfish (*Austropotamobius pallipes*), otter and water vole.	Located approximately 400m to the north of the Proposed Scheme boundary.	**Scoped In** Rationale: Hydrological links from the Proposed Scheme with potential to be indirectly affected.
Hungerly[4] Hall Farm Ecosite (Site code: 226/37)	Floristically rich grassland with invertebrate interest. The south-western part of the site designated as Gainford Rise Local LWS (part of which is now rejected).	Located adjacent to the Proposed Scheme boundary.	**Scoped In** Rationale: Located adjacent to the Proposed Scheme boundary. There is potential for direct and indirect effects which need to be assessed.
Big Rough Ecosite (and Little Rough) (Site code: 55/37)	Broadleaved plantation woodland with very little understorey and ground flora limited to bracken (*Pteridium aquilinum*)	Located approximately 80m to the east of the Proposed Scheme boundary.	**Scoped In** Rationale: A field drain from the Proposed Scheme links to the Ecosite. There is potential for indirect effects from the Proposed Scheme due to hydrological links.
Coombe Abbey Pool part LWS incl. Countryside Park West Deer Park pLWS (Site code 07/37 & 23_47)	The majority of the site is designated as Coombe Abbey LWS. Parts of the site in the south-east and south-west are identified as Coombe Countryside Park West Deer Park pLWS. This site has a variety of habitats, including	Located approximately 270m to the east of the Proposed Scheme boundary.	**Scoped Out** Rationale: Terrestrial habitats will not be directly or indirectly impacted due to distance from the Proposed Scheme boundary (≥250m).

[4] In accordance with the Ecosite citation, the Ecosite is referenced as Hungerly. It is to be noted that it is also referenced locally by an alternative spelling as Hungerley Hall.

Site Name / Designation	Reason for Designation	Relationship to the Site	Scoped In / Out of Assessment
	woodland, tall herb and species rich grassland. The site supports several nationally red-listed birds. Coombe Abbey has one of the best sites in the county for lesser-spotted woodpecker (*Dendrocops minor)*. The site supports a known population of grass snake (*Natrix helvetica).*		
Coombe Abbey LWS (Site code: 02/48)	The site comprises broad-leaved woodland and coniferous plantation with standing water and a brook running through it. Water vole, otter and grass snake are known to be using the site. A number of invertebrates were recorded here including (*Gyrinus urinator*) and (*Haliplus laminatus)*	Located approximately 270m to the north-east of the Proposed Scheme.	**Scoped Out** Rationale: Coombe Abbey Pool, the main waterbody, and associated brook, are assessed separately as per above. Terrestrial habitats will not be directly or indirectly impacted due to distance from the Proposed Scheme (≥250m)
Brandon Marsh LWS (Site code: 10/37)	Designated as a nationally important SSSI. Parts of this site are not SSSI, and designated as Brandon Marsh Sheep Field LWS, which acts as a high quality and an important buffer to the SSSI. An area of wetland habitat. The site is particularly good for invertebrates and birds (including a variety of waders).	Located approximately 605m to the south-east of the Proposed Scheme boundary.	**Scoped Out** Rationale: The drainage from Claybrookes Marsh LWS and Herald Way Marsh SSSI Ecosite heads south to meet the River Avon. This is further west of Brandon Marsh LWS and therefore not considered to be impacted.
Ryton and Brandon Gravel Pits	A geological SSSI showing important fluvial sequence.	Located approximately 510m to the south-east of	**Scoped Out**

Site Name / Designation	Reason for Designation	Relationship to the Site	Scoped In / Out of Assessment
SSSI Ecosite (Site code: 28/37)		the Proposed Scheme boundary.	Rationale: The drainage from Claybrookes Marsh LWS and Herald Way Marsh SSSI heads south to meet the River Avon. This is further west of Ryton and Brandon Gravel Pits SSSI Ecosite and therefore not considered to be impacted.
Stoke Floods Part LWS / Part LNR Ecosite (Site code: 8/37)	Majority of the site is designated as Stoke Floods LWS. Part of this site is designated as Stoke Flood LNR. A large pool with a mosaic of wetland habitats. Botanical and ornithological value.	Located approximately 815m to the north-west of the Proposed Scheme boundary.	**Scoped Out** Rationale: There is hydrological connectivity through Smite Brook and the River Sowe, however the LWS is considered to be a sufficient distance away from the road drainage outfall not to be impacted (more than 0.62 miles (1km)) and mitigation will be included for road pollutants. Refer to Chapter 13: Road Drainage and the Water Environment.
Brandon Wood LWS (Site code:01/37)*	Semi-natural ancient woodland and area of semi-improved grassland. Number of ponds important for dragonfly and historical survey work (dated 2001) identified dormouse (*Muscardinus avellanarius*) to be in the woodland.	Located approximately 390m to the east of the Proposed Scheme boundary.	**Scoped Out**

Site Name / Designation	Reason for Designation	Relationship to the Site	Scoped In / Out of Assessment
			Rationale: It is noted that there are terrestrial habitat links exist from the LWS to the Proposed Scheme and historical records of dormouse are known in the LWS woodland. However, potential impacts on dormouse from the Proposed Scheme have been scoped out (see baseline section below). The LWS is not considered to be directly or indirectly affected by the Proposed Scheme.
The Pools Ecosite* (Site code: 66/37)	Identified as part of The Pools, Black Spinney and Long Spinney pLWS. It is designated as ancient woodland. Contains small mixed woodland close to Brandon Wood and Piles Coppice. The woodland is in a hollow with impeded drainage.	Located approximately 400m to the east of the Proposed Scheme.	**Scoped Out** Rationale: No direct or indirect effects on terrestrial habitats due to distance away (≥250m).
Sowe Valley Dorchester Way LWS / River Sowe Ecosite (Site code: 45/38Z)	Designated as part of the Sowe Valley Dorchester Way LWS. The river includes a considerable area of flood plain. A good variety of bird species. Strong colony of water vole. Aquatic and emergent bankside vegetation.	Located approximately 760m to the north of the Proposed Scheme boundary	**Scoped Out** Rationale: Located upstream of the Proposed Scheme. No direct or indirect effects considered.
Sowe Valley Dorchester Way LWS / River Sowe Ecosite (Site code: 40/37Z)	Designated as part of the Sowe Valley Dorchester Way LWS. Aquatic, emergent and bankside vegetation.	Located approximately 800m to the north of the Proposed Scheme boundary.	**Scoped Out** Rationale: Located upstream of the Proposed Scheme. No direct or indirect effects considered.

Site Name / Designation	Reason for Designation	Relationship to the Site	Scoped In / Out of Assessment
Railway Verge pLWS / London to Birmingham Mainline Railway Ecosite (Site code: 91/47Y)	The site consists of tall herbs and grasses.	Located approximately 185m to the south of the Proposed Scheme	**Scoped Out** Rationale: No direct or indirect effects on terrestrial habitats. Habitat types present are not considered to be highly sensitive to changes in air quality (for example, no wetland habitats, acid grasslands, lichens).
Brinklow Slag Heap Ecosite (Site code: 103/37)	Semi-improved and amenity grassland. Small stream runs through the site.	Located approximately 400m to the west of the Proposed Scheme.	**Scoped Out** Rationale: A review of Ordnance Survey maps shows that the stream is in association with Gainford Rise LWS to the north. No direct or indirect effects on terrestrial habitats due to distance away (≥250m).

* Ancient woodland habitat present.

Habitats

8.4.7. The following habitats occur onsite or in the immediate surrounds up to 0.03 miles (0.05km) (as shown in Figure 8-5A and B):

- Cultivated or disturbed land - arable
- Cultivated or disturbed land- amenity grassland
- Broadleaved woodland – semi-natural (incl. ancient woodland – Piles Coppice and Binley Common Farm Wood as shown in Table 8-4)
- Broadleaved woodland – plantation
- Scrub – dense or continuous
- Species-poor hedgerow
- Buildings and hardstanding
- Other habitat – private gardens
- Swamp
- Tall ruderal
- Standing water
- Running water

8.4.8. Refer to Appendix 8-3 for the habitat descriptions and associated Target Notes shown on Figures 8-5A and 5B.

8.4.9. The Proposed Scheme borders two National Character Areas (NCA):

- NCA Profile 97 Arden (to the west) – comprising farmland and former wood-pasture with land use that is primarily residential, agricultural and industrial. There are numerous transport corridors, including road, rail, air and canal through the area (Ref. 8-22)
- NCA Profile 96 Dunsmore and Feldon (to the east) – predominantly rural, agricultural landscape crossed by numerous small rivers and tributaries varying from open to wooded character. The historic character of the area is important, particularly its ancient woodland, enclosed fields, veteran trees, landscaped park, and areas of archaeological interest (Ref. 8-23).

Species

8.4.10. Table 8-5 provides a summary of baseline results for protected and notable species and details ecological features scoped in or out of the next stage of assessment. The individual baseline survey reports presented in Appendix 8-2 provide further details.

Table 8-5: Protected and Notable Species in the Study Area

Protected / Notable Species	Survey	Date	Methodology (Refer to Baseline Reports Appendix 8-2 for details)	Summary of Findings	Report Reference (Appendix 8-2(a to n))	Scoped In / Out of Assessment
Great crested newts	Great Crested Newt (GCN) Habitat Suitability Survey (incl. eDNA)	2018, 2017 and 2016	Habitat Suitability Index (HSI) assessment (Ref. 8-24) of eight ponds within 500m of the Proposed Scheme boundary (Ponds 1 to 5 and 7 to 9, as illustrated in Appendix 8.2 (d), and Figure 8.6 of the EAR) was conducted in 2018. The eDNA sampling technique was also used to determine the presence or likely absence of GCN at those waterbodies in April 2018. This novel technique was developed through research funded by Defra, details of which can be found within the report on the Defra website (Ref. 8-25). One pond (Pond 6) confirmed to no longer exist.	There are 7 recent records of GCN (less than 10 years). The nearest record is located (0.88 km) to the south of the Proposed Scheme boundary at Brandon Marsh. 9 ponds were identified within 500m of the Proposed Scheme boundary. There had been no change in the HSI score within ponds 1-3 since the previous surveys undertaken in 2016 (HSI scores: 0.75-Good, 0.55-Below Average and 0.63-Average respectively), Pond 4 (which was not previously accessed for survey in 2017) was assessed as having a HSI score of 0.5 (Poor suitability for GCN), pond 5 (which was not previously surveyed in 2017 due to the pond being dry) was assessed as having a HSI of 0.62 (Average) and the HSI scores of ponds remain 7-9 were unchanged from the 2017 surveys (0.88-Excellent, 0.86-Excellent and 0.80 Excellent respectively). The eDNA sampling of ponds 1 to 5 and 7 to 9 returned negative results.	Appendix 8-2(d) Appendix 8-2(b) Appendix 8-2(e) Appendix 8-2(f)	**Scoped Out** *Rationale:* GCN are scoped out of the assessment as none of the ponds within 500m of the Proposed Scheme tested positive for GCN using eDNA testing.
Reptiles	Extended Phase 1 Habitat Survey	2019	The extended Phase 1 habitat survey appraised the potential for the Proposed Scheme site plus 50m buffer to support reptiles.	The data search returned 38 records of grass snake *Natrix helvetica* and one record of slow-worm (*Anguis fragilis)* from within 2 km of the Proposed Scheme boundary and within the last ten years. The closest grass snake was recorded from Claybrookes Marsh, c. 0.3 km to the south and the slow-worm was recorded in Brandon Woods, c. 1 km to the south-east of the Proposed Scheme boundary. The roadside verges and arable field margins within the Proposed Scheme boundary offer low quality habitat for basking and foraging reptiles – both of which are intensively managed. No other habitats (such as woodland, arable farmland or scrub) within the survey area are suitable for reptiles.	Appendix 8-2(b)	**Scoped In** *Rationale:* The risk of encountering transient grass snake (albeit low) needs to considered in this assessment, with precautionary mitigation and avoidance measures adopted where appropriate. Therefore, a precautionary approach is to be adopted for the assessment, as explained in section 8.6 *Assessment Methodology*.

Protected / Notable Species	Survey	Date	Methodology (Refer to Baseline Reports Appendix 8-2 for details)	Summary of Findings	Report Reference (Appendix 8-2(a to n))	Scoped In / Out of Assessment
Bats – Roosting	Updated Potential Roost Feature Assessment; Extended Phase 1 Habitat Survey	2019 and 2017	Trees and built structures within and adjacent to the Proposed Scheme, including woodland blocks, were assessed for their potential to support roosting bats as part of the potential roost feature assessment in 2019 and the extended Phase 1 habitat survey in 2017, based upon Bat Conservation Trust (BCT) survey guidelines (Ref. 8-26).	There are 9 recent records of bat roosts within 1.24 miles (2km) of the Proposed Scheme comprising 4 species: soprano pipistrelle (*Pipistrellus pygmaeus*), common pipistrelle (*Pipistrellus pipistrellus*), brown long-eared bat (*Plecotus auritus*) and Nathusius pipistrelle (*Pipistrellus nathusii*). The nearest roost record is of a brown long-eared bat located 250m to the east. No trees or built structures were found to be suitable for roosting bats within the Proposed Scheme boundary. Four trees with moderate suitability to support roosting bats (TN24, TN34, TN35 and TN36, Figure 8-5A and B) and one building with low suitability to support roosting bats (TN37, Figure 8.5A), were found within 50 m of the Proposed Scheme boundary. Woodland blocks adjacent to Combe Pool SSSI (TN5), Binley Common Farm Wood (TN3) and Piles Coppice (TN1) were also identified in 2017 to have moderate suitability to support roosting bats. In 2016 the bat activity survey results (see below) confirmed a potential common pipistrelle transient or occasional day roost north-east of the main general arrangement area, given that bat passes were recorded approximately 30 minutes after sunset in October.	Appendix 8-2(b) Appendix 8-2(c) Appendix 8-2(h)	**Scoped In** *Rationale*: Although no potential roosting features were confirmed within the Proposed Scheme boundary, potential for indirect effects on potential bat roost features (particularly in trees) located within 50m is assessed in this chapter, particularly in association with the proposed construction compounds.

Protected / Notable Species	Survey	Date	Methodology (Refer to Baseline Reports Appendix 8-2 for details)	Summary of Findings	Report Reference (Appendix 8-2(a to n))	Scoped In / Out of Assessment
Bats – Foraging and Commuting	Bat Activity Surveys	2018 and 2017	One visit per month (comprising one transect route) August to October 2017 covering representative habitats within and adjacent to the Proposed Scheme site boundary. A further two visits were carried out in 2018; a Spring visit in April and a Summer visit in June. Three static detectors per transect route per month for a minimum of five consecutive nights. Surveys were conducted in 2017 and 2018 based upon BCT survey guidelines (Ref. 8-26). Due to the relatively low levels of bat activity recorded during the surveys conducted in 2017 and the presence of the existing dual carriageway, which did not feature in the initial assessment, it was concluded that the habitat value for bats could be reduced to low in 2018 from the initial moderate value given in 2017.	There were 51 recent records of bat activity within 1.24 miles (2km) of the Proposed Scheme comprising 7 species: soprano pipistrelle, common pipistrelle, Nathusius' pipistrelle, brown long-eared bat, serotine bat (*Eptesicus serotinus*), Daubenton's bat (*Myotis daubentonii*) and noctule bat (*Nyctalus noctula*). The nearest record is of common pipistrelle located 100m to the east of the Proposed Scheme. During the walked transect surveys and automated surveys in 2017 and 2018, 4 species or species groups of bats were recorded; common or soprano pipistrelle, noctule and *Myotis* sp. Bat activity was very low to low; with the highest levels of bat activity recorded at Broadstreet Rugby Club, the adjacent roundabout junction and Herald Way Marsh SSSI / Claybrookes Marsh Nature Reserve / SSSI.	Appendix 8-2(g) Appendix 8-2h)	**Scoped In** *Rationale:* Surveys in 2018 verified very Low to Low bat activity was recorded across the site as per 2017, with relatively higher activity identified at the Rugby Club, the adjacent roundabout junction and Herald Way Marsh SSSI / Claybrookes Marsh Nature Reserve. Given the potential for foraging and commuting bats across the Proposed Scheme (during both construction and operation) bats are scoped into the assessment.
Birds	Ornithological Walkover	2019	The 2019 survey involved a walkover of the Proposed Scheme and the 250m buffer, accessing all areas where possible to within 100m. The survey visit also included the wider Coombe Country Park and Combe Pool SSSI, to the north-east of the Proposed Scheme. Trees and buildings within the survey area were assessed for their potential to support roosting and breeding barn owl, based on guidance as detailed by Shawyer: Barn Owl *Tyto alba Survey Methodology and Techniques for use in Ecological Assessment* (Ref. 8-27).	<u>Bird assemblage at Combe Pool SSSI</u> Waterbird populations present within the SSSI, the waterbody and associated assemblages are, at their closest, 250m from the Proposed Scheme. The waterbody is also screened through existing broad-leaved woodland. The heronry is located over 400m from the Proposed Scheme boundary. <u>Barn Owl</u> Five records of barn owl were returned from the data search, including a record of breeding barn owl at Brandon Marsh Nature Reserve, c 1 km south-east of the Proposed Scheme. No mature trees with a trunk diameter of sufficient girth and with a cavity of sufficient quality to support barn owl (e.g. provide a roosting or nesting platform), were recorded within the survey area.	Appendix 8-2(i)	**Scoped Out** *Rationale*: The notable bird assemblage at Combe Pool SSSI is located sufficient distance away not to be impacted. Barn owl is unlikely to forage adjacent to or cross the current A46. However, precautionary mitigation measures are included in the landscape proposals to minimise attraction of foraging barn owl on grassland verges to the east of the A46.

Protected / Notable Species	Survey	Date	Methodology (Refer to Baseline Reports Appendix 8-2 for details)	Summary of Findings	Report Reference (Appendix 8-2(a to n))	Scoped In / Out of Assessment
				No buildings with features that could support roosting or breeding barn owl, such as agricultural buildings and structures with access to the interior were recorded within the survey area. No barn owl nest boxes were recorded within the survey area. Considered unlikely that barn owl would use the survey area for foraging and in particular, areas in close proximity to the existing road carriageway and Proposed Scheme, due to lack of grass margins around the arable fields and along the verges of the current A46.		
				<u>Nesting birds and other farmland birds</u> The habitats present within the survey area, are likely to support small breeding and wintering populations of notable species, such as woodland and farmland birds (however, are neither of an extent or quality to support significant populations).		**Scoped In** *Rationale:* Potential for small breeding and wintering populations of notable species on and within proximity to the Proposed Scheme.
Badgers	Extended Phase 1 Habitat Survey; and Badger Walkover	2019 and 2017	The badger survey in September 2019 included a survey for badger on and within 50m of the Proposed Scheme site boundary. Particular attention was paid to the presence of field signs which would indicate the presence of badger on site including active setts, disused setts, latrines, scrapes, paths through vegetation, footprints and hair (Ref. 8-28). The locations of known historical badger setts within 500m were also visited in 2017 to determine whether they were still active.	No setts (active or disused) were found within close proximity (less than 50m) of the Proposed Scheme in 2019 or 2017. Additionally, the badger setts identified from historical records within 500m were found to be no longer present in 2017. Potential field signs of commuting badger were recorded at Herald Way Marsh and Piles Coppice in the form of breaches under fences; however, no other field signs (such as badger hair or footprints) were recorded in these locations.	Appendix 8-2(j) Appendix 8-2(k)	**Scoped Out** *Rationale:* No confirmed signs of badger. Potential signs of commuting and foraging badger identified. General mitigation measures will include precautions for badger.
Western European Hedgehog	Extended Phase 1 Habitat Survey	2019	The extended Phase 1 habitat survey appraised the potential for Proposed Scheme plus 50m to support hedgehog.	There are 43 recent records (less than 10 years old) of hedgehog within 1.24 miles (2km) of the Proposed Scheme boundary. The nearest record is 200m to the east. Several habitats including scrub, woodland and grassland suitable for foraging hedgehogs were identified within 50m of the Proposed Scheme boundary.	Appendix 8-2(b)	**Scoped In** *Rationale:* Precautionary approach to the assessment given potential habitat present.

Protected / Notable Species	Survey	Date	Methodology (Refer to Baseline Reports Appendix 8-2 for details)	Summary of Findings	Report Reference (Appendix 8-2(a to n))	Scoped In / Out of Assessment
Polecat	Extended Phase 1 Habitat Survey	2019	The extended Phase 1 habitat survey appraised the potential for the site plus surrounding 50m to support polecat. The nearest suitable rabbit holes were 60m from the Proposed Scheme boundary.	The data search returned three records of polecat pre-2017, the closest of which was 900m south-east of the Proposed Scheme red-line boundary in Brandon Marsh, 2017.	Appendix 8-2(b)	**Scoped In** *Rationale:* Precautionary approach to the assessment given potential habitat present and wide roaming nature of polecat given record within 1km of the Proposed Scheme.
Dormouse	Extended Phase 1 Habitat Survey	2019	The extended Phase 1 habitat survey appraised the potential for the site plus surrounding 50m to support dormouse.	Brandon Wood LWS, located approximately 380m to the east of the Proposed Scheme boundary (nearest point being the southern construction compound candidate site) has historical records of dormouse (more than 10 years old). People's Trust for Endangered Species and the Warwickshire Dormouse Conservation Group confirmed there are no recent records (which may be due to no recent surveys) and none within 1.24 miles (2km) of Brandon Wood LWS. Brandon Wood is ecologically connected to Piles Coppice, which is adjacent to the southern extent of the Proposed Scheme. Surveys for dormouse, undertaken by the Warwickshire Dormouse Conservation Group (WDCG) between 2009 and 2016 (Ref. 8-29) confirmed that there are no recent records of dormouse in Piles Coppice, Little Brandon Wood, Great Brandon Wood and none within 2km of Brandon Wood LWS. Some bramble was recorded in 2019 adjacent to Piles Coppice which may offer foraging opportunities for dormouse. However, it is confined to small areas of low-quality growth and is not extensive.	Appendix 8-2(b)	**Scoped Out** *Rationale:* Whilst the WDCG report suggests that dormice may have been missed during surveys, but still present: "*There may be an alternative explanation that we are looking for Dormice in the wrong place. There is evidence that dormice spend more time in the woodland canopy than in the shrub layer where, for our convenience, we are installing the nest tubes and boxes. As these are all mature woods, perhaps the canopy is where the dormice are, which is why we are not finding them (pers. comm. Andy Bucklitch, 2017)*", it is likely that if dormice were present in these areas, there would be evidence to support this (such as chewed nuts, or nests in tubes) and these signs of dormouse presence would have been recorded during surveys undertaken by WDCG. Dormice can and will inhabit road verges, particularly where foraging resources (such as bramble) are present (Ref. 8-29). Whilst some bramble was recorded in 2019, growing within small section of the Proposed Scheme, adjacent to the Piles Coppice, it is largely sub-optimal, and confined to small areas of low-quality growth and is not extensive. Given that there are no recent records of dormouse within 2 km of the Site, or within the last ten years; and that the habitat within a small section of the Proposed Scheme, adjacent to Piles Coppice, is largely sub-optimal and offers limited foraging habitat for dormouse, it is highly

Protected / Notable Species	Survey	Date	Methodology (Refer to Baseline Reports Appendix 8-2 for details)	Summary of Findings	Report Reference (Appendix 8-2(a to n))	Scoped In / Out of Assessment
						unlikely that this species occurs within the survey area. Dormouse are therefore scoped out.
Riparian mammals – water vole and otters	Otter and water vole survey	2019	The 2019 surveys focused on 7 watercourses within 50m of the Proposed Scheme and watercourses within 200m with hydrological links to the Proposed Scheme: 1) Smite Brook 2) Combe Pool SSSI / Country Park and drains 3) Oak Farm Nurseries drain 4) Field drain to the east of rugby fields 5) Field drain south of Binley Wood 6) Herald Way Marsh SSSI and LNR waterbodies 7) Drain south of Claybrookes Marsh Surveys applied the standard methodologies (Ref. 8-30 to 8-34)	The desk study identified the nearest recent records (within the last 10 years) of water vole were from Brandon Marsh, which is approximately 0.62 miles (1km) south-west of the proposed scheme. The closest, most recent record of otter to the Proposed Scheme was from Willenhall. No evidence of water vole or presence was found in any of the surveyed waterbodies and ditches. In 2019 presence of mink was recorded in Smite Brook. Otter prints were recorded in Smite Brook in July and September 2019.	Appendix 8-2(l)	**Water Vole – Scoped Out** *Rationale:* No evidence of water vole was recorded within any of the surveyed watercourses and as a result, it is also considered that those watercourses that were not surveyed were unlikely to hold water vole. **Otter - Scoped In** *Rationale*: Recent evidence of otter has been found on a data search and otter prints have been recorded in Smite Brook therefore a precautionary approach needs to be taken with suitable riverine habitats linked to the site.
White-clawed crayfish	Extended Phase 1 Habitat Survey	2017	The extended Phase 1 habitat survey appraised the potential for the site plus surrounding 50m to support white-clawed crayfish.	Smite Brook, headwater and tributaries, tributary of the River Sowe, Ecosite (a linear site which runs through Combe Pool SSSI) has historical records of white-clawed crayfish. However, no recent records were provided. It is considered unlikely that this species could be present in the River Sowe and Smite Brook due to the known distribution of white-clawed crayfish in the LBAP. None of the watercourses (field drains or ponds) within 50m of the Proposed Scheme were considered suitable to support white-clawed crayfish.	Appendix 8-2(c)	**Scoped Out** *Rationale:* No evidence or potential evidence to support these species from baseline surveys.
Aquatic Macro Invertebrates	Aquatic Macroinvertebrate Autumn and Spring Survey	2017 and 2019	In 2017 a walkover of 5 watercourses up to 200m from the Proposed Scheme boundary were surveyed which may be affected by changes in water quality, or where a waterbody was deemed to be hydrologically connected to waterbodies within the 200m site buffer:	<u>Combe Pool SSSI drain</u> Macroinvertebrate species diversity was recorded as *High* but conservation value was reduced (from *Moderate* to *Low*) as no notable species were recorded. The waterbody supports suitable fish spawning habitat with mixed sediment	Appendix 8-2(m) Appendix 8-2(n)	**Scoped In** *Rationale:* Fish populations and macroinvertebrate assemblages at Combe Pool SSSI drain, River Sowe, Smite Brook, and the field drain east of Broadstreet Rugby Club have potential to be impacted by the Proposed Scheme

Protected / Notable Species	Survey	Date	Methodology (Refer to Baseline Reports Appendix 8-2 for details)	Summary of Findings	Report Reference (Appendix 8-2(a to n))	Scoped In / Out of Assessment
			1) Field drain east of Broadstreet Rugby Club 2) Combe Pool SSSI drain 3) River Sowe 4) Smite Brook 5) Herald Way Marsh SSSI / Claybrook Marsh Nature Reserve This survey gave the opportunity to identify any need for further, more in-depth surveys (fish survey, macrophyte survey, macroinvertebrate survey and habitat survey). The following 2018 survey Claybrook Marsh Nature Reserve was scoped out due to dry ditches. Also, River Sowe was split into upstream and downstream surveys of Smite Brook confluence.	dominated by clay, which may deteriorate due to surface run off and associated sedimentation. <u>River Sowe</u> Located downstream of Combe Pool SSSI drain. Suitable habitat and records of notable fish populations and macroinvertebrate assemblages. The conservation value of this waterbody was at best *Moderate* conservation value. <u>Smite Brook</u> Located downstream of Combe Pool SSSI drain. Suitable habitat and records of notable fish populations and macroinvertebrate assemblages. Given that the conservation value is *Moderate* and the watercourse is currently being impacted by reduced flow and sedimentation from the surrounding land use, it is unlikely that the proposed works will have an adverse effect on the macroinvertebrate ecology. <u>Field drain east of Broadstreet Rugby Club</u> This waterbody is at the margin of the 200m survey buffer. It is potentially chronically degraded by surface runoff from the adjacent heavily managed arable land. The results of the 2017 macroinvertebrate analysis show that the water body is of Fairly *High* conservation value due to the presence of the truefly (*Dixa nubilipennis*). The results of the 2018 macroinvertebrate analysis for the spring samples show that the water body remains Fairly *High* conservation value due to the presence of the beetle, (*Agabus guttatus).* Although the results suggest this waterbody supports limited aquatic communities and so any potential impacts would be minimal.		through increased run-off and turbidity / suspended sediment load.
				<u>Herald Way Marsh SSSI / Claybrook Marsh Nature Reserve</u>		**Scoped Out** *Rationale*: Herald Way Marsh SSSI / Claybrook Marsh Nature Reserve are

Protected / Notable Species	Survey	Date	Methodology (Refer to Baseline Reports Appendix 8-2 for details)	Summary of Findings	Report Reference (Appendix 8-2(a to n))	Scoped In / Out of Assessment
				The majority of the ditches were dry with the exception of one surveyed, which is already heavily negatively influenced by the surrounding land use.		scoped out of assessment for further survey.
Terrestrial Invertebrates	Extended Phase 1 Habitat Survey	2019	The extended Phase 1 habitat survey appraised the potential for the site plus 50m surrounds to support terrestrial invertebrates.	The data search returned 54 records of protected or notable terrestrial invertebrate species, including moths, butterflies, beetles, bees and small red-eyed damselfly (*Erythromma viridulum)*. The Lobster (*Stauropus fagi) and* orange footman *(Eilema sororcula)* moths which were considered extinct in Warwickshire were found here in Piles Coppice in 2018. The road verges provide suitable habitat for a variety of invertebrates, such as common butterfly and moth species of grassland. These suitable habitats are associated with the less managed areas of habitat, for example hedgerow and scrub. Areas of greatest terrestrial invertebrate interest were associated with Herald Way Marsh SSSI, which comprised a mosaic of woodland and scrub habitats designated for its invertebrate interest.	Appendix 8-2(b)	**Scoped Out** *Rationale:* Terrestrial invertebrate species and communities present within the survey area are likely to be common and widespread, given the limited quality and extent of habitats. The road verges provide habitat for a variety of invertebrates; it is considered unlikely that any impacts on habitats potentially supporting notable invertebrates will occur. Piles Coppice is to be protected from the development.
Other flora	Extended Phase 1 Habitat Survey	2019	The extended Phase 1 habitat survey appraised the potential for the site plus 50m surrounds to support protected or notable plant species.	There were 37 recent records of notable flora species within 1.24 miles (2km) of the Proposed Scheme the nearest records are in association with Claybrookes Marsh Nature Reserve located 100m to the west (including Heath Dog-violet *Viola canina*). No notable or protected plant species were recorded during field surveys. Additionally, no invasive plant species were found within a 50m buffer of the Proposed Scheme boundary.	Appendix 8-2(b)	**Scoped Out** *Rationale:* No evidence of notable or protected plant species from baseline field surveys.

Importance of Ecological Features

8.4.11. Based on analysis of the baseline surveys and desk studies to date, a list of receptors (that is, important ecological features) has been identified as being potentially subject to a degree of impact by the Proposed Scheme.

8.4.12. A hierarchical geographical approach is used to assign value (sensitivity) (that is, ecological importance) as based upon *Highways England Interim Advice Note 130/10* (Ref. 8-35), *Guidelines of Ecological Impact Assessment in the UK and Ireland* (Chartered Institute of Ecology and Environmental Management, September 2019, Ref. 8-20), hereafter referred to as the CIEEM guidelines, and professional judgement.

8.4.13. Appendix 8-4 provides full details on the methodology used to determine ecological importance.

8.4.14. The following frames of geographical reference used and assigned to important ecological features are:

- International or European
- UK or National
- Regional
- County or Unitary Authority
- District
- Local
- Site level

8.4.15. The importance presented reflects the currently known distribution within the study area. Table 8-6 presents details of the geographical scale of importance assigned to ecological features scoped into the assessment.

Table 8-6: Importance of Ecological Features

Designated Site / Habitat / Species	Ecological Feature	Rationale	Importance of Ecological Feature
Statutory Designated Sites	Combe Pool SSSI	SSSIs denote a protected area in the UK which is legally protected. The features for which it has been designated meet the published national criteria for selection.	UK / National
	Herald Way Marsh SSSI / Herald Way Marsh (Claybrook Marsh) LNR	SSSIs denote a protected area in the UK which is legally protected. The features for which it has been designated meet the published national criteria for selection. LNRs are designated by the local authority and generally valued up to District or County level. However, the site overlaps with the SSSI designation. The higher valuation of UK/ National is therefore assigned to Herald Way Marsh / Claybrook Marsh.	UK / National
Non-Statutory Designated Sites	Coombe Abbey Pool (part SSSI) SSSI Ecosite	Local ecosite designated in Warwickshire. Overlaps with SSSI designation – see above.	Up to UK / National
	Claybrookes Marsh LWS / Herald Way Marsh (part SSSI) Ecosite	LWS designated in Warwickshire. Overlaps with SSSI designation – see above.	Up to UK / National
	Willenhall Wood and Meadow LWS / LNR Ecosite	LWS designated in Warwickshire. Also, ancient woodland, which contributes to NCA Profile 96: Dunsmore and Feldon.	County or Unitary Authority
	Piles Coppice LWS / Ecosite	LWS designated in Warwickshire. Also, ancient woodland, which contributes to NCA Profile 96: Dunsmore and Feldon.	County or Unitary Authority

Designated Site / Habitat / Species	Ecological Feature	Rationale	Importance of Ecological Feature
	Grassland adjacent to Brandon Wood LWS / Area between Brandon Wood and Piles Coppice Ecosite	LWS designated in Warwickshire.	County or Unitary Authority
	Binley Common Farm Wood pLWS / Ecosite	Potential LWS designated in Warwickshire. Also, an ancient woodland, which contributes to NCA profile. Site noted to be of district nature conservation value in biological record citation.	Up to County or Unitary Authority
	The Pools, Black Spinney and Long Spinney pLWS / Black Spinney and Long Spinney Ecosite	Potential LWS and Ecosite designated in Warwickshire. Site noted to be of county nature conservation value in biological record citation.	Up to County or Unitary Authority
	Smite Brook, headwater and tributaries. Tributary of the River Sowe. Ecosite.	Local Ecosite designated in Warwickshire, however does not meet LWS status.	Up to District
	Hungerly Hall Farm Ecosite	Local ecosite designated in Warwickshire, however does not meet LWS status.	Up to District
	Big Rough Ecosite (and Little Rough)	Local ecosite designated in Warwickshire, however does not meet LWS status.	Up to District

Designated Site / Habitat / Species	Ecological Feature	Rationale	Importance of Ecological Feature
Habitats	Cultivated or disturbed – arable; cultivated or disturbed - amenity grassland; scrub – dense or continuous; tall ruderal; and broadleaved plantation woodland.	No notable or protected habitats, however they form part of the Warwickshire, Coventry and Solihull green infrastructure corridor and strategy. Arable land contributes to the NCA profile.	Up to District
	Broadleaved woodland – semi-natural (incl. ancient woodland)	Potential for woodlands to meet Habitats of Principal Importance – NERC Act, LBAP habitat, 2002 Highways BAP habitat and LWS quality. Some designated as ancient woodlands and contribute to NCA profile.	Up to County or Unitary Authority
	Species-poor hedgerow	Species-poor hedgerows are Habitats of Principal Importance – NERC Act. However, none qualify as important under the Hedgerow Regulations in terms of biodiversity or are species-rich. LBAP habitat.	Local
	Buildings and hardstanding; and Private gardens	Although not designated, the Built Environment LBAP exists to highlight enhancement opportunities for this habitat type. Contributes to the NCA profile.	Site
	Flowing water	Not notable or protected, however they form part of the Warwickshire, Coventry and Solihull green infrastructure corridor / strategy. The watercourses within 50m feed into or are located alongside designated sites (SSSI, LWS, pLWS and	Local

Designated Site / Habitat / Species	Ecological Feature	Rationale	Importance of Ecological Feature
		Ecosites). Otter could be present within Smite Brook recorded in 2019.	
	Swamp	Swamp in Herald Way Marsh SSSI is one of the qualifying features for the designation. Habitat of Principal Importance – NERC Act and LBAP habitat.	County or Unitary Authority
	Open water	There is a pond in association with Binley Common Farm Wood pLWS. LBAP habitat, however no protected or notable species (such as great crested newts) confirmed to be present.	Local
Species	. Reptiles	Species of Principal Importance – NERC Act, legally protected under the WCA 1981 (as amended). . Desk study records have confirmed presence of grass snake in the surrounding area however the risk of encountering transient reptiles is low given the types of habitats present within and adjacent to the Proposed Scheme boundary.	Local Legally protected
	Bats – roosting	Species of Principal Importance – NERC Act. LBAP species, protected under the WCA 1981 (as amended) and Conservation of Habitats and Species Regulations 2017. No potential bat roost features within the Proposed Scheme boundary. However, there are four trees and one building with potential bat roost features within 50m of the Proposed Scheme.	Local Legally protected

Designated Site / Habitat / Species	Ecological Feature	Rationale	Importance of Ecological Feature
	Bats – foraging and commuting	Species of Principal Importance – NERC Act. LBAP species, protected under the WCA 1981 (as amended) and Conservation of Habitats and Species Regulations 2017. Bat activity recorded in 2017 and 2018 was low and primarily common species. Based on the value of foraging and commuting habitat the site is assessed to be of importance at the Local level.	Local Legally protected
	Birds – nesting birds and other farmland birds	Species of Principal Importance – NERC Act, LBAP species and protected under the WCA 1981 (as amended) for nesting. The habitats present, whilst likely to support small breeding and wintering populations of notable species, such as farmland birds, are neither of an extent or quality to support populations of importance at more than Site or Local scales.	Local Legally protected
	Western European Hedgehog	Species of Principal Importance – NERC Act, and LBAP. There are 43 recent records of hedgehog within 1.24 miles (2km) of the Proposed Scheme. Considered to be relatively widespread in the area.	Site
	Polecat	The European polecat receives only limited protection under the Wildlife & Countryside Act (1981) (as amended) Schedule 6. This protects them from being killed or taken by certain methods (i.e. self-locking snares, bows, crossbows,	Local Partially protected

Designated Site / Habitat / Species	Ecological Feature	Rationale	Importance of Ecological Feature
		explosives (other than ammunition or a firearm), or live decoys). Under the Conservation of Habitats and Species Regulations 2010 Schedule 4 there is a duty to monitor any records of incidental killing and capture to ensure conservation targets are met but no specific protection is given. Species of Principal Importance – NERC Act. There are three recent records of polecat within 2km of the Proposed Scheme, with the nearest record approximately 900m away.	
	Otter	Species of Principal Importance – NERC Act. LBAP species, protected under the WCA 1981 (as amended) and Conservation of Habitats and Species Regulations 2017. Two records of otter footprints were recorded in Coombe Country Park drains in July and September 2019. Otter may use the local waterways for passage.	Local
	Aquatic macroinvertebrate	Species of Principal Importance – NERC Act, 2002 HABAP, LBAP and notable Nationally Rare, Scarce or Red Data List species. Combe Pool SSSI drain conservation value was reduced to Low in 2018 due to no notable species being recorded. River Sowe had a Moderate conservation value with species values below Local level, Smite Brook also had a Moderate conservation value with the Field drain east	Local

Designated Site / Habitat / Species	Ecological Feature	Rationale	Importance of Ecological Feature
		of rugby fields showing a Fairly High conservation value due to presence of beetle *Agabus guttatus.*	
	Terrestrial Invertebrates	Species of Principal Importance – NERC Act, 2002 Highways BAP, LBAP and notable Nationally Rare, Scarce or Red Data List species. The road verges provide suitable habitat for a variety of invertebrates, such as butterfly and moth species. These suitable habitats are associated with the less managed areas of habitat, for example, hedgerow and scrub. Invertebrate assemblages at Herald Way Marsh SSSI, Hungerly Hall Farm Ecosite and Piles Coppice LWS are assessed and valued as part of the 'statutory and non-statutory designated sites' ecological feature above.	Site (See above regarding Herald Way Marsh SSSI;Hungerly Hall Farm Ecosite; and Piles Coppice LWS)

8.5. Potential Impacts

8.5.1. Potential impacts and resultant effects to ecological features from construction and operation of the Proposed Scheme are considered to include the following impacts during construction:

- Permanent and temporary land-take resulting in habitat loss for new road alignment construction and construction compounds. Lost habitat may be of value to various species including foraging and commuting bats, nesting birds, hedgehog;
- Temporary obstruction or severance of foraging and commuting routes for wildlife; and
- Temporary disturbance (both displaced and physical disturbance) to wildlife, habitats and designated sites from indirect impacts such as noise, pollution, sedimentation, dust, and lighting.

8.5.2. During operation, it is anticipated there would be the potential for the following impacts:

- Risk of collisions of wildlife with traffic (an ongoing risk as the existing road is already a risk) which has potential to reduce local populations of some species;

- Pollution from highway drainage or from polluting spillages (which would affect the quality of aquatic habitats); and
- Air quality (impacting habitats of sensitivity to changes in nitrogen oxide).

8.6. Assessment Methodology

8.6.1. The method used for the ecological assessment is based upon *Guidelines of Ecological Impact Assessment in the UK and Ireland* by the Chartered Institute of Ecology and Environmental Management (Ref. 8-20), *Highways England Interim Advice Note IAN 130/10* (Ref. 8-35), species specific assessment guidance and methodologies (where applicable; these are named where mentioned) and professional judgement. This deviates slightly from the approach outlined in *Chapter 4: Environmental Assessment Methodology* of this report, by defining ecological importance rather than sensitivity and making a qualitative judgment on the effect without considering magnitude of impact.

8.6.2. The scope of the ecological assessment covers the following:

- Characterisation of ecological impacts on specific ecological features (that is, important ecological features as confirmed during the baseline surveys) taking into account impact avoidance design measures and standard management activities;
- Determination of the significance of effects by the importance of the ecological feature and the characterisation of the ecological impact on each specific feature.

8.6.3. Appendix 8-4 provides additional details on the assessment methodology used for this assessment.

8.6.4. Options to avoid, reduce, mitigate, and compensate for any identified significant potential effects are considered in line with the *Highways England Biodiversity Plan* (Ref. 8-16) and to the point where any residual effects are not considered to be significant. In addition, opportunities are sought for the enhancement of biodiversity as associated with the Proposed Scheme (taking into account the sustainability objectives as set out in the *Highways England 2015 Biodiversity Plan*).

8.6.5. As per Design Manual for Roads and Bridges guidance (Ref. 8-35), potential effects of air pollutants from operation of the Proposed Scheme have been assessed only for SSSI designated sites with sensitive features to nitrogen oxide (NOx) and nitrogen deposition.

8.7. Assessment Assumptions and Limitations

8.7.1. The following assumptions and limitations have been noted during the assessment and described below.

8.7.2. This assessment is based upon existing data gathered between 2016 and 2019 (as detailed in Table 8-5). Baseline conditions are based on data at the time of writing and conditions as experienced at the time during survey visits.

8.7.3. It is assumed the installation of the proposed signage outside the main site will be localised with minimal vegetation clearance required, and therefore will not require verification surveys in 2020.

8.7.4. It is assumed for this assessment that most habitats within the Proposed Scheme will be lost during construction of the Proposed Scheme as based upon the General Arrangement Drawing (Figure 2.2) and preliminary landscape mitigation plan (Figure 7.4). However, this is likely to be an overestimate of the actual impact, and where possible areas of habitat will be protected or retained during the construction phase; this will be finalised during detailed design after receipt of the licence to proceed with construction. Additionally, where areas of new plantation woodland are proposed,

existing grassland understory will aim to be retained where possible (dependent on requirements for the construction phase).

8.7.5. A Biodiversity Metric Assessment has however been conducted for the Proposed Scheme and reported separately based on the Highways England metric and Defra 1.0 metric calculator tool, measuring the number of biodiversity units before and after development based on the habitats lost, retained and created. The biodiversity metric assessment considers potential delivery of no net loss[5] of biodiversity in numerical terms for habitats only. It is primarily an evidence-based approach to assist with quantifying the overall outcome on biodiversity and calculating any offsetting requirements. The biodiversity metric helps identify any potential project risks, focusing on habitat areas and lengths in a two-dimensional aspect. The metric translates habitat; distinctiveness, condition and extent into a score which is presented in biodiversity units. It also uses multipliers to account for risks in delivering habitat creation or enhancement. The calculation compares the biodiversity units pre and post-development to indicate either a net loss or net gain. The results of the biodiversity metric assessment will be used to guide the Proposed Scheme detailed design process.

8.7.6. Arable habitat will be lost as a result of the construction compounds and most will be reinstated and returned to the landowner upon completion of the works. There will be some permanent loss of arable habitat due to construction of the attenuation ponds, access track and landscaping on the embankments to the A46.

8.8. Design, Mitigation and Enhancement Measures

Design Measures

8.8.1. Options to avoid, reduce, or otherwise mitigate and compensate for any potential significant adverse effects identified were considered in line with guidance provided by Highways England as well as the Chartered Institute of Ecology & Environmental Management (CIEEM), and with the aim of reducing where possible residual impacts on identified features to the point where they are no longer considered to be significant adverse.

8.8.2. Design actions that have contributed to avoiding or reducing potential adverse effects on biodiversity include the following:

- Land take and permanent habitat loss has been minimised by making use of the existing carriageway and minimising the extent of new infrastructure. The Proposed Scheme is primarily confined to land within the existing highway boundary. Of the habitats to be lost, all are of common types, with low distinctiveness and which can readily be created or replaced (primarily arable, amenity grassland and managed roadside verges);
- No land loss of Combe Pool SSSI;
- There will be no land loss within any other statutory or non-statutory designated sites;
- No loss of ancient woodlands;
- No loss of buildings or trees with potential to support roosting bats;

[5] No-Net Loss (NNL) of biodiversity regarding a development project means biodiversity losses are balanced by at least equivalent gains - https://ec.europa.eu/environment/nature/biodiversity/nnl/index_en.htm - accessed 07.10.19

- All buildings and trees with suitable bat roost features will be retained and appropriate working buffers will be maintained to minimise any potential impacts on bat roosts (if present);
- There will be no new outfalls for the proposed A46 junction improvements; however, alterations to the drainage system through five existing drainage outfalls will be used; appropriate working buffer and precautionary methods will be used for potential presence of otter. Refer to Chapter 13: Road Drainage and the Water Environment for details.

8.8.3. Binley junction will remain lit, with new lighting provision along the verges and viaduct. The lighting design will avoid potential impacts on nocturnal species including foraging and commuting bats through the following:

- Providing lighting only where necessary to meet safety standards for the lighting of junctions; and
- Minimising horizontal light spill and avoiding direct illumination of potential bat roosts (woodland edges, trees and buildings).

8.8.4. Outline landscape designs have been developed to incorporate ecological mitigation measures. A preliminary landscape mitigation plan is presented in Chapter 18: Figure 7-4.

Mitigation Measures

8.8.5. Generic mitigation measures, appropriate working practices, and inclusion of species-specific mitigation measures will be implemented as part of the Proposed Scheme to reduce potentially significant effects during construction and operation. This includes the following:

- **Retention of habitats and landscape planting**: Areas identified within the boundaries of the Proposed Scheme for soft-landscaping will be used to contribute to the replacement of those habitats lost to construction. Where species-poor hedgerows, amenity grassland, or plantation woodland along the A46 verge are lost to construction, these would be replaced with species-rich hedgerows, species-rich grassland, and native broadleaved woodland using species of local provenance (as part of the Proposed Scheme landscape design). Where possible, areas of existing habitat within the Proposed Scheme boundary will be protected or retained during the construction phase where ground works may not be required. Additionally, where areas of new plantation woodland are proposed, existing grassland understory would aim to be retained (where possible). As woodland would take time to establish and mature, woodland would be enhanced to compensate for that lost through the provision of other features. For example, dead wood piles and understorey planting with native herb species (where suitable). This would aim to replace and enhance woodland lost. New habitats of principal importance will also be created, such as pond and associated wetland habitat, as part of the sustainable drainage system (SuDs) design.
- **Environmental Management Plan (EMP):** Prior to commencement of construction, the EMP will be updated and implemented by the selected construction contractor. This will identify risks of environmental harm and set out method statements, designs and protocols to minimise the risk of pollution events or other environmental harm during the construction period.
- **Bird foraging and nesting habitat**: To compensate for the loss of habitat of value to foraging and nesting birds, trees and shrubs of local provenance will be planted as part of the landscape design, to provide nesting and food resources for birds,

particularly for those Amber and Red List species, such as song thrush and dunnock. This will include seed-bearing species such as hawthorn and elder (planting specification to be confirmed).

- **Bat foraging and commuting habitat:** To compensate for the loss of potential habitat, a mixture of habitat types will be incorporated into the landscape design to benefit foraging and commuting bats across the Proposed Scheme. Linear features (such as hedgerows and linear strips of woodland) will be incorporated into the landscape design to maintain the ecological function across the Proposed Scheme for bats and connect to the wider landscape.
- **Minimising noise, lighting and night-time working which may potentially impact species, for example bats**: All plant and machinery will have effective silencers fitted and maintained. Lighting will be the minimum brightness necessary for adequate security and safety and directed away from woodland and field boundaries with no lighting on (or near) potential roost sites. Night-time working will be kept to a minimum. Working hours during construction will be 7am to 7pm Monday to Friday and 7am to 1pm Saturday; aiming to avoid the sensitive times, which is dusk through to dawn. Construction works close to potential roost sites will be minimised with appropriate buffers (specifically, working distances, noise buffers or light screening) in place, particularly in proximity to Binley Common Farm Wood and Piles Coppice from the construction compound.
- **Monitoring programme:** A monitoring programme will be implemented during the following phases of the Proposed Scheme, to be outlined in the Environmental Management Plan:
  - Monitoring checks prior to construction e.g. badger
  - During construction period e.g. nesting bird checks;
  - 5-year aftercare period following completion of construction (that is, detailed within a Handover Environmental Management Plan (HEMP) which would contain essential environmental information needed by the body responsible for the future maintenance and operation of the Proposed Scheme).

  The monitoring checks prior to construction will be focused on the presence of mobile statutorily protected and notable species, including bats, badgers, riparian mammals (otter), and non-native invasive plant species to identify any significant changes in distribution or status local to the Proposed Scheme. The results of the monitoring would enable modification of the environmental design or construction and mitigation programmes where necessary to help minimise any unexpected impacts that are encountered.
- **Pollution prevention control measures**: Standard control measures to prevent water resource pollution, and measures to control dust from construction activities will be included in the EMP.

  Construction works near channels will aim to reduce noise, vibration and direct channel disturbance at any time. Best practice will be put in place with regards to pollution and sediment management including buffer strips around watercourses, and suitable placement of work compounds. No refuelling will occur less than 30m from a watercourse; and avoiding storing fuel in vessels within 10m of any watercourse.

  Construction dust generation will be controlled via suppression using water sprinkling systems.

- **Non-licensed Method Statement for hedgehog, polecat, otter and reptile**: There is considered to be a low risk of encountering transient badger, polecat, otter and reptile during construction. Hedgehog may however more likely be encountered in areas of woodland or hedgerow / scrub to be cleared. A method statement will be in place for these species as part of the Environmental Management Plan. For reptile, this would include measures to minimise potential effects by strimming vegetation over the winter months and maintaining it at short length. This would include avoiding vegetation clearance for example around potential den sites (rabbit burrows) during the summer (May / June) – which coincides with avoiding the nesting bird season.
- **No vegetation clearance during the bird nesting season:** Site vegetation clearance would aim to avoid the nesting bird period, which is March to September (inclusive). Any vegetation clearance proposed inside of this time will be checked for the presence of any nest by a suitably qualified ecologist or Ecological Clerk of Works (ECoW), prior to removal. If active nests are found, then appropriate buffer zones will be put in place and the area monitored until the young birds have fledged.
- **Legally Protected Species and Natural England Licences:** Standard environmental best practice and mitigation will be implemented to ensure construction and operation of the Proposed Scheme complies with legislation relating to protected species, including otter. It will ensure the Proposed Scheme does not compromise the local conservation status of ecological features present within or in the vicinity of the Proposed Scheme. No protected species licences are currently considered to be required based on the information gathered to date. However, should this change during the monitoring programme, these would be obtained from Natural England accordingly with appropriate mitigation in place.
- **Tree protection zones (including areas of retained ancient woodland) and protection of statutory and non-statutory designated sites adjacent to the Proposed Scheme:** Construction inclusion zones demarked by fencing around ancient woodlands and designated site areas will be erected prior to any development and maintained throughout.
- **Drainage to minimise surface water pollution and runoff during operation:** The HAWRAT (Highways Agency (now Highways England) Risk Assessment Tool) analysis informed the treatment required. This is presented in Chapter 13: Road Drainage and The Water Environment.

Enhancement Measures

8.8.6. Potential enhancement opportunities to be explored during the environmental assessment of the Proposed Scheme include the following:

- The detailed landscape design after receipt of the licence to construct the Proposed Scheme will investigate the suitability of incorporating species–rich habitats of value to pollinators to contribute to the Government's National Pollinator Strategy and aim to meet the objectives of the *2015 Highways England Biodiversity Plan, Road Investment Strategy,* and *Highway's England Delivery Plans*. The Proposed Scheme will seek to aim to reduce net loss of biodiversity as a minimum through appropriate landscape design and planting;
- Improved attenuation measures for the existing A46 outfalls that are to be used under the drainage strategy for the Proposed Scheme also offers opportunity for reduced pollution in the receiving watercourses in comparison to existing conditions. Refer to Chapter 13: Road Drainage and The Water Environment.

- Innovative ecological enhancement designs to concrete infrastructure will be explored during the detailed design stage to enhance the green infrastructure corridor of the Proposed Scheme, for example moss walls. At this stage, this does not form part of the Proposed Scheme.

8.9. Assessment of Effects

8.9.1. Taking into account the mitigation measures as detailed in Section 8.8, potential impacts on ecological features were characterised and the potential for the Proposed Scheme to generate significant biodiversity effects was evaluated using the methodology as detailed in Section 8.6. The aim of this evaluation was to identify any potentially significant effects for those ecological features of importance at the local level or above, or subject to legal protection.

8.9.2. The text below details the characterisation of ecological impacts and significance of effects during construction and operation of the Proposed Scheme.

Construction

Designated Sites

8.9.3. This section describes the impacts during construction on designated sites within the study area.

Direct impacts - Habitat loss

8.9.4. There would be no land take (direct impact) on either statutory or non-statutory designated sites. The Proposed Scheme avoids any habitat loss from these sites.

Indirect impacts - Pollution runoff and dust from construction activities

8.9.5. There is potential for temporary indirect effects from pollution run off during construction activities on Combe Pool SSSI and Herald Way Marsh SSSI / Herald Way Marsh (Claybrook Marsh) LNR (and Coombe Abbey Pool (part SSSI) SSSI Ecosite, and Claybrookes Marsh LWS / Herald Way Marsh (part SSSI) Ecosite which overlap with these SSSI designations). There are direct outfalls from the A46 into these SSSIs. At Combe Pool, there could be potential impacts to the ditch in the SSSI which runs along the periphery of the pool (i.e. Birchley Wood Brook). Pollution prevention control measures will be in place and implemented through the Environmental Management Plan (EMP). Refer to Chapter 13: Road Drainage and The Water Environment.

8.9.6. The Pools, Black Spinney and Long Spinney pLWS / Black Spinney and Long Spinney Ecosite, Smite Brook headwater and tributaries (Tributary of the River Sowe Ecosite) and Big Rough (and Little Rough) Ecosite have hydrological links with the Proposed Scheme. Pollution prevention control measures will however be in place and implemented through the EMP.

8.9.7. Willenhall Wood and Meadow LWS / LNR Ecosite, Grassland adjacent to Brandon Wood LWS / Area between Brandon Wood, Piles Coppice Ecosite, Binley Common Farm Wood pLWS / Ecosite, and Hungerly Hall Farm Ecosite, are located adjacent to the Proposed Scheme boundary. These sites may be susceptible to temporary disturbance from dust from construction activities given their proximity to the main general arrangement where most of the construction activities will occur. The current buffer between the A46 and Binley Common Farm Wood pLWS will be temporarily reduced slightly during construction as a result of the possible compound location being sited immediately to the south of the wood. However, air quality and dust control measures (including dust suppression on plant) will be in place during construction and implemented through the EMP to ensure no negative impacts on Binley Common Farm Wood pLWS or other designated sites located adjacent to the Proposed Scheme. The construction compounds are temporary; the land used will be reinstated and returned back to the land owner when construction is completed. Buffer zones will be marked out (for example, with Heras fencing which align with tree root protection zones) to ensure any potential impacts on the sites are minimised during construction.

8.9.8. Given the above, there is considered to be no significant adverse (neutral) effect on designated sites from construction activities of the Proposed Scheme.

Habitats

Direct Impacts – Habitat Loss

8.9.9. Table 8-7 shows the approximate areas and lengths of habitat lost in association with land take required permanently and temporarily for the Proposed Scheme; and the area and lengths of habitat to be re-instated and planted within the Proposed Scheme boundary.

Table 8-7: Approximate Habitat Loss and Habitat Creation/Reinstatement during Construction*

*Approximate habitat calculation based on the Landscape Mitigation Plans

Habitat Type	Ecological Importance (as per Table 8.6)	Quantity of Habitat within the Proposed Scheme boundary	Approximate Habitat lost (Hectares / metres)	Habitat Created / Reinstated as part of landscape design	Approximate Net Habitat Loss / Gain
Cultivated / disturbed – Arable	Up to District	8.11ha	8.11ha	7.15ha (excluding 0.49ha of attenuation features proposed) Reinstated and returned back to landowner	-0.96ha
Cultivated / disturbed – Amenity grassland		3.62ha	2.8ha	1.43ha (low maintenance grassland – opportunity for semi-improved grassland species-rich))	+1.43ha (species-rich)
Scrub – dense / continuous		0.84ha	0.84ha	0.43ha	-0.41ha
Broadleaved plantation woodland		0.59ha	0.47ha	1.85ha (New native woodland. Retained grassland and native shrub understorey where possible with appropriate tall ruderal and wildflower buffer planting)	+1.38ha
Broadleaved woodland – semi-natural woodland (including ancient woodland)	Up to County or unitary Authority	0.79ha (no loss of ancient woodland – primarily young trees to semi-mature trees)	0.58ha		
Species-poor hedgerow	Local	518m	518m	392m (species-rich)	+392m (species-rich)
Buildings and hardstanding	Site	4.68ha (no buildings)		6.11ha	+1.43ha
Other habitat – Private gardens		Not applicable	Not applicable	Not applicable	Not applicable

Habitat Type	Ecological Importance (as per Table 8.6)	Quantity of Habitat within the Proposed Scheme boundary	Approximate Habitat lost (Hectares / metres)	Habitat Created / Reinstated as part of landscape design	Approximate Net Habitat Loss / Gain
Swamp	County	Not applicable	not applicable	Not applicable (Opportunity for swamp or wetland habitats in association with the pond to be investigated at detailed design)	Not applicable
Open Water	Local	Not applicable	not applicable	0.49ha Pond area (however, the proposed attenuation pond will likely not be permanently wet and poor biodiversity value (classed as tall ruderal habitat in the biodiversity metric assessment). Opportunities to increase the biodiversity value of the ponds may be considered at detailed design)	Not applicable
Running water	Local	Not applicable	Not applicable	not applicable	

8.9.10. There may be a short[6] to medium term slight significant adverse effect (at the local level) on woodland (young broadleaved semi-natural woodland lost to the west of Piles Coppice and plantation woodland lost on the verge of the A46) during construction until replacement habitat establishes. However, given the mitigation proposed to replace woodland habitats there is considered to be no significant adverse (neutral) effect on woodland in the long term.

8.9.11. There is no significant adverse (neutral) effect on any of the other habitats as a result of habitat loss during construction. Habitats lost will be replaced to ensure continuity of green infrastructure; and the results of the biodiversity metric assessment (reported separately) will be used to facilitate detailed design.

8.9.12. There is potential for a slight significant beneficial effect in the long term on all habitat types due to the mitigation and enhancement measures proposed. Habitat lost will be replaced, where species-poor hedgerows, amenity grassland, and woodland are lost to construction. These would be replaced with species-rich hedgerows, species-rich grassland (where possible), and native broadleaved woodland using species of local provenance (as part of the Proposed Scheme landscape design; plan shown in Chapter 18: Figure 7-4). New habitats of principal importance will also be created, that is a pond and associated wetland habitat, as part of SuDS design.

Indirect impacts - Pollution Runoff and Dust from Construction Activities

8.9.13. Pollution prevention and air quality control measures will be in place to ensure no significant adverse (neutral) effects on habitats as a result of pollution runoff or dust from construction activities. Mitigation measures will be implemented through the EMP. Refer to Chapter 13: Road Drainage and the Water Environment and Chapter 5: Air Quality.

Species

Reptiles

Direct Impacts - Habitat Loss including Mortality or Injury of Reptiles (if present) from Construction Activities

8.9.14. Proposed earthworks and habitat loss is confined to arable fields, their margins, amenity grassland and roadside verges which are intensively managed, offering little habitat for basking, foraging or sheltering reptiles. Recent reptile records have been returned from the 2019 desk study, primarily in association with Combe Pool Country Park/SSSI and Brandon Marsh SSSI, which are located outside the site boundary at the extreme north and south of the Proposed Scheme respectively. A method statement as part of the EMP will be in place to minimise potential effects to transient reptiles, should they be present, during vegetation clearance and the construction phase of the Proposed Scheme. Based on the level of protection for grass snake, the scale and nature of the Proposed Scheme and mitigation in place, there is considered to be no significant adverse (neutral) effect on reptiles from construction activities.

[6] 'Short term' in regards to woodland is considered to be in the region of 5 to 10 years; 'medium term' 10 to 15 years; and 'long term' >15 years.

Bats – Roosting

Direct Impacts – Loss of Roosts including Mortality or Injury of Bats from Construction Activities

8.9.15. There are no trees, buildings or structures within the Proposed Scheme boundary that have potential features to support roosting bats. There will be no direct impact on potential bat roosts and therefore no significant adverse (neutral) effect.

Indirect Impacts – Disturbance to Bats while Occupying Potential Roost Features

8.9.16. Two trees adjacent to the A428 Rugby Road (TN24 (updated Target Note TN34), and TN35) as illustrated in Chapter 18: Figure 8-5) were assessed as Moderate potential to support roosting bats. An assessment of Binley Common Farm Wood pLWS, Piles Coppice LWS and Combe Pool SSSI / Country Park also confirmed that trees within these woods (that is, within 50m of the Proposed Scheme) have generally Moderate potential to support roosting bats. There will be no direct impact to the trees at TN24(TN34) or TN35 or to the woodlands as a result of the Proposed Scheme; however, there is potential for indirect effects in terms of disturbance to bats and their roosts. Construction works close to potential roost sites will be minimised as far as possible with appropriate buffers in place, particularly to the south of Binley Common Farm Wood where the temporary construction compound will be located. Lighting will be at the minimum brightness necessary for adequate security and safety at the compound and avoid light spill to woodland edges and field boundaries. Night-time working will also be minimised, and temporary lighting will avoid direct illumination of potential bat roost features and woodland edges.

8.9.17. One building at Greens Home & Garden was assessed in 2019 as having Low potential to support roosting bats TN 37. It is considered the garden centre buildings, are unlikely to be affected by the Proposed Scheme (potential roost features are facing away from the Proposed Scheme, or some are buffered by existing gardens and landscaping). The works are also primarily localised to the existing road footprint or highways boundary in those areas.

8.9.18. Given the above, there are considered to be no significant adverse (neutral) effects on roosting bats from construction of the Proposed Scheme.

Bats – Foraging and Commuting

Direct Impacts – Habitat Loss

8.9.19. Habitat loss and land take from the Proposed Scheme is relatively small. Additionally, the existence of an already busy road network consisting of a wide dual-carriageway would be expected to have some influence of the existing values of adjacent habitats for bats. Recent research has shown that major roads reduce bat activity and species diversity over more than 0.62 miles (1km) either side of the road (Ref. 8-36).

8.9.20. Habitat lost will be replaced through appropriate landscape planting and ensure hedgerows are re-planted to re-instate navigational clues. Given the current low levels of bat activity and mitigation proposed, it is considered that there would be no significant adverse (neutral) effect on foraging and commuting bats as a result of habitat loss from construction activities.

Indirect Impacts – Disturbance from Construction Activities

8.9.21. There is potential for foraging and commuting bats across the Proposed Scheme to be disturbed from construction activities, for example from lighting and night-time working, which could cause bats to avoid these areas. However, night-time working (and associated lighting) will be kept to a minimum. Working hours during construction are understood to be 7am to 7pm Monday to Friday and 7am to 1pm Saturday; aiming to avoid the sensitive times which are particularly dusk through to dawn.

8.9.22. Given the low bat activity currently recorded across the site, and mitigation measures proposed, it is considered that there will be no significant adverse (neutral) effect on foraging and commuting bats as a result of disturbance from construction activities.

Birds – Nesting birds and Other Farmland Birds

Direct Impact – Habitat Loss (including Killing or Injury of Birds)

8.9.23. The habitats present within the Proposed Scheme boundary, whilst likely to support small breeding and wintering populations, such as farmland birds, are neither of extent or quality to support significant populations. There may be a temporary negative effect on birds as a result of habitat loss from construction of the Proposed Scheme. However, the majority of sensitive breeding and non-breeding bird habitat will not be affected, meaning Combe Pool SSSI, broadleaved semi-natural woodlands, and arable land to the far east of the Proposed Scheme. Arable land lost to the construction compounds will be reinstated upon completion of the Proposed Scheme. Landscape planting will ensure habitat lost is replaced incorporating a diversity of habitats suitable for birds including woodland, hedgerows, scrub and shrubs, and grassland.

8.9.24. Vegetation clearance will avoid the nesting bird season, which is March to September (inclusive). Any vegetation clearance proposed inside this time would be checked for the presence of any nest by a suitably qualified ECoW, prior to removal. If active nests are found, then appropriate buffer zones would be put in place and the area monitored until the young birds have fledged.

8.9.25. Therefore, there is considered that there will be no significant adverse (neutral) effect on birds as a result of habitat loss from construction of the Proposed Scheme.

Riparian Mammals - Otter

Indirect Impacts – Disturbance from Construction Activities

8.9.26. There is potential for commuting otters across the site waterways to be disturbed from construction activities, for example from lighting and night-time working, which could cause them to avoid these areas. However, night-time working (and associated lighting) will be kept to a minimum. Working hours during construction are understood to be 7am to 7pm Monday to Friday and 7am to 1pm Saturday; aiming to avoid the sensitive times.

8.9.27. A method statement as part of the EMP will be in place to minimise potential effects to transient otter, should they be present, during the construction phase of the Proposed Scheme.

8.9.28. Given the low activity currently recorded across the site, and mitigation measures proposed, it is considered that there will be no significant adverse (neutral) effect on foraging and commuting otters as a result of disturbance from construction activities.

Polecat

Direct Impacts – Habitat loss including Mortality or Injury of Polecat (if present) from Construction Activities

8.9.29. The desk study identified three records of polecat within 2km of the Proposed Scheme; the nearest within 900km. Polecat often leave piles of scats near den sites (i.e. rabbit burrows) however this was not identified / observed indirectly during badger surveys conducted in 2019 across the Proposed Scheme. However, given the records and suitable habitat (farmland, hedgerows, woodland and rabbit burrows) across the site a precautionary approach will be taken for polecat during construction. A method statement as part of the EMP will be in place to minimise potential direct effects to polecat, should they be present, during the construction phase of the Proposed Scheme. This would include for example avoiding vegetation clearance around potential den sites (i.e. rabbit burrows) where applicable during the summer (May / June) – which would coincide with avoiding the nesting bird season and any general measures to avoid harm to mammals under the Wild Mammals (Protection) Act 1996.

8.9.30. Habitat will be created to compensate for that lost, including reinstatement of farmland habitat and planting of woodland and hedgerows. Therefore, there is considered to be no significant (neutral) effect on polecat as a result of habitat loss.

Indirect Impacts - Disturbance from Construction Activities

8.9.31. There is potential for polecat across the Proposed Scheme to be disturbed by construction activities, which could cause them to avoid these areas.

8.9.32. A method statement as part of the EMP will be in place to minimise potential effects to transient polecat, should they be present, during the construction phase of the Proposed Scheme. This would include not leaving trenches open or putting in mammal escape ramps.

8.9.33. Given the low activity currently recorded across the site, and mitigation measures proposed, it is considered that there will be no significant adverse (neutral) effect on foraging and commuting polecat as a result of disturbance from construction activities.

Aquatic Macroinvertebrates

Direct Impacts – Potential Changes in Water Quality associated with Site Runoff

8.9.34. Existing outfalls will remain unchanged. Pollution prevention control measures will be in place to ensure no impacts on watercourses from construction activities. Refer to Chapter 13: Road Drainage and the Water Environment. Potentially notable aquatic macroinvertebrate communities and fish populations within Combe Pool SSSI drain, River Sowe, and Smite Brook will therefore remain unaffected.

8.9.35. It is considered that there will be no significant adverse (neutral) effect on aquatic macroinvertebrates and fish from construction activities.

Operation

Designated Sites

Indirect Impacts – Pollution from Surface Water Run-off

8.9.36. There is potential for permanent indirect effects from polluted surface water run off during operational activities on Combe Pool SSSI and Herald Way Marsh SSSI / Herald Way Marsh (Claybrook Marsh) LNR (and Coombe Abbey Pool (part SSSI) SSSI Ecosite, and Claybrookes Marsh LWS / Herald Way Marsh (part SSSI) Ecosite which overlap with these SSSI designations). There are direct outfalls from the A46 into these SSSIs. Combe Pool itself should not be affected; however, there could be potential impacts to the ditch in the SSSI which runs along the periphery of the pool (i.e. Birchley Wood Brook).

8.9.37. The Highways Agency (now Highways England) Water Risk Assessment Tool (HAWRAT) analysis, informed the treatment required. Assuming this mitigation is put in place there is considered to be no significant adverse (neutral) effect on Combe Pool SSSI or Herald Way Marsh SSSI / Herald Way Marsh (Claybrook Marsh) LNR as a result of surface water runoff during operation. It is noted that the watercourse within Herald Way Marsh SSSI / LNR (i.e. Brandon Wood Brook) fails the HAWRAT assessment for copper impact, however it does not show any deterioration in comparison to existing drainage impacts, and actually shows marginal improvements in the quantitative assessment performance. Additionally, the implementation of the suggested attenuation measures should improve the water quality in receiving watercourse over existing conditions resulting from current outfall arrangements. Therefore, there is potential for permanent slight significant beneficial effects on Combe Pool SSSI and Herald Way Marsh SSSI / Herald Way Marsh (Claybrook Marsh) LNR in the long term**,** as the mitigation may provide betterment over the existing situation as they already receive outfalls from the road.

8.9.38. The Pools, Black Spinney and Long Spinney pLWS / Black Spinney and Long Spinney Ecosite, Smite Brook headwater and tributaries (Tributary of the River Sowe Ecosite) and Big Rough (and Little Rough) Ecosite also have hydrological links with the Proposed Scheme site. Treatment measures, as determined from the HAWRAT analysis, will in turn also ensure no significant adverse effects on these non-statutory designated sites from operation of the Proposed Scheme. The A46 outfall to the north-east of the Binley roundabout also drains into the Big Rough (and Little Rough) Ecosite; therefore, there is potential for permanent slight significant beneficial effect on Big Rough (and Little Rough) Ecosite through appropriate drainage enhancement measures as explained above.

Indirect Impacts – Changes in Air Quality and Emissions from Operational Traffic

8.9.39. Predictions in nitrogen oxide (NO_x) concentrations and nitrogen deposition rates at the designated sites have been made for the base year (2016) and opening year (2021) with the Proposed Scheme (Do-Something) and without the Proposed Scheme (Do-Minimum). Refer to Chapter 5: Air Quality for details.

8.9.40. Overall, NOx concentrations and nitrogen deposition rates are predicted to be lower in the opening year (2021) with the Proposed Scheme than in the base year (2016) due to improvements in vehicle emissions over time. An assessment of potential effects on sensitive habitats within the SSSIs is provided below.

Combe Pool SSSI

8.9.41. There are no critical loads for deposition of nitrogen to the habitats present within Combe Pool SSSI (Ref. 8-37). The majority of lowland freshwater bodies are phosphate-limited. Therefore, traffic associated with the Proposed Scheme will not affect the ability of the SSSI to meet its conservation objectives.

8.9.42. The critical level for nitrogen oxide (NO_x) in the air is generic for all habitats (30 micrograms pollutant per metre cubed of air ($\mu g/m^3$)). The increase in NO_x concentrations is predicted to be 1.0 to 1.7 $\mu g/m^3$ at the western boundary of the SSSI near the A46 due to the Proposed Scheme which is considered to be a small increase. Concentrations decrease rapidly away from the A46. However, given there are no sensitive habitats for nitrogen identified at Combe Pool SSSI, a slight elevation in NO_x concentrations is irrelevant.

8.9.43. Given the above, it is considered that there will be no significant adverse (neutral) effect on Combe Poole SSSI as a result of air pollution from operation of the Proposed Scheme.

Herald Way Marsh SSSI

8.9.44. There are marshy wetland communities, which support important invertebrate communities, present within the SSSI that are potentially sensitive to nitrogen deposition (Ref. 8-38). The main habitat present in the SSSI is open water surrounded by swamp and lowland fen communities. Fens are relatively insensitive to nitrogen deposition because they are naturally high nitrogen environments, such that the critical load is fairly high (15-30 kilograms nitrogen per hectare per year (kgN/ha/yr)) for base-rich fens (Ref. 8-49). Predicted nitrogen deposition rates due to the Proposed Scheme are expected to increase by a maximum of 0.1 kgN/ha/yr within 50m of the Proposed Scheme boundary (across less than 10% of the SSSI; on the eastern edge), which is a negligible increase (0.7% of the most stringent part of the critical load range).

8.9.45. NO_x concentrations are expected to be above the critical level of $30\mu g/m^3$ in the opening year of 2021 on the boundary of the SSSI closest to the A46 (as per existing conditions). This decreases within the SSSI below the critical level with distance from the A46.

8.9.46. There is therefore, considered to be no significant adverse (neutral) effect on Herald Way Marsh SSSI as a result of air pollution from operation of the Proposed Scheme.

Habitats

8.9.47. The drainage design and water treatment will ensure no significant adverse (neutral) effect from surface run-off and pollution on habitats from operation of the Proposed Scheme. Refer to Chapter 13: Road Drainage and the Water Environment.

Reptiles

8.9.48. The layout of the A46 road at the Binley junction will largely remain unchanged. There is no permanent severance or fragmentation of habitats, which may cause reptiles to cross the road (if present). There is therefore, considered to be no impact and no significant adverse (neutral) effect on reptiles during operation of the Proposed Scheme.

Bats – Roosting, Foraging and Commuting

Direct Impacts – Injury or Mortality

8.9.49. The layout of the A46 road at the Binley junction will largely remain unchanged. There is no permanent severance or fragmentation of habitats, which may cause bats to cross the road. Navigational cues for bats will be reinstated during the landscape planting, running parallel to the A46. The Proposed Scheme involves the grade separation of the Binley junction by raising the A46 over the A428 Rugby Road, with entry and exit slip roads to an at-grade gyratory junction. The increase elevation will be 7m. The bat activity surveys (carried out to date) did not identify any known bat commuting routes at this location. Therefore, it is considered that there will be no significant adverse (neutral) effect on bats from operation of the Proposed Scheme.

Indirect Impacts – Disturbance through Lighting

8.9.50. The lighting design will take into account guidance from the Institute of Lighting and wildlife recommendations (Ref. 8-40) to ensure no significant adverse (neutral) effect on bats from artificial lighting during operation. Such measures would include, for example, no excessive lighting, avoiding illuminating potential bat roost features, minimising horizontal light spill, and limiting the times that lights are operational.

Birds

Direct Impacts – Injury or Mortality

8.9.51. The layout of the A46 road at the Binley junction will largely remain unchanged. The increase in elevation at the Binley junction is not considered to increase the risk of mortality to birds given the most favourable bird habitat (arable fields and woodland) is to the east of that location. There is considered to be no impact and no significant adverse (neutral) effect on birds during operation of the Proposed Scheme.

Riparian Mammals – Otter

Direct Impacts – Injury or Mortality

8.9.52. The layout of river, stream and channel systems will largely remain unchanged therefore the risk of mortality to commuting otter will be minimal.

8.9.53. There is considered to be no impact and no significant adverse (neutral) effect on otter during the operation of the Proposed Scheme.

Polecat

8.9.54. The layout of the A46 road at the Binley junction will largely remain unchanged. There is no permanent severance or fragmentation of habitats, which may cause polecat to cross the road (if present). Therefore, there is considered to be no impact and no significant adverse (neutral) effect on polecat during operation of the Proposed Scheme.

Aquatic Macroinvertebrates

8.9.55. As stated above regarding the designated sites, the HAWRAT analysis, informed the treatment required where direct outfalls exist from the A46 into existing watercourses and drains. Assuming this mitigation is put in place it is considered that there will be no significant adverse (neutral) effect on any notable aquatic macroinvertebrates and fish, which may be present in association with Combe Pool SSSI drain, Smite Brook and the River Sowe, and the field east of the rugby fields.

8.10. Summary of Residual Effects

8.10.1. Table 8-8 shows a summary of the residual effects on receptors and species.

Table 8-8: Summary of Residual Effects

Designated Sites/ Habitats/ Species	Nature Conservation Feature	Nature Conservation Value of Feature	Proposed Activity/ Source of Impact	Residual Significance of Effects
Construction				
Statutory Designated Sites	Combe Pool SSSI	UK / National	Pollution runoff and dust from construction activities	No significant adverse effect (neutral)
	Herald Way Marsh SSSI / Herald Way Marsh (Claybrook Marsh) LNR	UK / National		
Non-Statutory Designated Sites	Coombe Abbey Pool (part SSSI) SSSI Ecosite	Up to UK / National		
	Claybrookes Marsh LWS / Herald Way Marsh (part SSSI) Ecosite	Up to UK / National		
	Willenhall Wood and Meadow LWS / LNR Ecosite	County or Unitary Authority		
	Piles Coppice LWS / Ecosite	County or Unitary Authority		
	Grassland adjacent to Brandon Wood LWS / Area between Brandon Wood and Piles Coppice Ecosite	County or Unitary Authority		
	Binley Common Farm Wood pLWS / Ecosite	Up to County or Unitary Authority		

Designated Sites/ Habitats/ Species	Nature Conservation Feature	Nature Conservation Value of Feature	Proposed Activity/ Source of Impact	Residual Significance of Effects
	The Pools, Black Spinney and Long Spinney pLWS / Black Spinney and Long Spinney Ecosite	Up to County or Unitary Authority		
	Smite Brook, headwater and tributaries. Tributary of the River Sowe. Ecosite.	Up to District		
	Hungerly Hall Farm Ecosite	Up to District		
	Big Rough Ecosite (and Little Rough)	Up to District		
Habitats	Cultivated or disturbed – arable; cultivated or disturbed - amenity grassland; scrub – dense or continuous; tall ruderal; and broadleaved plantation woodland.	Up to District	Habitat Loss	No significant adverse effect (neutral). Potential for slight significant beneficial effect in the long term with habitat enhancements
			Pollution Runoff and Dust from Construction Activities	No significant adverse (neutral) effect

Designated Sites/ Habitats/ Species	Nature Conservation Feature	Nature Conservation Value of Feature	Proposed Activity/ Source of Impact	Residual Significance of Effects
	Broadleaved woodland – semi-natural (incl. ancient woodland)	Up to County or Unitary Authority	Habitat Loss	Slight significant adverse effect in the short to medium term until habitat establishes; no significant adverse effect (neutral) in the long term. Potential for slight significant beneficial effect in the long term with habitat enhancements
			Pollution Runoff and Dust from Construction Activities	No significant adverse (neutral) effect
	Species-poor hedgerow	Local	Habitat Loss	No significant adverse effect (neutral). Potential for slight significant beneficial effect in the long term with habitat enhancements.
			Pollution Runoff and Dust from Construction Activities	No significant adverse (neutral) effect
	Running water	Local		

Designated Sites/ Habitats/ Species	Nature Conservation Feature	Nature Conservation Value of Feature	Proposed Activity/ Source of Impact	Residual Significance of Effects
	Swamp	County or Unitary Authority	Pollution Runoff and Dust from Construction Activities	No significant adverse (neutral) effect
	Open water	Local		
Species	Reptiles	Local	Habitat Loss including Mortality or Injury of Reptiles (if present) from Construction Activities	Residual no significant adverse (neutral) effect
	Bats – roosting	Local	Loss of Roosts including Mortality or Injury of Bats from Construction Activities	No significant adverse (neutral) effect
			Disturbance to Bats while Occupying Potential Roost Features	No significant adverse (neutral) effect
	Bats – foraging and commuting	Local	Habitat Loss	No significant adverse (neutral) effect
			Disturbance from Construction Activities	No significant adverse (neutral) effect
	Birds – nesting birds and other farmland birds	Local	Habitat Loss (including Killing or Injury of Birds)	No significant adverse (neutral) effect

Designated Sites/ Habitats/ Species	Nature Conservation Feature	Nature Conservation Value of Feature	Proposed Activity/ Source of Impact	Residual Significance of Effects
	Riparian Mammals (Otter)	Local	Disturbance from Construction Activities	No significant adverse (neutral) effect
	Polecat	Local	Habitat Loss including Mortality or Injury of Polecat (if present) from Construction Activities	No significant adverse (neutral) effect
			Disturbance from Construction Activities	No significant adverse (neutral) effect
	Aquatic macroinvertebrate and fish populations	Local	Potential Changes in Water Quality associated with Site Runoff	No significant adverse (neutral) effect
Operation				
Statutory Designated Sites	Combe Pool SSSI	UK / National	Pollution from Surface Water Run-off	No significant adverse (neutral) effect. Potential for slight beneficial effects in the long term.
			Changes in Air Quality and Emissions from Operational Traffic	No significant adverse (neutral) effect

Designated Sites/ Habitats/ Species	Nature Conservation Feature	Nature Conservation Value of Feature	Proposed Activity/ Source of Impact	Residual Significance of Effects
	Herald Way Marsh SSSI / Herald Way Marsh (Claybrook Marsh) LNR	UK / National	Pollution from Surface Water Run-off	No significant adverse (neutral) effect. Potential for slight beneficial effects in the long term.
			Changes in Air Quality and Emissions from Operational Traffic	No significant adverse (neutral) effect
Non-Statutory Designated Sites	The Pools, Black Spinney and Long Spinney pLWS / Black Spinney and Long Spinney Ecosite	Up to County or Unitary Authority	Pollution from Surface Water Run-off	No significant adverse (neutral) effect.
	Smite Brook, headwater and tributaries. Tributary of the River Sowe. Ecosite.	Up to District		
	Big Rough Ecosite (and Little Rough)	Up to District	Pollution from Surface Water run-off	No significant adverse (neutral) effect. Potential for slight beneficial effects in the long term.
Species	Bats – foraging and commuting	Local	Injury or Mortality from Operational Traffic	No significant adverse (neutral) effect
			Disturbance Through Lighting	No significant adverse (neutral) effect

Designated Sites/ Habitats/ Species	Nature Conservation Feature	Nature Conservation Value of Feature	Proposed Activity/ Source of Impact	Residual Significance of Effects
	Birds – nesting birds and other farmland birds	Local	Injury or Mortality from Operational Traffic	No significant adverse (neutral) effect
	Otter	Local	Injury or Mortality from Operational Traffic	No significant adverse (neutral) effect
	Aquatic macroinvertebrate	Local	Pollution from Surface Water run-off	No significant adverse (neutral) effect

Monitoring

8.10.2. Any vegetation clearance proposed inside the bird nesting season (March to September inclusive) will be checked for the presence of bird nests by a suitably qualified ecologist or Ecological Clerk of Works (ECoW), prior to removal. If active nests are found, then appropriate buffer zones will be put in place and the area monitored until the young birds have fledged.

8.10.3. Construction is due to commence in March 2020. Pre-construction surveys will be undertaken to check for the presence of mobile statutorily protected and notable species, badgers, polecats, riparian mammals (otter),and non-native invasive plant species to identify any significant changes in distribution or status local to the Proposed Scheme.

8.10.4. A structured monitoring programme will be implemented, and this will include a monitoring schedule during construction, and 5 years following completion of construction; which is to be included within the Environment Management Plan.

9. GEOLOGY AND SOILS

9.1. Introduction

9.1.1. This chapter of the environmental assessment report identifies baseline conditions with reference to soils, geology and potential ground, and the potential for the Proposed Scheme to create pathways or affect these baseline conditions.

9.1.2. This chapter of the EAR has been undertaken by competent experts with relevant and appropriate experience:

- Senior Environmental Consultant, MSCi Geological Science, FGS
- Associate, Bsc (Hons), MSc, PhD, CSci CGeol EurGeol FGS SiLC

9.2. Legislative and Policy Framework

9.2.1. The geology and soils assessment will be undertaken in accordance with the guidance in *Design Manual of Roads and Bridges* (DMRB) Volume 11, Section 3, Part 11 Geology and Soils (Ref. 9-1).

9.2.2. The assessment of agricultural soils will be undertaken in accordance with the guidance within DMRB Volume 11, Section 3, Part 6 – Land Use – Amendment No 1 (Ref. 9-2) and will consider the impact of agricultural soil loss at the areas of the Proposed Scheme which have Grade 2 and Grade 3 designations.

9.2.1. The DMRB Volume 11 guidance defines the scope, but does not provide formal guidance on the assessment of impacts and effects. The impact assessment methodology applied will take account of technical guidance that has been produced in the UK for the assessment of ground conditions and water resources by the government (that is, Defra and its predecessor and successor departments), agencies such as the Environment Agency and Contaminated land: Applications in Real Environments (CL:AIRE); and British Standards.

9.2.2. Those planning policies, legislations and guidance documents relevant to the Proposed Scheme are outlined within Table 9-1 below.

Table 9-1: Legislation, Planning Policy and Guidance Documents Summary

Legislation, Planning Policy and Guidance Documents Summary			
Legislation and National Policy	National Legislation	Key Parliamentary Acts and Regulations	Part 2A of the Environment Protection Act 1990 (Part 2A EPA 1990)
			Water Resources Act 1991 (WRA 1991)
			Town and Country Planning Act 1990 (TCPA 1990)
			The Building Act 1984 and The Building Regulations 2010
			Environmental Damage (Prevention and Remediation) Regulations 2009 (EDR 2009)

Legislation, Planning Policy and Guidance Documents Summary			
			Environmental Permitting Regulations 2016 (EPR 2016)
			Anti-Pollution Works Regulations 1999 (APWR 1999)
		Water Framework Directive (WFD) (Directive 2000/60/EC)	
	National Planning Policy	National Planning Policy Framework (NPPF) (2019)	
Local and Regional Policy	Coventry Local Plan 2019		
	Coventry Contaminated Land Inspection Strategy 2012		
	Rugby Borough Council's Local Plan 2011-2031 Adopted June 2019		
	Rugby Borough Council Contaminated Land Strategy 2001		
	Warwickshire County Council's Minerals Plan 2018 (under Consultation)		
Other Relevant Policy, Standards and Guidance	Model Procedures for the Management of Land Contamination (CLR11). CLR 11 is to be replaced by the Land Contamination: Risk Management (LCRM) which is currently under consultation for feedback.		
	Guiding Principles for Land Contamination (Environment Agency 2010)		
	Groundwater Protection (Previously GP3) 2017		
	A Framework for Assessing the Sustainability of Soil and Groundwater Remediation SuRF-UK 2010		
	Relevant Pollution Prevention Guidelines (Environment Agency Pollution Prevention Guidance Notes). While these guidance documents have been withdrawn the principals which they outline are still considered relevant.	PPG1: General Guide to the Prevention of Pollution	
		PPG2: Above Ground Oil Storage Tanks	
		PPG3: Use and Design of Oil Separators in Surface Water Drainage Systems	
		PPG4: Treatment and Disposal of Sewage where no Foul Sewer is Available	
		PPG5: Works and Maintenance in/ or Near Water	

Legislation, Planning Policy and Guidance Documents Summary		
		PPG6: Working at Construction and Demolition Sites
		PPG7: Safe Storage: The Safe Operation of Refuelling Facilities
		PPG20: Dewatering of Underground Ducts and Chambers
		PPG21: Incident Response Planning
	Construction Industry Research and Information Association (CIRIA) Guidance	Guidance C532 Control of Water Pollution from Construction Sites: Guidance for Consultants and Contractors
		Guidance C665 Assessing Risks Posed by Hazardous Ground Gases to Buildings
		Guidance C697 The SUDS Manual
		Guidance C692 Environmental Good Practice On Site (Third Edition)

9.2.3. The following sections describe the assessment methodologies which will be used to assess the likely effects of the Proposed Scheme. These methodologies have been informed by a number of policies and guidance, which are described in further detail below.

Part 2a of the Environmental Protection Act (EPA) 1990

9.2.4. Part 2a of the Environmental Protection Act (Ref. 9-3) sets out a regulatory framework for the identification and remediation of contaminated land and includes a statutory definition for contaminated land.

9.2.5. Contaminated land is defined as *"land which appears to the local authority in whose area it is situated to be in such a condition, by reason of substances in, on or under the land, that:*

- *significant harm is being caused or there is a significant possibility of such harm being caused; or*
- *pollution of controlled waters is being, or is likely to be, caused".*

Contaminated Land Regulations 2006

9.2.6. The Contaminated Land Regulations (Ref. 9-4) consolidate the provisions of the Contaminated Land (England) Regulations 2000 (SI 2000/227) (Ref. 9-5) and the Contaminated Land (England) (Amendment) Regulations 2001 (SI 2001/663) with amendments (Ref. 9-6). They also set out provisions relating to the identification and remediation of contaminated land under Part 2A of the Environmental Protection Act 1990.

National Planning Policy Framework (NPPF)

9.2.7. The National Planning Policy Framework (Ref. 9-7) sets out the Government's planning policies for England and how these are expected to be applied. Chapter 15 covers conserving and enhancing the natural environment. Chapter 17 covers facilitating the sustainable use of minerals.

9.3. Study Area

9.3.1. A desk-based study of readily available sources has been undertaken in order to identify potential impacts of the Proposed Scheme on geology and geomorphology, soils and contaminated land, as required by DMRB (Volume 11, Section 3, Part 11 – Geology and Soils). The review of information has been confined to the following distances from the Proposed Scheme alignment:

- Geology, along the route of the Proposed Scheme
- Geological designated sites, within 250m of the Proposed Scheme boundary
- Historical land uses and potential sources of contamination: within 250m of the Proposed Scheme boundary
- Controlled waters, within 500m of the Proposed Scheme boundary
- Agricultural land, immediately adjacent to the existing highway and within the Proposed Scheme boundary

9.4. Baseline Conditions

9.4.1. A review of the A46 Coventry Junctions Upgrade Preliminary Sources Study Report compiled in February 2017 (Ref. 9-9) was conducted and the salient sections including where necessary, corroborative checks against publicly available information were summarised within the scoping report. The scoping report advised the acquisition of a full Environmental Index Report to support the subsequent assessment and the inclusion of the findings of the Ground Investigation Report (Ref. 9-10) which was not available at the time of the Scoping Report.

9.4.2. As recommended in the Scoping Report, for this assessment, an Enviro Insight Report has been obtained (Appendix 9-1) and reviewed, along with the Ground Investigation Report, September 2017 for the site investigation undertaken between 2 May and 25 May 2017. In addition, where applicable the publicly available information has been revisited for this assessment to provide current information. The baseline conditions presented in this chapter have been revised for this assessment based upon this additional information available.

9.4.3. The environmental assessment report Scoping Report referenced:

- The British Geological Survey (BGS) GeoIndex web service (Ref. 9-11)
- The Environment Agency's "What's In Your Backyard" (WIYBY) web service (Ref. 9-12)
- Information from Groundsure Geo-Insight Report, reference: GS-3445084, dated 14 November 2016 (Appendix 9-1)
- The government MAGIC maps website (Ref. 9-13)
- The LandIS website(Ref. 9-14)
- Including reference to earlier interim assessments carried out in the earlier stages of the Proposed Scheme and include:

- A46 Coventry Junctions Environmental Study Report June 2016 (Ref. 9-15).
- A46 Coventry Junction Upgrade Interim PCF - Environmental Scoping Report February 2017 (Ref. 9-16).

9.4.4. For this assessment the following additional references have been made:

- Information from Groundsure Enviro-Insight Report, 29 November 2017 (Appendix 9-1)
- AECOM Ground Investigation Report, September 2017 (Ref. 9-10)
- Revisit of publicly available information:
  - The British Geological Survey (BGS) GeoIndex web service (Ref. 9-11)
  - The UK Government Data.gov.uk (accessed September 2019); 'Data sets from the Environmental Agency', (including Flood Maps for planning portal .https://flood-map-for-planning.service.gov.uk). (Ref. 9-26)
  - The UK government DEFRA - MAGIC maps website (Ref. 9-13)
  - The LandIS and soilscape website (Ref. 9-14)

Historical Land Use

9.4.5. The Scoping Report and Preliminary Sources Study Report present a summary of the land use at the site of the Proposed Scheme from the historical mapping included as part of the Groundsure Geo-Insight Report. Only small scale mapping has been made available including maps of 1:10,000 and 1:10,560 scale ranging from 1886 to 2014.

9.4.6. Table 9-2 is a tabulated presentation of the review of these maps and available pertinent historic information.

9.4.7. Table 9-2 presents a summary of the main pertinent features on and within approximately 250m of the site taken from the mapping. It is noted that only indicative maps scales are provided. Where dates are stated, these refer to the dates of the maps on which the features become present, have changed use, or are no longer annotated, and do not necessarily refer to the exact dates of the existence of a particular feature.

9.4.8. It is noted that from the GroundSure Enviro-Insight Report and aerial photography, Binley Woods Service Centre, a former fuel station is noted south of the A428 to the east of the A46 junction. This is currently a vehicle sales, repair, and maintenance garage and vehicle cleaning service. Historic mapping notes that the buildings for this facility were present at least in similar form on the historic mapping from 1955.

Table 9-2: Historic Mapping Review

Date / Scale	On-site land use	Off-site land use (within 250m of the site plus selected features applicable to the site or the understanding of the wider setting)
1886 / 1:10,560	Binley Common Farm lies in the centre of the site just south of the present roundabout. A road runs east west past the north side of the farm	The area is predominantly open, presumed agricultural, land with the village of Binley approximately 500m north west. Binley Common and Piles Coppice lie to the east and south east of site respectively.

Date / Scale	On-site land use	Off-site land use (within 250m of the site plus selected features applicable to the site or the understanding of the wider setting)
	approximately along what is currently the A428. Ponds lie to the west and east of the farm to the south of the road. Two ponds are noted in the north half of the site on the current A46 alignment. The remaining area is predominantly open, presumed agricultural, land with Binley Common and Piles Coppice encroaching on the eastern and south eastern ends of the site.	An area named The Bogs is noted to the south west of site with a stream running through north to south. The southern end of a large lake (currently named Coombe Pool) is noted approximately 300m north of site. This is an elongate curved lake over 100m wide in the section included on the mapping. On the northern bank of the lake is a boathouse and a marge building noted as a menagerie.
1903 / 1:10,560	No significant change	No significant change
1912 / 1:10,560	No significant change	A colliery has been developed 300m south east of the Proposed Scheme with an associated railway line running north and south within the colliery and extending from the colliery south along the western side of The Bogs.
1926 / 1:10,560	No significant change	Housing has been developed to the immediate west of Binley Colliery and an area of infill is noted to the colliery's immediate east. Binley has expanded and includes a school about 500m from site.
1938 / 1:10,560	No significant change	No significant change
1955 / 1:10,560	No significant change	An equipment depot comprising a large building and smaller associated building have been constructed to the west of the junction immediately west of the current small roundabout on the A428. Binley common has been predominantly developed with low density housing and a plant nursery. Additional housing is also noted within Binley and to the west of Binley Colliery.

Date / Scale	On-site land use	Off-site land use (within 250m of the site plus selected features applicable to the site or the understanding of the wider setting)
1967 / 1:10,560	Overhead lines with associated pylons are noted to cross the site from north to south.	The equipment depot has expanded with a number of small associated buildings immediately west of site at the location of the current small roundabout. Further west along the road a works is noted with a series of large industrial/ commercial buildings. The infill area to the east of the colliery (now noted as a mine) has expanded significantly to within about 100m of the south western end of the site.
1973 / 1:10,000	A large area approximately 200m in diameter noted as an infilled area encroaches on the central portion of the northern half of site. The area extends from site to the west. One of the northern ponds is no longer noted.	Binley Colliery is no longer present, and the infill area is noted as a disused tip. Binley has expanded significantly to the south with residential properties. The works area to the west of site has expanded with a number of large buildings forming an industrial estate.
1980 / 1:10,000	The second northern pond is no longer noted. The infilled land in the northern end is no longer noted and a track is in its place leading to a rugby football ground north west of site.	Colliery disused tip area is no longer noted (potentially levelled or infilled) and now comprises roads and a large building.
1991 / 1:10,000	The A46 and associated roundabout is shown as it is at present. Binley Farm is no longer present being in the alignment of the new A46.	The former colliery tip area has been developed as part of the expanding industrial estate to the north, now Binley Industrial Estate which has also expanded east up to the new A46 running north south. A hotel and a number of other buildings are present to the south west of the roundabout, and additional buildings are present south west and south east of the roundabout. A nursery is noted approximately100m north west of the northern end of the site

Date / Scale	On-site land use	Off-site land use (within 250m of the site plus selected features applicable to the site or the understanding of the wider setting)
		and a drainage channel is noted running from the A46, north west, past the nursery to Coombe Pool.
2002 / 1:10,000	Grass verges, planted areas and hard standing shall be present onsite along the western boundary, south of the roundabout, associated with the expansion of the industrial estate.	A large residential housing estate is now present to the north west of site. The industrial estate has expanded to meet the A46. New buildings are present near to the roundabout, a hotel complex to the north west and a rugby football club to the north east. A superstore is noted about 200m west of site off the A428
2010 / 1:10,000	No significant change	No significant change
2014 / 1:10,000	No significant change	Three large buildings are now located to the north east of the superstore, west of the A46 alignment.

Geology

9.4.9. The scoping report presented a summary of the ground conditions published within the Preliminary Sources Study Report (Ref. 9-17) alongside supporting information from the BGS GeoIndex web service.

9.4.10. The revised summary presented here includes new information from the Enviro-Insight report and the September 2017 Ground Investigation Report.

9.4.11. The Ground Investigation Report presents the assessment of the ground investigation undertaken across the site area between 2 May 2017 and 25 May 2017. The ground investigation included six rotary cored boreholes with target depths between 25m below ground level (mbgl) and 27mbgl (RC401/17 to RC406/17), thirteen dynamic sample boreholes to depths ranging between 0.90mbgl and 10.80mbgl (BH301/17 to BH311/17), twenty two windowless sample boreholes to depths ranging between 1.65mbgl and 5.45mbgl (WS201/17, WS201A/17, WS203/17 to WS205/17 and WS207/17 to WS222/17), and seven hand excavated trial pits (TP101/17 to TP105/17 and TP107/17 to TP108/17). These locations were evenly split on either side of the existing A46 Junction alignment.

Geological Features

9.4.12. The BGS mapping within the Envirocheck-Report identifies a sequence of three faults trending north west to south east. The faults cross the far southern end of the site, with two faults located onsite and the third 23m south of the site boundary. These are noted as being inferred from coal seams and it is assumed that this relates to relative depths of the same coal measures in the area inferring the presence of up or down thrown fault lines; however no further detail is available for these faults.

Made Ground

9.4.13. The BGS mapping as provided within the Groundsure Geo-Insight Report identifies two areas of potential Made Ground onsite:

- One area is to the immediate northwest of Binley junction and is predominantly offsite to the west. The area is identified as Made Ground (undivided) and is defined by the BGS as "*man-made deposits on the ground surface, such as embankments and spoil heaps*". The same area is identified as a historic landfill within the Enviro-Insight Report and the Environment Agency's website. The *landfill* is named *Borrow Pit, North A428* and noted for household waste. Further details are presented in the *landfill* sites section below and in Table 9-3. The majority of this area has been subsequently developed as a shopping complex including three large warehouse type retail units offsite the current A46 and landscaping covers the portion underlying the site
- The second area is identified extending onto the southern end of the site and is noted as an area of Infilled Ground. This is described by the BGS as "*areas where the pre-existing (natural or artificial) land surface has been worked and subsequently partially or wholly backfilled*". This area in part aligns with the *Fosseway Sand and Gravel Company Limited, Landfill Site*. Further details are presented in the 'landfill sites' section below and in Table 9-3, however this area extends further south and east around Piles Coppice and may not be directly related

9.4.14. The Preliminary Sources Study Report notes that previous ground investigations between 1981 and 1989 proved a Made Ground thicknesses in the southwest area of the Proposed Scheme of up to 6.8m thick and up to 5.0m thick in the northeast area. Further detail on the specific locations of these findings and their relation to the existing site boundary is not known.

9.4.15. The material in the southwest of the site was described as Brown clay, sand and gravel silty at some horizons with variable proportions of brick fragments, wood, ash, glass, concrete and paper.

9.4.16. The material in the north-east of the site was described as Red/brown silty/gravelly/sandy clay fill, or brown sand, containing occasional ash, timber, shale, brick, charcoal and glass fragments.

9.4.17. The ground investigation undertaken across the site area between 2 May 2017 and 25 May 2017 provided updated ground conditions across the site. The exploratory hole location plan from the Geotechnics Factual Report for the investigation is presented in Figure 9-1.

9.4.18. Within the factual report and subsequent Ground Investigation Report Made Ground was identified within 39 of the 48 intrusive locations and in most locations Made Ground was overlain by grass and topsoil. Where Made Ground was not present topsoil directly overlies the superficial deposits these locations were predominantly within the southern end of the site (WS201/17, WS201A/17, WS203/17, WS204/17, WS205/17, WS222/17), with the exception of adjacent locations BH309/17 and WS218/17 within the northern end of the site and RC405/16 just north of the Binley junction.

9.4.19. Within the southern end of the site ground conditions are quite variable, BH302/17 lies approximately 4m apart from WS205/17. However, unlike WS205/17, which notes 0.3mbgl of dark grey topsoil over a brown gravelly slightly clayey sand, BH302/17 identifies Made Ground to a depth of 1mbgl with no topsoil, noting black sandy slightly clayey gravel to 0.25mbgl overlaying 0.75m thickness of *possible Made Ground* similar in composition but greyish brown in colour.

9.4.20. The Made Ground is typically underlain by the superficial geology as described below, generally comprising granular strata of sands and gravels with bands of cohesive clays. WS220/17 and BH311/17 within the far northern end of the site record Made Ground directly overlying the mudstone bedrock with no superficial deposits present. However, within BH311/17 there is 0.6m of *possible Made Ground* described as firm to stiff clays overlying the bedrock and WS220/17 notes 0.2m of topsoil over 1m of coarse gravel not identified as Made Ground but underlain by a similar strata defined as *possible Made Ground.* It is possible that these strata are construction fill material placed overlying bedrock however the borehole log does not discern whether the material was *engineered* or tipped.

9.4.21. The thickest sequence of Made Ground was identified in BH307 which was sited approximately 200m north of the A428 roundabout. The Made Ground at this location comprised predominantly reddish brown bands of sand and gravel with variability in colour and interbedded layers and pockets of gravel, sand and clay throughout the general sequence. The strata contains variable anthropogenic inclusions, including brick fragments, glass, plastic and wood although these are not noted extensively within the Made Ground. Inclusions of *carbonaceous material* are noted and a hydrocarbon odour is noted between 3.50mbgl and 3.65bgml in soils and from a piece of wood encountered between 5.1mbgl and 5.3mbgl.

9.4.22. Out with the Made Ground at BH307/17, the only other record of visual of or olfactory potential contamination was a slight hydrocarbon odour noted within the base of the Made Ground at RC402/17 between 0.8mbgl and 1.5mbg within a very soft dark brown mottled black clay.

9.4.23. It is possible that other Made Ground or visual and olfactory evidence for contamination exists within the site footprint that has not been identified as part of the mapping or site investigations.

Superficial Deposits

9.4.24. According to published geological mapping, the majority of the site area is underlain by either the Baginton Sand and Gravel Formation, within the central and northern end of the alignment, or River Terrace Deposits across the southern portion of the site. To the east of the Proposed Scheme the superficial strata comprise the pebbly silty clays of the Thrussington Member and Bosworth Clays of the Wolston Formation. These underlie the A428 east of the Binley junction.

9.4.25. The ground investigation undertaken across the site provided corroboration of the ground conditions across the site broadly confirming the published mapping.

9.4.26. Within the factual report and subsequent Ground Investigation Report, of the 48 intrusive locations 39 were extended below the base of the made ground. Of these 39 locations 37 identified superficial deposits below the Made Ground with two locations WS220/17 and BH311/17 comprising made ground directly over shallow bedrock. Of the 37 samples which identified superficial deposits 13 proved the base of the strata, terminating within the bedrock. The thickness of the superficial deposits varies significantly across the site from 0.4m thick at WS219/17 to 15m thick at RC405/17.

9.4.27. The base of the superficial deposits is identified where bedrock was proven, between 0.6mbgl and 16.7mbgl, or when adjusted for elevation, between 88.55mAOD and 68.68mAOD representing a 19.87m difference across the site. While there is significant variability in depth along the alignment.

9.4.28. The top of the superficial deposits, where identified, ranged in level between 88.85m above ordnance datum (AOD) and 72.29mAOD, with a 6.36m difference in level across the site. This is similar to that of the ground level of the site which ranges from

89.75mAOD to 83.19mAOD with a variation in elevation of 6.56m. Both level profiles are in general accordance with one another, as with the exception of BH307/17 the variation in overlying Made Ground/ topsoil is relatively limited. The level profiles for both the ground level and top of the superficial deposits show a general drop in elevation from south to north. This is interrupted by the notable rise and fall over the centre of the site, focused around the location of the roundabout. It is also noted that the site dips down from east to west with the highest locations onsite recorded at the eastern side of the roundabout along the A428.

9.4.29. The presence of the various superficial deposits, as anticipated from the published mapping, is corroborated through the results of the ground investigation undertaken across the site area as compiled within the Ground Investigation Report.

9.4.30. The following provides a brief description of the superficial strata encountered across the site:

Baginton Sand and Gravels

9.4.31. The Baginton Sand and Gravel Formation underlies Binley junction and the associated A46 and A428 road links extending to the north and west of the junction. The deposits terminate in the north of the site at approximate national grid reference 438842, 278044. Deposits are also present in the southern-most part of the site beneath the A46, south of national grid reference 438424, 277173. The BGS Lexicon describes this formation as *sands and gravels, with lenses of silt and clay*.

River Terrace Deposits

9.4.32. The River Terrace Deposits underlie the site and the A46 to the south of Binley junction. These terminate against the Baginton Sand and Gravel Formation at E438424, N277173, approximately 600m southwest of the junction. The BGS Lexicon described the deposits as 'sand and gravel, locally with lenses of silt, clay or peat'.

Wolston Formation: Thrussington Member

9.4.33. The Thrussington Member is a glacial till deposit recorded along the eastern flank of the site, from Binley Junction southwards. This is described by the BGS Lexicon as *"diamicton, brown to reddish-brown with subordinate sand, gravel, clay and silt, described as pebbly clays and silty clays with rock fragments".* The deposits terminate against the Bosworth Clay Member in the east.

Wolston Formation: Bosworth Clay

9.4.34. The Bosworth Clay member underlies the east end of the site beneath the A428. These deposits are described as glaciolacustrine muds and form part of the pre-Devensian glacial succession within the Wolston Formation.

Bedrock Geology – Mercia Mudstone Group

9.4.35. Mercia Mudstones are identified by the BGS and Groundsure mapping to underlie the entirety of the site. The Mercia Mudstone Group is described by the BGS Lexicon as *"red or green-grey mudstones and subordinate siltstones, with thick halite-bearing units in some basinal areas and thin beds of gypsum/anhydrite. Sandstones also present".*

9.4.36. The presence of the Mercia Mudstone is corroborated through the results of the ground investigation undertaken across the site area as compiled within the Ground Investigation Report. The investigation proved rock head in 15 of the 48 locations between 0.6mbgl and 16.7mbgl, or when adjusted for elevation, between 88.55mAOD and 68.68mAOD. This represents a 19.87m difference across the site. The bedrock is

noted to comprise a tiered formation; from south to north the bedrock has a gentle south to north dip towards the roundabout in the centre of the site. At this point the bedrock becomes more shallow to its highest elevation located just north of the roundabout in the northern end of the site. The level after this point gently dips off to the north again. Although the BGS mapping does not indicate a fault in this area it is possible that this change in elevation of the bedrock represents a fault.

Groundwater

9.4.37. The ground investigation identified ground water strikes within a number of the boreholes with gas and ground water monitoring wells installed within a number of these boreholes for continued monitoring.

9.4.38. During advancement of the boreholes ground water strikes were all noted within the superficial deposits at depths between 2.1mbgl and 7.9mbgl. This places the water level between 82.51mAOD (RC404/17) and 74.31mAOD (BH311/17). While ground water strikes are not as reliable as monitoring well level readings post ground investigation, due to false positives from seepage and the drilling works disturbing the ground water level, the ground water showed a general downward gradient towards the north end of site which was broadly in line with the topography of the site. While no gas monitoring was scheduled as part of the investigation, a programme of groundwater monitoring of the borehole installations was undertaken between November 2017 and January 2018. The results of the monitoring indicated the water table generally sat between 78mAOD and 80mAOD with an observed minimum of 3.75mbgl and most measurements >4mbgl. The monitoring results were broadly in-line with the initial ground water strikes and the variation in monitoring rounds suggested the shallow water table is susceptible to fluctuations in level as a result of seasonal variations in rainfall.

Soils

9.4.39. The LandIS Soilscapes website (last accessed September 2019) identifies two types of topsoil present at the location of the Proposed Scheme.

9.4.40. The soil type that is prevalent across most of the central and southern site is a freely draining slightly acidic loamy material with low fertility. The soil is noted to drain to local groundwater and rivers. This soil is prevalent through the land to the west of site. The soil is associated with pastures, deciduous woodlands, and bracken and gorse in the uplands.

9.4.41. The second soil type intrudes into the south-eastern end of the site including a portion of the A428 east of the roundabout and the southern temporary construction compound area. These soils surround the former areas of Binley Common to the east. A second area of these soils encompasses the northern construction compound and the main alignment from that point to the north end of site. This second soil type is a slowly permeable and seasonally wet soil with impeded drainage; the soil is a slightly acidic but base-rich loamy and clayey soil of moderate fertility. The soil is associated with seasonally wet pastures and woodlands

9.4.42. The Agricultural Land Classification (ALC) as defined by Natural England and presented within the government online MAGIC mapping. The classification is based on a five grade rating. Grade one being the best quality and most versatile and grade five being the poorest quality. A number of consistent criteria are used for the assessment by Natural England which include climate (temperature, rainfall, aspect, exposure, frost risk), site area (gradient, micro-relief, flood risk) and soil description (depth, structure, texture, chemicals, stoniness).

9.4.43. The Agricultural Land Classification identifies the junction and northern part of the Proposed Scheme, at Grade 2. This is defined by Defra as very good quality land with minor limitations which affect crop yield, cultivations, or harvesting. A wide range of agricultural and horticultural crops can usually be grown but on some land in this grade there may be reduced flexibility due to difficulties with the production of the more demanding crops such as winter harvested vegetables and arable root crops.

9.4.44. The Agricultural Land Classification across the remaining southern portion of the site is classified as Grade 3. This is defined as good to moderate quality land with moderate limitations which affect the choice of crops, timing and type of cultivation, harvesting or the level of yield. Where more demanding crops are grown yields are generally lower or more variable than on land in Grades 1 and 2. It is noted that the LandIS Soilscapes website does not distinguish between Grades 3a and 3b, as such for the purpose of this assessment the soils are considered the higher 3a grade as a conservative measure.

Coal Mining and Worked Ground

9.4.45. The Preliminary Sources Study Report describes two coal seams underlying the Proposed Scheme; these are the *Nine Feet* and *Two Yard* seams. The *Four Feet* seam is present to the southwest of the Proposed Scheme. The BGS map indicates that these seams form part of the Thick Coal Group.

9.4.46. The approximate depth of these seams is anticipated to be between around 140m to 150m below ground level. Historic boreholes from the BGS indicate coal measures beneath the Binley Colliery at national grid reference 438290, 277300 that are approximately 108m deep and between approximately 10.0m to 10.5m thick.

9.4.47. The Preliminary Sources Study Report notes no known coal outcrops within the area of the Proposed Scheme.

9.4.48. Reference is made in the Preliminary Sources Study Report to the Ove Arup and Partners (Ref. 9-17) report which states that a mining subsidence report for the area was compiled by the Valuation Office of the Inland Revenue in 1979. The report concluded that the risk to road works arising from subsidence as a result of mining of the Warwickshire Coal Seam was insignificant.

9.4.49. The BGS Coal Authority mapping website indicates the site is within a coal mining reported area. Additionally, it identifies two *"potential mine entry zones of influence*" which in turn are identified as high risk areas with regards development. These two entry zones are located within the area of the former Binley Colliery.

9.4.50. Binley Colliery was located approximately 900m southwest of Binley junction, approximately 300m from the Proposed Scheme site. The colliery is captured within the Groundsure Geo-Insight Report identifying three references to collieries between 1912 and 1950 and an *unspecified mine* in 1967 at the location. The Preliminary Sources Study Report states that the shaft at Binley Colliery was sunk in 1909 and was sealed in 1963. The mine entries in the vicinity of Binley Colliery are noted on the BGS Coal Authority mapping website as having been *treated*, however the nature of this treatment is unknown.

9.4.51. The Groundsure Report (Appendix 9-1) indicates the presence of *"historical surface worked ground features"* of which there are six records on site, five relate to a pond identified on the historic mapping, halfway along the site A46 alignment between the roundabout and the northern end of the site. The last is a refuse heap, identified as the infill area to the north west of the junction as noted in the historic mapping.

9.4.52. A current ground workings feature is also indicated on the site within the refuse heap area, which is a *Sand and Gravel quarry* described as being at Brinklow Road but this has been assigned a status of *"ceased"*.

9.4.53. The Groundsure Geo-Insight Report (Appendix 9-1) identifies the presence of coal mining on site however it also notes no *non-coal* mining is recorded within 0.62 miles (1km) of the site including tin, gypsum and clay as well as no natural cavities being present.

Hydrology

9.4.54. A summary of the hydrology is presented in this section. Further detail of the surface water features and associated abstractions is presented within Chapter 13: Road Drainage and the Water Environment of this report.

9.4.55. In review of the Groundsure Enviro-Insight Report, historical mapping information and publicly available mapping, the nearest surface water feature is identified to be an unnamed *secondary river*. This river is straight and partially culverted extending north east from the northern end of the site. The river leads from the A46 through Beechwood Trees and Landscapes tree nursery and to an existing stream which runs north-west around the edge of Coombe Pool within Coombe Country Park to the north east of site. This secondary river was constructed between 1980 and 1991 at the same time as the A46 and is presumed to be associated with drainage for the current road. The partially culverted river is a tributary to a pre-existing field drainage channel or stream which runs south-east to north-west adjoining the river around Coombe Pool. These two existing streams are recorded on the historic mapping from 1912 and likely predate this.

9.4.56. Additionally, two smaller ditches or drainage channels are present to the south of the junction roundabout noted to be offsite, however aerial photography indicates these may extend onsite. Aerial photography also identifies the potential for drainage ditches either side of the A46 in places.

9.4.57. Two of the historic ponds, dating to before 1886 are currently present: one is located within a fenced and walled area of vegetation in the carpark of the hotel and public house to the south west of the junction roundabout off site; the other is smaller and located within the remaining wooded area of Binley Common, south east of the roundabout. These do not relate to the former ponds in the northern portion of the site noted as *historical surface worked ground features.*

9.4.58. The Groundsure Enviro-Insight Report identified one surface water abstraction within 0.62 miles (1km) of the site. Lying 865m east of the site and relating to the abstraction of water from a tributary of the River Sowe by Roland Hill & Son of Old Lodge Farm, Binley, for spray irrigation and storage. There is no expiry for this extraction which started in May 1985.

Hydrogeology

9.4.59. A summary of the hydrogeology is presented in this section. Further detail of the ground water features and associated abstractions is presented within Chapter 13: Road Drainage and the Water Environment of this Report.

9.4.60. The Groundsure Geo-Insight Report indicates the permeability of superficial deposits on site varies from *low* to *very high* with *very high* permeability assigned to the Made Ground. The permeability of the underlying bedrock resulting from fractures is considered *low*.

9.4.61. The aquifer designations of superficial deposits identified onsite and the bedrock are detailed below.

9.4.62. The superficial deposits of the Baginton Sand and Gravel Formation and Sand and Gravel River Terrace Deposits which occupy the majority of the site are described as a Secondary A aquifer. This is defined by the Environment Agency as *"permeable layers capable of supporting water supplies at a local rather than strategic scale, and in some cases forming an important source of base flow to rivers"*.

9.4.63. The Thrussington Member and Bosworth Clay member to the east of the junction round about towards Binley Woods are designated as *Unproductive*. These strata are defined as *"rock layers or drift deposits with low permeability that have negligible significance for water supply or river base flow".*

9.4.64. The northern half of the alignment to the north of the roundabout has no superficial deposits.

9.4.65. The Mercia Mudstone bedrock is designated as a Secondary B aquifer. This is defined by the Environment Agency as *"predominantly lower permeability layers which may store and yield limited amounts of groundwater due to localised features such as fissures, thin permeable horizons and weathering".*

9.4.66. The site area is not recorded to be within a source protection zone (SPZ) however the central portion of the site is noted as a *minor aquifer high* with regards to Groundwater Vulnerability Zones.

Landfill Sites

9.4.67. Review of the Groundsure Enviro-Insight report identifies four landfill areas onsite (Table 9-3).

9.4.68. The landfill identified as *Borrow Pit* is associated with the infill area to the north of the roundabout noted on the historic mapping. The three other landfills are located south of the A46 junction roundabout and appear to be associated with the construction of the A46. The Fosseway Sand and Gravel landfill is the farthest south and is elongate north to south along the A46 adjacent to the Piles Coppice woodland. Both remaining A428 Borrow Pit landfills lie between the Fosseway landfill and the A46 roundabout, one comprising the A46 alignment and area to the west of this and the other lies to the immediate east of the alignment.

Table 9-3: Summary of Historical Landfills in the Site and Surrounds

Name (Licence Holder)	Address (Easting/ Northing)	Details	Waste Type
Fosseway Sand and Gravel Company Ltd, Landfill Site (Fosseway Sand and Gravel Company Limited	Fosseway Sand and Gravel Company Limited, Landfill Site, Piles Coppice, Binley Woods, Near Rugby, Warwickshire (national grid reference 438200, 276900)	Preliminary Sources Study Report Notes: Underlies a 150m section of the A46 within the southern end of the Proposed Scheme . Ove Arup and Partners (1984) suggest that the tip was active in 1984 and received general construction waste. There was no evidence of industrial waste input. Licence date: Issued 14 April1977: Surrendered: 11 July 1989.	Inert, liquid sludge

		Waste date: First recorded: 31 December 1971 Last recorded: 31 December 1981	
A428 Borrow Pit (A F Budge (Contractors) Limited)	A428 Borrow Pit, Adjacent to Barn Antiques, Brandon Road, Coventry, Warwickshire (NGR 438600, 277300)	Preliminary Sources Study Report Notes: Underlies a 600m section of A46 in the south of Binley Junction. The pit also underlies land to the immediate south of the A428 westbound carriageway. Licence date: Issued 15 September 1987: Surrendered: N/A. Waste date: First recorded: 01 August 1987: Last recorded: 31 December 1989	Inert
Borrow Pit (Unknown)	Borrow Pit, North A428 (NGR 438700, 277900)	Preliminary Sources Study Report Notes: Underlies a 120m section of A46 within the scheme footprint to the north of Binley. Licence date: Unknown Waste: First recorded: 01 January 1970: Last recorded: 31 December 1974	Household
A428 Borrow Pit (Unknown)	A428 Borrow Pit, Binley, Coventry (NGR 438600, 277400)	Preliminary Sources Study Report Notes: Not listed in Preliminary Sources Study Report as occupies the same location as Borrow Pit (above) with slightly different extents noted in Groundsure Report mapping Licence date: Unknown Waste date: Unknown	Unknown

Sensitive Land Uses

9.4.69. The Groundsure Enviro-Insight Report and supporting information sources indicate there are no Sites of Special Scientific Interest (SSSI's) identified onsite, however two lie within 500m of the site: Combe Pool 245m north-east of the Proposed Scheme boundary, including the lake and surrounding parkland; and Herald Way Marsh located immediately adjacent to the south-western boundary of the Proposed Scheme boundary, adjacent to the extended southern sections in the location of *The Bogs* and which extends west to encompass a portion of the former colliery and landfill area.

9.4.70. The Scoping Report noted a review of the Warwickshire County website's environmental mapping service shows that a Local Geological Site (LGS), which was formerly classified as a Regionally Important Geological Site (RIGS), is present 330m to the south-west of the Proposed Scheme. The online map indicates this to be Claybrookes Marsh Spoil Tip which correlates with the tip associated with the colliery shown on the 1967 historic map.

9.4.71. No reports of pollution incidents have been identified within the Proposed Scheme boundary from any of the sources accessed including the Groundsure Report.

9.4.72. The Groundsure Enviro-Insight Report shows that the Proposed Scheme is within a surface water related Nitrate Vulnerable Zone.

9.4.73. The site and areas to the east of the A46 are classified as greenbelt land.

9.4.74. Piles Coppice and the rectangular remnant of Binley Common (Woods), to the east of site are designated ancient woodlands.

Regulated Activities

9.4.75. The Groundsure Enviro-Insight Report reviews records of a number of regulated activities; the following is a summary of those findings.

9.4.76. Although no further information is available on the historic mapping, a vehicle sales, repair, and maintenance garage (Binley Woods Service Centre) is identified onsite however the actual location is on the boundary of the site, located on the south side of the A428 (Rugby Road) east of the roundabout.

9.4.77. No Control of Major Accident Hazards (COMAH) or Notification of Installations Handling Hazardous Substances (NIHHS) sites have been identified within 500m of the site.

9.4.78. No recorded pollution incidents are noted within a 0.62 miles (1km) radius of the site.

9.4.79. There are no entries for sites determined as contaminated land under Part 2A in the area surrounding site.

9.4.80. The Groundsure Enviro-Insight Report shows the site study area is absent of Industrial Sites Holding Licences or Authorisations including but not limited to: Integrated Pollution Prevention and Control, hazardous and dangerous substance consents, radioactive substances authorisations and red list discharge consents.

Radon

9.4.81. The Groundsure Enviro-Insight Report indicates that the site is not within a radon affected area, denoted as less than 1% of the properties are above the Health Protection Agency (HPA) Action Level. It notes that no radon protective measures are necessary for new properties or extensions to existing ones as described in publication BR211 by the Building Research Establishment (Ref. 9-18).

Potential Sources of Contamination

9.4.82. The potential sources of contamination outlined within this section have been identified based upon the desk study undertaken as part of this report including a review of the information available as outlined in this chapter. The potential sources of contamination have not been surveyed at the time of this report however; an indicative base plan which lays out the potential sources across the site area is presented in the CSM Red Line in Chapter 18: Figure 9.2 for visual reference.

9.4.83. Table 9-4 presents a summary list of potential contaminants that may be present within the study area as based on identified existing and historic and current land uses identified.

Table 9-4: Potential Sources of Contamination within the Study Area and Typical Associated Contaminants

On-Site Existing and Historic Land Use	Age	Location	Typical Potential Contaminants
Binley Common Farm	Pre 1886 to 1991	Centre of site in alignment of the A46 immediately south of the A46 junction.	Metals & Metalloids, herbicides, pesticides, Phenols, chlorides, sulphates, sulphides, Total Petroleum Hydrocarbons (TPHs), Polycyclic Aromatic Hydrocarbons (PAHs), asbestos and cyanides
Infilled area (Historic landfill: Borrow Pit).	1973 to present	A large area approximately 200m in diameter encroaching on the central portion of the northern half of site. The area extends from site to the west.	Identified as taking Household waste Metals & Metalloids, Phenols, chlorides, sulphates, sulphides, TPHs, PAHs, asbestos and cyanides, landfill gas.
Infilled areas (Historic Landfills)	Within period from 1970-1989	Four landfill areas covering the southern half of the site.	Identified as taking Inert, unknown or *liquid sludge* waste. Likely associated with fill for the construction of the A46. Metals & Metalloids, Phenols, chlorides, sulphates, sulphides, asbestos and cyanides

On-Site Existing and Historic Land Use	Age	Location	Typical Potential Contaminants
Infilled areas (ponds)	1973/1980 to present	Two ponds within the northern end of the site on the A46 alignment.	Metals & Metalloids, Phenols, chlorides, sulphates, sulphides, TPHs, PAHs, asbestos and cyanides
A46 road and Junction	1991 to present	Existing A46 Alignment across majority of site excluding the temporary store areas.	Metals & Metalloids, Phenols, chlorides, sulphates, sulphides, Total Petroleum Hydrocarbons (TPHs), Polycyclic Aromatic Hydrocarbons (PAHs), asbestos and cyanides
Agricultural Land	Pre 1886 to present	Majority of the site prior to the A46 development and present areas outside of the A46 development.	Metals & Metalloids, Phenols, chlorides, sulphates, sulphides,

9.4.84. Table 9-5 presents a summary list of potential contamination sources outside of the defined study area, as based upon identified historic and current land uses identified.

Table 9-5: Potential Sources of Contamination outside the Study Area and Associated Contaminants

Off-Site Existing and Historic Land Use	Age	Location	Typical Potential Contaminants
Equipment Depot	1955 to present	East of the A46 Junction, south of the A428.	Metals & Metalloids, Phenols, chlorides, sulphates, sulphides, Total Petroleum Hydrocarbons (TPHs), Polycyclic Aromatic Hydrocarbons (PAHs), PCBs asbestos and cyanides

Off-Site Existing and Historic Land Use	Age	Location	Typical Potential Contaminants
Bingley Industrial Estate	1967 to present	1967 to 1980: Industrial development extending west of the equipment depot 1980 to present: Expanded south across former colliery land and named 'Bingley Industrial Estate'	Metals & Metalloids, Phenols, chlorides, sulphates, sulphides, TPHs, PAHs, asbestos and cyanides
Rugby club, hotel/restaurant developments	2002 to present	Adjacent to site to the north west, north east and south west of the A46 junction.	Metals & Metalloids, Phenols, chlorides, sulphates, sulphides, TPHs, PAHs, asbestos and cyanides
Retail development	2002 to present	2002 to 2014: North west of A428 (west of junction) 2014 to present: additional retail units to north west of A46 junction	Metals & Metalloids, Phenols, chlorides, sulphates, sulphides, TPHs, PAHs, asbestos and cyanides
Colliery (and associated 'tip' area)	1926 to 1973: Colliery 1973 to 1980: 'disused tip'	300m south west	Metals & Metalloids, Phenols, chlorides, sulphates, sulphides, TPHs, PAHs, asbestos and cyanides

Off-Site Existing and Historic Land Use	Age	Location	Typical Potential Contaminants
'Binley Woods Service Centre' (Former fuel station, currently vehicle repair, maintenance and cleaning services	Not present on historic mapping (est. 1955 onwards based buildings noted on mapping)	Adjacent to site on the east of the junction, off the A428	Metals & Metalloids, Phenols, chlorides, sulphates, sulphides, TPHs, PAHs, asbestos and cyanides
Superstores and hotels	1991 to present 2002	Adjacent to main junction	Metals & Metalloids, Phenols, chlorides, sulphates, sulphides, TPHs, PAHs, PCBs, asbestos and cyanides
A46 road and Junction	1991 to present	Existing A46 Alignment extending north and south from site.	Metals & Metalloids, Phenols, chlorides, sulphates, sulphides, TPHs, PAHs, asbestos and cyanides
Agricultural Land	Pre 1886 to present	Majority of the surrounding area.	Metals & Metalloids, Phenols, chlorides, sulphates, sulphides,

Soil Chemistry

9.4.85. The Groundsure Geo-insight Report summarises the natural background concentrations for certain heavy metals at the site including arsenic (less than 15 milligrams per kilogram (mg/kg)), cadmium (less than 1.8 mg/kg), chromium (60-90 mg/kg), lead (less than 150 mg/kg) and nickel (15-30 mg/kg).

9.4.86. The 2017 Ground Investigation Report presents an assessment of the ground risks and geohazards posed to and from the development and focuses upon the geotechnical analysis undertaken as part of the works including chemical analysis for waste acceptance criteria (WAC) and aggressivity in soils. However, as part of the investigation a suite of environmental chemical analysis was also undertaken for limited samples taken across the site as part of the ground investigation.

9.4.87. While chemical data is limited due to the investigation being focused on the geotechnical requirements for the Proposed Scheme, the available data may provide additional insight into the site setting in support of the impact assessment. For the soil samples a human health risk assessment has been undertaken at a generic level (termed *generic quantitative risk assessment* (GQRA) or *stage 2* in CLR11). With regards to the leachate analysis results a controlled waters risk assessment has also been undertaken at a GQRA level. Both assessments have been undertaken in

accordance with the legislative and policy framework presented in section 9.2. The data is presented in tabular form in full, with associated exceedances highlighted, within Appendix 9-2. Presented below is a summary of the analysis of those samples and any notable exceedances highlighted by the GQRAs.

Soil Analysis

9.4.88. Eighteen soil samples were assessed as part of the Ground Investigation Report. The focus of the Ground Investigation Report was primarily upon the geotechnical requirements for construction purposes to inform the Proposed Scheme and not on that of environmental assessment. As such the available data is limited for chemical analysis with variable and in some cases limited suites of contaminants with respect to human health assessment. Of the eighteen samples eight were analysed for a broad suite including a selection of metals, organics and inorganics, speciated Total Petroleum Hydrocarbons (TPHs) with BTEX, and speciated Poly-aromatic Hydrocarbons (PAHs) as well as a number of other potential contaminants. Two of these samples included a wider suite incorporating Volatile Organic Compounds (VOCs) and Semi-Volatile Organic Compounds (SVOCs), chlorinated hydrocarbons, phenolics, PCBs, halogenated phenols and benzenes among others. The remaining ten samples had a varied suite which typically included pH, and a limited number of inorganics organics and a number of other compounds.

9.4.89. When the samples were screened using the methodology and generic assessment criteria outlined in Appendix 9-3 the majority of the samples were below the generic assessment criteria with most concentrations being recorded below the laboratory limits of detection. It should be noted that there is no specific scenario for highways or infrastructure end use due to the limited potential for risk to human health post construction as such, as discussed in Appendix 9-3 the generic assessment criteria have been derived for a commercial or industrial end use which is the nearest approximate however these values are considered very conservative in relation to highways.

9.4.90. One sample (WS209/17) located south of the A46 junction within a layby area, taken at 0.3mbgl within the Made Ground, identified a single exceedance of the generic assessment criteria relating to total chromium (III+VI). The reading was 150mg/kg, above the generic assessment criteria of 33mg/kg. However, the generic assessment criteria for total chromium is conservatively based upon the more toxic chromium VI and not the more common chromium III which has a generic assessment criteria of 8600mg/kg. Chromium III occurs naturally in many fruits and vegetables, meats and grains; in comparison chromium VI is commonly produced through industrial processes in oxidising conditions and is relatively rare outside of areas where its potential presences is anticipated. As such, it is unlikely that the chromium present at WS209/17 is chromium VI or at least not in its entirety. The 150mg/kg of chromium identified when considered against the typically low readings across the other samples and the low level of the exceedance when compared to the two generic assessment criteria, and as the location is within the roadway and the footprint of the future raised slip roads where the made ground is likely to be removed as part of the development of the embankments, it is not considered to pose an unacceptable risk to human health.

Leachate Analysis

9.4.91. Eight soil samples from seven different wells were scheduled for leachate analysis. All of the samples were within the top 1m of topsoil or Made Ground. Of the eight samples, five (RC405/17, WS203/17, WS207/17, WS215/17 and WS217/17 (0.1mbgl)) were scheduled for a suite of testing including metals, organics, TPH with BTEX, PAH, and a number of other compounds. The remaining three (WS208/17, WS212/17 and

WS217/17 (0.1mbgl) were scheduled for range of metals, inorganics and PAH alongside some physical parameters.

9.4.92. The result shows that the bulk of those compounds analysed were close to or below the limits of detection. However, a number of exceedances of the Environmental Quality Standards and UK Drinking Water Standards guidance values were identified.

9.4.93. Limited exceedances of the Environmental Quality Standards were identified for a number of PAHs across all five samples tested and for metals including copper (5 samples; WS203/17, WS207/17, WS208/17, WS215/17, WS217/17), zinc (3 samples; WS203/17, WS208/17, WS217/17) and lead (1 sample; WS203/17). Exceedances of the UK Drinking Water Standards were less prevalent with only exceedances for PAHs benzo(a)pyrene, indeno(1,2,3-c,d)pyrene, benzo(g,h,i)perylene, benzo(b)fluoranthene and benzo(k)fluoranthene in three or four of the five tested locations with the exception of WS207/17 which showed no exceedances. Dibenz(a,h)anthracene was also noted in exceedance of the UK Drinking Water Standards only within WS203/17. The exceedances for PAH are notably above the screening criteria however this is related more to the very conservative nature of the Environmental Quality Standards and UK Drinking Water Standards when considering soil leachates, than the concentrations within the soils.

9.4.94. The exceedances show no particular trend across the site. WS203/17 showed generally slightly higher concentrations in comparison to the other samples and is located within the southern end of the site. No nearby data to WS203/17 is available to identify any specific trends. These exceedances are considered relatively low and taking into account the generally conservative nature of the Environmental Quality Standards and UK Drinking Water Standards and the very conservative application of the screening criteria with regards to the development requirements.

9.5. Potential Impacts

9.5.1. Construction of the Proposed Scheme may result in physical changes on the geology and soils of an area. These include:

- Impacts on ground stability from the underlying geology and through construction works including excavations and earthworks alterations
- Effects on agricultural soils as a valuable resource: For example, loss or damage to soils of good agricultural quality that is present within the Proposed Scheme study area
- Impacts associated with re-use of soils and waste soils. Re-use of site-sourced materials on or off-site, disposal of site-sourced materials off-site, and importation of materials to the site
- Impacts associated with mobilising potential contaminants to a wider area on and off site, and to potential sensitive receptors
- Impacts from chemical spillages and leaks from plant and machinery used in construction

9.5.2. The impacts during operation and maintenance are expected to be less, although might include changes to the soils through contaminated runoff from the Proposed Scheme and spillages from accidents, for example.

9.6. Assessment Methodology

9.6.1. The geology and soils assessment has been undertaken in accordance with the advice provided in *DMRB Volume 11, Section 3, Part 11 Geology and Soils*. The objective of this assessment is to identify any significant impact on geology and soil and where

appropriate any particular environmental issues associated with contaminated land in regards to the construction and operation of the Proposed Scheme. This guidance defines the scope of the topic, although it does not provide formal guidance on the assessment of impacts and the significance of effects. As such the DMRB methodology has been further developed by the project team based on government guidance and published industry best practice and professional experience, noting that the methodology applied has been successfully applied to other environmental assessments.

9.6.2. The assessment of agricultural soils will be undertaken in accordance with the guidance within *DMRB Volume 11, Section 3, Part 6 – Land Use – Amendment No 1*. The assessment considers the impact of agricultural soil loss from the Proposed Scheme which has Agricultural Land Classification Grade 2 and Grade 3 designations.

Impact Assessment Criteria

9.6.3. The *DMRB Volume 11, Section 3, Part 11 Geology and Soils* guidance defines the scope of the geology and soils topic, although it does not provide formal guidance on the assessment of impacts and the significance of effects. As such the DMRB methodology has been further developed by the project team based on government guidance and published industry best practice and professional experience, noting that the methodology applied has been successfully applied to other environmental assessments.

9.6.4. The methodology considers the potential presence of land and groundwater contamination, sites of geological or geomorphological significance (such as geological conservation features or mineral resources), controlled waters, the built environment, human receptors, and the presence of agricultural land/soils.

9.6.5. The impact assessment methodology applied takes account of technical guidance that has been produced in the UK for the assessment of ground conditions and water resources by the government (Defra and its predecessor and successor departments), agencies such as the Environment Agency and Contaminated land: Applications in Real Environments (CL:AIRE), and British Standards.

9.6.6. While the impact upon agricultural soils is not specifically considered within Highways Act applications, the assessment methodology in this chapter has taken into account the consultation undertaken with Natural England with regards to the Scoping Report.

9.6.7. Available information which includes previous ground investigation results, third party assessments, and publicly available information has been used to establish baseline conditions as detailed in Section 9.4. Supporting information is consistent with the risk-based framework adopted in the Environment Agency document *Model Procedures for the Management of Land Contamination – CLR11* (Ref. 9-19). Risks from ground gas emission and accumulation is assessed in line with CIRIA C665 *Assessing Risks posed by hazardous ground gases to buildings*. Guidance within BS10175: 2011 *Investigation of Potentially Contaminated Sites – Code of Practice* (Ref. 9-20) is also followed.

9.6.8. Where necessary, risks to flora and fauna is assessed in line with current Environment Agency guidance including:

- *Derivation and use of soil screening values for assessing ecological risks (2017), Guidance on the Use of Soil Screening Values in Ecological Risk Assessment (2008b) or BS3882 Specification for Topsoil and Requirements for Use* (2015) (Ref. 9-21)
    - *ISO 19204:2017 Soil quality -- Procedure for site-specific ecological risk assessment of soil contamination* (soil quality TRIAD approach) (Ref. 9-22).

Scope and Level of Assessment

9.6.9. For each of the potential impacts identified, an assessment has then been made of the likely significance of resulting effects on the receptor. The definition of effect significance has been made by taking into account both the importance/sensitivity of the receptor (refer to Table 9-6) and the magnitude of the predicted impact (refer to Table 9-7), using the matrix as presented in Table 9-8, in conjunction with professional judgement of the site-specific factors that may be of relevance.

9.6.10. Impacts to construction and maintenance workers have been scoped out of this assessment as these workers will be protected under Health and Safety measures employed by competent contractors. Impacts to development infrastructure from potential contamination have also been scoped out as they will be addressed as part of the design.

Assessment of Value

9.6.11. The criteria outlined in Table 9-6 have been used to define the value or sensitivity of receptors potentially affected by the Proposed Scheme. Defining the importance or sensitivity of a receptor takes into consideration the following:

- Surrounding land uses, based on mapping and site visits and existing planning designations
- Proposed end-use, based on the nature of the Proposed Scheme
- Soil resource losses as associated with the Proposed Scheme
- Construction operations that are necessary by the Proposed Scheme
- Geology, hydrogeology, and hydrology of the study area and the surrounding area

Table 9-6: Descriptive Scale for Sensitivity and Value of Geology and Soil Receptors

Sensitivity/ Value of Receptor	Receptors Susceptible to Land Contamination and Ground Hazard Impacts	Soil and Geological Resources
Very High	• Future site users (residential development). • Residential areas or schools within 50m of construction works. • Water features deemed to be of high value • Ecological features deemed to be of high value. • Allotments, arable farmland, livestock or market gardens on or adjacent to the site.	• Internationally and nationally designated sites. • Regionally important sites with limited potential for substitution. • High quality agricultural soils (Grade 1 and 2) or soils of high nature conservation or landscape importance. • Presence of significant mineral reserves and within a Mineral Consultation Area. • Soil or materials disposal required following earthworks resulting in a significant increase in demand on waste management infrastructure.
High	• Future site users (commercial	• Regionally important sites with potential for substitution.

	development). • Residential areas or schools within 50 to 250m of construction works. • Commercial areas within 50m of construction works. • Water features deemed to be of medium value. • Ecological features deemed to be of medium value. • The built environment including buildings and infrastructure.	• Locally designated sites with limited potential for substitution. • Good quality agricultural soils (Grade 3a) or soils of medium conservation or landscape importance. • Site within a Mineral Consultation Area. • Soils or materials disposal required following earthworks resulting in a moderate increase in demand on waste management infrastructure.
Medium	• Future site users (car park, highways and railway related development). • Residential areas over 250m from construction works. • Commercial areas within 50 to 250m of construction works. • Water features deemed to be of low value. • Ecological features deemed to be of low value.	• Undesignated sites of some local earth heritage interest. • Moderate or poor quality agricultural soils (Grade 3b or 4) or soils of low nature conservation or landscape importance. • Limited potential for mineral reserves and site not within a Mineral Consultation Area. • Soil or materials disposal required following earthworks resulting in a minor increase in demand on waste management infrastructure.
Low	• Areas where there are no built structures, crops, or livestock. • Commercial areas over 250m from construction works. • Ecological features deemed to be of limited value.	• Other sites with little local earth heritage interest. • Very poor quality agricultural soils (Grade 5) or soils of negligible nature conservation or landscape importance. • Limited potential for mineral reserves to exist.
Negligible	• Areas where there are no built structures, crops, or livestock. • Commercial areas over 250m from construction works. • Ecological features deemed to be of negligible value.	• Other sites with negligible local earth heritage interest. • Very poor-quality agricultural soils (Grade 5) or soils of negligible nature conservation or landscape importance. • Negligible potential for mineral reserves to exist.

Assessment of Impacts

9.6.12. The magnitude of potential impacts on identified receptors, as associated with the Proposed Scheme options, has been determined using the four-point scale as detailed in Table 9-7 taking into account the potential pathways through which an impact source or hazard may affect identified receptors. Table 9-7 sets out the criteria used to assess the magnitude of an impact.

Table 9-7: Criteria for Assessing the Magnitude of Impact upon Receptors

Magnitude of Impact	Criteria	Receptors Susceptible to Land Contamination and Ground Hazard Impacts	Soil and Geological Resources	Agricultural Soil Resources
Major	Results in loss of attribute and/ or quality and integrity of the attribute.	• Human Health: Acute risk (short term exposure resulting in e.g. death, developmental toxicity or motor function impact) to human health. • Surface waters and/or groundwater: Substantial acute pollution or long term degradation of sensitive water resources (Principal Aquifer, groundwater source protection zone, surface waters of good or very good quality). • Ecology: Significant change to the number of one or more species or ecosystems. • Landscaping/Agriculture:	• Loss of feature or attribute. • Earthworks resulting in high volume (over 50%) of surplus soil for off-site disposal. • Classification of surplus soil as Hazardous Waste where the intention is to discard.	• Loss of over 50 ha of 'Best Most Versatile agricultural land' Grades 1, 2 and 3a. • Damage to/or loss of all topsoil resource. • Soil sealing over 75%.

Magnitude of Impact	Criteria	Receptors Susceptible to Land Contamination and Ground Hazard Impacts	Soil and Geological Resources	Agricultural Soil Resources
		Loss in value of livestock or crops as a result of death, disease, or physical damage.		
Moderate	Results in effect on integrity of attribute, or loss of part of attribute.	• Human Health: Chronic risk to human health. • Surface water and/or groundwater: Pollution of non-sensitive water resources or small scale pollution of sensitive water resources (Principal or Secondary Aquifers of water courses of fair quality or below). • Ecology: Change to population densities of non-sensitive species. • Landscaping/Agriculture: Non-permanent health effects to vegetation/crops from disease or physical	• Impact on integrity of or partial loss of feature or attribute. • Earthworks resulting in moderate volume (25% to 50%) of surplus soil for off-site disposal.	• Loss of between 20 and 50 ha of 'Best Most Versatile agricultural land' Grades 1, 2 and 3a. • Damage to/or loss of half of topsoil resource. • Soil sealing over 50%.

Magnitude of Impact	Criteria	Receptors Susceptible to Land Contamination and Ground Hazard Impacts	Soil and Geological Resources	Agricultural Soil Resources
		damage, which results in a reduction in value.		
Minor	Results in some measure-able change in attributes quality or vulnerability	• Human Health: Slight reversible short- term effects to human health. • Surface waters and/or groundwater: Slight pollution of non-sensitive water resources. • Ecology: Some change to population densities of non-sensitive species with no negative effects on the function of the ecosystem. • Landscaping/Agriculture: Slight or short term health effects which result in slight reduction in value.	• Minor impact on feature or attribute. • Earthworks resulting in low volume (5% to 25%) of surplus soil for off-site disposal.	• Loss of less than 20 ha of 'Best Most Versatile agricultural land' Grades 1, 2 and 3a or the loss of any quantity of land not considered 'Best Most Versatile agricultural land' Grades 3b, 4 or 5. • Re-use of all topsoil resource within the development. • Soil sealing less than 50%.
Negligible	Results in effect on attribute, but of insufficient magnitude to affect the use or integrity.	• Human Health: Negligible measurable effects on humans. • Surface waters and/or groundwater: Insubstantial pollution to non-sensitive	• Impact of insufficient magnitude to affect use or integrity of feature or attribute. • Negligible off-site disposal of surplus soil required.	• Negligible loss of agricultural land. • Minor disturbance to soils. Soil sealing unlikely to occur.

Magnitude of Impact	Criteria	Receptors Susceptible to Land Contamination and Ground Hazard Impacts	Soil and Geological Resources	Agricultural Soil Resources
		water resource. • Ecology: Negligible significant changes to population densities in the environment or in any ecosystem. • Landscaping/Agriculture: Negligible significant reduction in landscape value.		
No Change	Results in no notable effect on attribute, with no notable magnitude to affect the use or integrity.	• Human Health: No measurable effects on humans. • Surface waters and/or groundwater: Insubstantial pollution to non-sensitive water resource. • Ecology: No significant changes to population densities in the environment or in any ecosystem. • Landscaping/Agriculture: Negligible significant reduction in landscape value.	• Impact of insufficient magnitude to affect use or integrity of feature or attribute. • No off-site disposal of surplus soil required.	• No loss of agricultural land. • No disturbance to soils. Soil sealing very unlikely to occur.

Assessment of Significance

9.6.13. When assessing the potential significance of effects, impact avoidance measures included in the Scheme option designs as well as standard management activities have been taken into account (see Section 9.7). If potentially significant effects are still predicted, further mitigation and management actions may need to be defined as necessary. The overall significance of effect is calculated by use of the matrix indicated in Table 9-8.

Table 9-8: Criteria for Assessing the Significance of Geology and Soils Effects

Magnitude of Impact	Value / Sensitivity of Receptor				
	Very High	**High**	**Medium**	**Low**	**Negligible**
Major	Very Large	Large/ Very Large	Moderate/ Large	Slight/ Moderate	Slight
Moderate	Large/ Very Large	Moderate/ Large	Moderate	Slight	Neutral/ Slight
Minor	Moderate/ Large	Slight/ Moderate	Slight	Neutral/ Slight	Neutral/ Slight
Negligible	Slight	Slight	Neutral/ Slight	Neutral/ Slight	Neutral
No change	Neutral	Neutral	Neutral	Neutral	Neutral

9.6.14. Effects predicted to be slight and neutral are considered to be manageable and are therefore *not significant*, whereas effects assessed as moderate, large, or very large are considered to be *significant*. Professional judgement will be allowed where two terms are presented in Table 9-8 to determine the anticipated level of significance.

9.6.15. Effects may be both adverse and beneficial and will be noted as such during the assessment.

9.7. Assessment Assumptions and Limitations

9.7.1. Data has been obtained from a number of statutory and non-statutory bodies, previous reports (by third parties) and external sources. The authors of this report are not required to identify deficiencies or errors in the information provided by the user or owner or from any other source, but have sought to compensate for these, where obvious in the light of other information.

9.7.2. Historical borehole records, the GroundSure Geo-Insight Report, publicly available information from the BGS, and the 2017 geotechnical ground investigation were utilised to inform the ground conditions. No further site investigation data or gas or groundwater monitoring data has been made available at the time of this assessment, and no further ground investigation works are known to have been undertaken at this stage.

9.7.3. There has been limited chemical analysis undertaken with regards to human health and environmental impact as part of the 2017 ground investigation. Those results available are primarily tailored towards providing geotechnical information, focused on locations required for design and with a limited analytical suite. With limited data and no analysis targeted on those locations of potential contamination identified in the baseline, it cannot be confirmed if these potential sources of contamination exist. Data pertaining to the underground mining and opencast mining carried out within the vicinity of the Proposed Scheme was accessed through the Coal Authority website. However,

no Coal Authority Reports or mine abandonment plans were accessed. The ground investigation comprised a number of deep rotary boreholes to a maximum depth of 27mbgl however no deeper boreholes were carried out with regards the anticipated coal measures at about 100m.

9.8. Design, Mitigation and Enhancement Measures

9.8.1. The following sections contain details of environmental design and management measures to be implemented in order to manage potential impacts associated with soils and geology during the construction and operation phases of the Proposed Scheme.

Construction Phase Mitigation Measures

9.8.2. An Environmental Management Plan (EMP) has been prepared in parallel with this report and will be updated during detailed design phase and implemented by the selected construction contractor. This EMP includes a range of measures associated with mitigating potential impacts as associated with land contamination as detailed below. Such measures accord with legal compliance and best practice guidance when working with or around contaminated materials.

9.8.3. Prior to construction, a strategy would be prepared, which would set out how the earthworks and excavation stage of the Proposed Scheme will be undertaken. Where necessary, the strategy will consider what materials (if any) need to be imported, can be reused, and what materials are surplus and require either disposal or onward management to ensure appropriate re-use. The earthworks strategy should detail an inspection and discovery strategy for contamination especially in light of the Made Ground encountered as outlined in the Baseline Conditions. This should include provision for a watching brief by a suitably qualified and competent environmental scientist. The strategy would also define whether any treatment may be required, prior to reuse or disposal as well as establishing risk-based compliance criteria for soils to be screened against. The strategy would cover the clearing of the site and the works required to prepare it for development. A remediation strategy will be prepared if significant contamination is encountered during any future ground investigation.

9.8.4. An appropriate Materials Management Plan (MMP) under the CL:AIRE Development Industry Definition of Waste Code of Practice will be prepared alongside any earthworks and excavation strategy. The Materials Management Plan details the procedures and measures that would be taken to classify, track, store, dispose of and possibly re-use all demolition and excavated materials that would be encountered during the development works along with the classification, tracking, storage, and use of imported materials.

9.8.5. Imported and site won materials for use within the Proposed Scheme will require to be validated as inert and meet the required standards for the end development. Requirements for the testing of all imported materials will be detailed in the relevant documentation which would be prepared during detailed design (for example, within the Materials Management Plan for the site) and in accordance with any other relevant specifications for highway works.

9.8.6. The disposal of soil waste, contaminated or otherwise to landfill sites would be best mitigated by minimisation of the overall quantities of waste generated during construction and by ensuring that excavated material consigned to landfill cannot, as an alternative, be put to use either on site or on other sites.

9.8.7. The assessment methodology set out in BRE Special Digest 1 (2005) will be adopted to determine the appropriate Design Sulphate (DS) concrete classification to prevent chemical attack on concrete.

Asbestos

9.8.8. If any asbestos contaminated material is encountered during the earthworks, then the requirements of the earthworks and reclamation strategy and health and safety plan will be complied with and the appropriate steps taken. Typically, such requirements will include segregation and quarantine of the excavated materials until assessment of testing results provide evidence that the material can be re-used within the works or whether the material requires disposal off-site to a permitted landfill site. Material movement records will be checked to determine whether material from the same location has been used within the works before asbestos was identified in the excavated materials and an assessment would be undertaken to determine whether such material would need to be removed and replaced. Any material retained within the Proposed Scheme will be noted on the project file. For further details regarding the management of asbestos please refer to the Asbestos Management Plan (HE551486-ACM-GHS-A46_SW_000_Z-RP-ZS-0001).

Leaks and Spillages of Contaminants

9.8.9. In relation to leaks and spillages of contaminants, the following mitigation measures will be put in place and embedded within the EMP:

- The risk of the uncontrolled release of pollutants will be managed through mitigation such as speed limits, road markings, and procedures during delivery or movement of materials
- An emergency spillage action plan will be produced and included within the EMP during detailed design. On-site provisions will be made to contain a serious spill or leak through the use of techniques such as booms, bunding and absorbent material
- Wherever possible, damage to any drainage infrastructure network which is to be retained will be repaired
- Should the use of the existing drainage systems be required the appropriate custodians or authorities will be contacted. Of particular attention will be the existing drainage for the A46 at the north end of the Proposed Scheme which, from the information available, is potentially connected to a culverted stream leading to an existing water course passing around Coombe Pool in Coombe Country Park
- Plant and machinery will be kept away from the drainage system and will have drip trays beneath oil tanks, engines, gearboxes, and hydraulics, which will be checked and emptied regularly by the contractor
- Where possible, concrete will be pre-mixed and delivered from an off-site source, thereby negating the need to mix concrete on-site and reducing the creation of alkaline wastewater. Any mixing and handling of wet concrete on-site will be undertaken in designated impermeable areas and away from drainage channels and surface water
- Appropriate watertight enclosures will be utilised should it be required to work within any watercourse to reduce the risk of release of cement products and sand during construction
- A designated impermeable area will be used for washing down or equipment cleaning associated with concrete or the cementing processes. Wastewater will be discharged to the foul drainage system if there is a suitable connection point (with approval from Northumbrian Water) or contained and removed by tanker to a suitable discharge location via a licenced waste operator

- Drainage and service runs will be surrounded by appropriate granular bedding materials
- The drainage network installed as part of the Proposed Development will be constructed to meet appropriate regulations (such as The Building Regulations 2010, Part H (Schedule 1) (RIBA, 2015))

Impact on Off-site Receptors

9.8.10. The potential impacts on off-site receptors will be addressed through the adoption of the following measures, which will be included in the EMP:

- Damping of ground with water to minimise dust;
- Sheeting of lorries transporting spoil off site and the use of dust suppression equipment on plant
- Groundwater level controls (as required)
- Adequate fuel and chemical storage facilities, such as bunded tanks, hard standing, and associated emergency response spillage control procedures
- Well maintained plant and associated emergency response and spillage control procedures
- Temporary onsite storage of contaminated material would be stored on sheeting and covered to minimise the potential for leachate and run off from the stockpile being generated

Impact on Controlled Waters

9.8.11. The mitigation measures would aim to ensure that the surface water run-off from the construction site (site preparation, earthworks and construction activities) do not have a detrimental effect on any receiving watercourses (such as the culverted stream running north-east form the north end of site and the associated lake, several ponds adjacent to site, and un-named drainage ditches and streams in the area).

9.8.12. Mitigation measures would aim to ensure that surface water run-off does not have a detrimental effect on the underlying aquifers. Surface water run-off would be controlled using appropriate drainage measures and infiltration into the ground would be minimised. This would minimise the potential for contaminants to migrate to controlled waters.

9.8.13. Since a piled foundation solution is required for the proposed flyover structure, a piling risk assessment will be undertaken in accordance with Environment Agency guidance. Construction involving piling and/or penetrative ground improvement will require a location-specific risk assessment to establish the means of mitigating the risks of causing new pollutant linkages or worsening existing ones with respect to risks to controlled waters at the construction stage.

9.8.14. In the event that ground contamination is discovered during the works, work will stop immediately and the requirements of the earthworks, reclamation strategy, and the health and safety plan will be complied with and the appropriate steps taken. Suitable measures will be taken to prevent disturbance and mobilisation of contaminants, until the observed contamination is reviewed and where appropriate has been treated on-site or removed for off-site disposal or treatment.

9.8.15. Uncontaminated water arising from excavations will be treated as required for suspended solids using a commercially available water treatment system (such as a

silt buster-type system) and discharged appropriately (subject to suitable Environment Agency licenses and permits being obtained).

Impacts on Agricultural Soils and Soil Resources

9.8.16. The most relevant areas of agricultural soils within the site area are the two temporary onsite storage areas to the east of the main alignment. The majority of the site outside of these areas is predominantly occupied by the A46 alignment and adjacent embankments and landscaping.

9.8.17. The potential impacts specific to contamination impacting on vegetation and the Grade 2 and Grade 3 agricultural land will be mitigated through the following measures:

- Works will be in compliance with *BS 3882:2015 British Standard Specification for Topsoil and Requirements for Use* (2007) (Ref. 9-23) and the *Construction Code of Practice for the sustainable use of soils on construction sites* (Ref. 9-24).
- A Soil Resource Plan will be prepared following receipt of a licence and during detailed design, as described by Defra (2009). The Soil Resource Plan will detail the areas and type of topsoil and subsoil to be stripped, stripping method, haul routes and the management of the soil stockpiles.
- The movement of traffic will be confined to designated routes to reduce the amount of heavy machinery going over soil materials which could cause compaction of soil materials. Such routes would exclude areas of proposed landscaping
- Where topsoil shall be impacted during the construction, topsoil will be handled only in the appropriate conditions of weather and soil moisture, and with suitable machinery
- The stockpiling of soils will be avoided whenever possible. Where stockpiling was unavoidable, heaps will be tipped loosely and the surface firmed and shaped to shed water
- The source of topsoil imported or for re-use onsite will be investigated carefully with respect to its suitability for the intended use
- Where possible, excavated topsoil will be beneficially re-used on site as applicable. Re-use of topsoil should be prioritised over the import of topsoil or use from undeveloped areas onsite (for example, preference for the re-use of existing topsoil onsite from within the A46 landscaping areas should be given priority over import or from existing agricultural land within the Proposed Scheme).

Operational Phase Mitigation Measures

Impact on Maintenance Workers

9.8.18. For maintenance workers during the Proposed Scheme operation phase, any maintenance works will be carried out in accordance with *CIRIA C692 3rd Edition Environmental Good Practice on Site (2010)* (Ref. 9-25). Maintenance workers would be provided with appropriate Personal Protective Equipment (PPE) such as gloves and overalls to minimise direct contact with soils. Any required entry into excavations or confined spaces would comply with confined space legislation and assessed prior to entry. Should there be any changes to the Proposed Scheme to incorporate any confined spaces such as ducts, manholes and inspection chambers, a gas monitoring programme and gas risk assessment should be undertaken to determine the site Characteristic Situation in accordance with CIRIA Report C665.

9.8.19. Where chemicals and oils are to be used appropriate environmental controls for handling those chemicals and oils (including COSHH (Control of Substances Hazardous to Health) assessments will be implemented and operatives or users will be trained in the application and use of dosing chemicals.

9.8.20. All chemicals used onsite will be stored in a suitably secure dry and contained area and adhere to best practice for storage, handling and use. This may be a purpose built store onsite or appropriate storage within vehicles for mobile works.

9.8.21. Oil and chemical spills will immediately be cleared up and documented. The Environment Agency will be notified of any large spillages of fuel or chemicals.

Impact to Off-site Receptors and Future Site Users

9.8.22. No specific mitigation measures are considered to be needed for future site users and off-site receptors with regard to geology and soils.

Impact on Controlled Waters

9.8.23. The Proposed Scheme will not include any activities that are likely to generate contaminants that could pose significant risk to controlled waters during operation and maintenance. However, there would be potential for environmental risks as associated with spillages due to road accidents or faulty vehicles. To mitigate the impacts on controlled waters during the Proposed Scheme operation stage, the highway drainage system (refer to Chapter 13: Road Drainage and Water Environment) incorporates appropriate measures to minimise impacts associated with accidents and spillages.

Impact on Agricultural Soils and Soil Resources

9.8.24. The most relevant areas of agricultural soils within the site are the two temporary onsite storage areas to the east of the main alignment; these are proposed to be returned to the former land owners post construction. The operational site area will predominantly be occupied by the A46 alignment and adjacent embankments and landscaping.

9.8.25. The potential for contaminants to impact upon landscaping vegetation along the route should be mitigated through design, and the implementation of a clean suitable growing medium for the flora in accordance with the *'British Standard Specification for Topsoil and Requirements for Use' (*BS 3882:2015*,* 2015*).*

9.8.26. Any chemicals used, such as fertilizers or herbicides will be used in accordance with appropriate environmental controls manufacturer's instructions for handling those chemicals and oils (including COSHH (Control of Substances Hazardous to Health) assessments will be implemented and operatives or users will be trained in the application and use of dosing chemicals.

9.9. Assessment of Effects

9.9.1. Based on a review of the previous and current land use in the area, there would appear to be some locations on and in the vicinity of the Proposed Scheme which have the potential for contamination to be present. The principal receptors which could be affected by either contamination on-site or off-site which is created or affected by construction or operation of the Proposed Scheme comprise:

- Human health: Future site users; residents and workers; and hotel and shopping centre patrons close to the development may be exposed to potential contaminants
- Controlled waters: The Mercia Mudstone Formation is designated a Secondary B aquifer by the Environment Agency. The superficial deposits are predominantly classified as a Secondary A aquifer with the eastern side of the A428 having two

areas, one a "*secondary 'undifferentiated' aquifer*" and the other noted as "*unproductive strata*".

- Sensitive land Uses: The alignment does not pass through any identified sensitive land uses; however, two areas of ancient woodland are located approximately 20m south and south-east of the site and the wider area is considered green belt land. The site is also located within a nitrate vulnerable zone.
- The majority of the land at and within the vicinity of the scheme is classified as Grade 2 (very good quality) and Grade 3 (good to moderate quality) agricultural land. Consideration for a loss of soils should be considered however it is not anticipated that there shall be a significant loss of soils due to the majority of the site currently comprising the existing A46. The main areas for consideration of soils shall be the two temporary storage areas located within agricultural fields adjacent to the alignment.

9.9.2. The importance and sensitivity of potential receptors or soil and geological resources to ground conditions impacts has been described qualitatively according to the categories in Table 9-6. Receptors and their sensitive are identified in Table 9-9.

Table 9-9: Summary of Critical Receptors and their Sensitivity

Receptor	Phase		Sensitivity
	Construction	Operation	
Human Health – Off-site Receptors	✓	✓	Very High
Human Health – Future Site Users	×	✓	Medium
Controlled Waters – Groundwater	✓	✓	High
Controlled Waters – Surface Waters	✓	✓	Very High
Surrounding Land Uses (Commercial / Industrial)	✓	✓	High
Surrounding Land Uses (Residential)	✓	✓	Very High
Surrounding Land Use (Agricultural Land)	✓	✓	Very High to High
Soil Quality	✓	✓	Very High

Magnitude of Impacts

Construction Phase

9.9.3. The sections below consider the potential impacts upon identified receptors taking into account the impact avoidance and mitigation measures as detailed in section 9.8.

Impacts to Off-site Receptors

9.9.4. Residents and visitors of surrounding properties would be at risk from wind-blown dust and subsequent inhalation or direct contact with dusts or vapours generated by construction activities. The residents and visitors of properties within 50m are

considered to be of a very high sensitivity, while the residents and visitors of properties between 50m and 250m are considered to be of a high sensitivity (see Table 9-6) Although there is little residential development within 50m of the site, with the exception of those on the A428 east of the junction and those to the northwest of the site, the junction area where the most significant construction works are to take place is located adjacent to hotels, restaurants, and retail units.

9.9.5. As such the sensitivity of off-site receptors during the construction phase is considered overall to be very high. Taking into account the mitigation measures as detailed in Section 9.8 the magnitude of the impact of the works is considered be negligible. On this basis the significance of the effect is considered to be slight**.**

Impacts on Controlled Waters

9.9.6. Potential contaminants could be mobilised during the construction works which could impact upon controlled water receptors (for example by disturbance or exposure of contaminated materials, direct release of contaminants, or through the creation of preferential pathways).

9.9.7. During the construction phase it will be necessary to fuel and maintain a fleet of mobile plant. Potential impacts on soil and groundwater quality could arise from the uncontrolled release of fuel and oils, either by leakages or spillages from storage areas, or by incorrect disposal of waste or surplus material.

9.9.8. The sensitivity of controlled water receptors during the construction phase is considered high for ground water and very high for surface waters. Taking into account the mitigation measures as detailed in Section 9.8 the magnitude of impact upon controlled waters is considered to be negligible for the Scheme. On this basis the significance of the effect is considered to be slight for both ground water and surface waters.

Impacts on Agricultural Soils and Soil Resources

9.9.9. The majority of the Proposed Scheme and site area is currently occupied by the existing A46 and its associated landscaping and adjoining infrastructure. The main areas where potential loss of agricultural soils may occur are within the two temporary storage areas within the redline boundary. The soils in these areas are Grades 2 and Grade 3 agricultural soils.

9.9.10. These areas comprise approximately 8 ha of agricultural land. Soils of Grade 2 are considered to be of very high sensitivity. Soils of Grade 3 are considered to be of high sensitivity.

9.9.11. In accordance with Table 9-7, the loss of less than 20 ha of Best Most Versatile agricultural land (which is Grades 1, 2 and 3a, or the loss of any quantity of land not considered Best Most Versatile agricultural land Grades 3b, 4 or 5) constitutes a minor impact magnitude.

9.9.12. Based upon the high to very high sensitivity and taking into account the mitigation measures as detailed in Section 9.8, the potential magnitude of impact on the agricultural soils is considered to be negligible as the magnitude is based upon a long term loss of agricultural land which is not anticipated as part of this scheme.

9.9.13. During the construction phase the movement of vehicles across the site may result in the deterioration of soil physical quality through compaction. Soil materials would also deteriorate through compaction and loss of structure if soil were to be handled in a wet condition. Compaction of the soil materials would reduce the permeability of the surface soils thereby increasing the likelihood of surface run-off and flooding. Groundwater has been recorded at relatively shallow depths within the boundary of the

site which may contribute to impacted soil permeability leading to surface run-off and flooding. The underlying superficial geology is typically granular however the locations of the temporary storage area may partially be underlain by clays of negligible permeability.

9.9.14. The Proposed Scheme shall expand the existing route alignment however the majority of the expansion works will be within the existing alignment and landscaped areas. The storage areas are to be temporary and are to be returned to agricultural land and to their former land owners post construction. Any soil under infrastructure permanent or temporary will be removed. If temporary for haul routes or compound areas it should be reinstated. As such there is unlikely to be a significant long term removal of soil resources from future use however consideration should be given to the potential impact upon the quality of the land post construction works.

9.9.15. On this basis the significance of the effect is considered to be slight. This is based on the assumption that the reinstatement and conditions of the soils post temporary works will be completed to a high standard and avoids potentially significant effects on soils and groundwater.

Operational Phase

Impacts to Future Site Users and Off-site Receptors

9.9.16. Off-site receptors include residents, visitors and patrons of nearby properties within the vicinity, whilst future site users include road users (of very high and medium sensitivity, respectively).

9.9.17. While there is potential for environmental risks associated with spillages including due to road accidents or faulty vehicles it is not anticipated that the scheme operation would present a risk to human health in terms of exposure to contaminated soils.

9.9.18. As such while the sensitivity is considered to be very high offsite and medium onsite, the design for the scheme should follow the design, mitigation and enhancement measures detailed in Section 9.8 and appropriate measures will be taken to limit the magnitude of impacts on future site users and off-site receptors.

9.9.19. On this basis the magnitude of impact on off-site receptors and future site users is considered to be negligible for the Proposed Scheme. This indicates a neutral to slight significance of effect

9.9.20. There is the potential for ground gasses migrating to enclosed spaces onsite from landfill including putrescible, potentially gas generating waste (Household waste Borrow Pit Landfill) which might pose a risk to future development. It is noted that the majority of the site shall be open to air within enclosed spaces generally limited to service ducting. However as no current gas monitoring data has been made available for the site, the nature of potential ground gasses is unknown and assumed to not be significant.

Impacts on Controlled Waters

9.9.21. The sensitivity of controlled water receptors during the construction phase is considered high for ground water and very high for surface waters.

9.9.22. There is potential during operation for environmental risks associated with spillages including those due to road accidents or faulty vehicles. However as indicated in the design and mitigation measures outlined in Section 9.8, the scheme design will include a suitable drainage system design which would prevent accidental spillages from entering the ground or discharging directly into surface waters.

9.9.23. In addition the use of chemicals (fertilisers and pesticides) within landscaped areas and onsite vegetation may pose a risk to controlled waters; however, with the mitigation measures outlined in Section 9.8 adhered to, including the following of manufacturer's instructions and correct storage, the magnitude of the impact is considered negligible

9.9.24. On this basis the significance of the effect is considered to be slight**.** As such the Proposed Scheme operation is not considered to pose a significant risk to surface waters and/or ground water.

Impacts on Agricultural Soils and Soil Resources

9.9.25. The soils within the site area are considered to be of a very high to high sensitivity based upon their soils grading. However, the majority of the site during the operational phase shall be occupied by the road and junctions. The temporary storage areas are intended to be returned to their previous owners and operators. The remaining soils onsite shall relate to landscaped areas and other vegetated areas adjacent to the roadway.

9.9.26. As identified in the mitigation measures outlined in Section 9.8, soils within the Proposed Scheme footprint would need to be appropriately managed, whilst any chemical used (such as fertilisers and herbicides) will be applied in accordance with the manufacturers' instructions and stored correctly.

9.9.27. Taking into account the mitigation measures as detailed in Section 9.8, the magnitude of impact upon soil resources is considered to be negligible for the scheme during the operational phase.

9.9.28. On this basis the significance of the effect is considered to be slight and the scheme operation is not anticipated to significantly impact upon soil resources during operation.

Significance of Effects

9.9.29. A summary of the soils and geology assessment for the scheme options is presented in Table 9-10 for the construction and operational phases.

9.9.30. Table 9-10 indicates that given appropriate design of the scheme, and adherence to appropriate construction and operational practices that accord with legal compliance and best practice guidance when working with or around contaminated materials, effects associated with soils and geology are generally predicted to be of no more than slight significance.

9.9.31. The magnitude for the impact on agricultural soils and soil resources is based upon the temporary store areas, which utilise approximately 8Ha of Grade 2 and 3 agricultural land, being returned to agricultural use at the end of the construction phase. On this basis the magnitude has been classified as negligible indicating little overall change. The significance of the effect from the construction phase is, on this basis, considered a slight effect. Should the land be utilised differently post construction this significance may be required to be revised.

9.9.32. However, as these areas are temporary and it is proposed within the current scope to return the land to agricultural use, the significance of the effect post construction is considered to have a negligible magnitude and as such only a slight effect.

9.9.33. It should be noted that although ground gas is considered within this assessment, no data is available as to the nature of the ground gas profile onsite. It is known that there has been landfill onsite potentially comprising household waste which may include putrescible elements. These would present a potential source of ground gas. However, as the development is not anticipated to incorporate significant enclosed spaces

outside of service ducts it is unlikely that ground gas shall pose a significant issue (however this cannot be established for sure at this stage).

9.9.34. In summary there are no effects above a classification of slight and therefore no significant effects. As such it is anticipated that there are no significant residual effects relating to the development noted after embedded mitigation is taken into account.

Table 9-10 Summary of Residual Effects to Soils and Geology

Source	Description of Resource/ Receptor and Impact	Sensitivity / Importance of Resource/ Receptor	Magnitude of Impact	Significance of Effect
Construction				
Made Ground and soil derived leachate	Effect on Off-site Receptors: exposure to contaminants, dust and vapours.	Very High	Negligible	Slight
	Effect on Controlled Waters (surface waters): reduction in groundwater/ surface water quality due to uncontrolled release of pollutants.	Very High	Negligible	Slight
	Effect on Controlled Waters (groundwater): Migration of contaminated water through preferential pathways (such as piling) to groundwater in underlying aquifers.	High	Negligible	Slight
	Effect on Agricultural Soils Quality: spread of potentially contaminated material/contamination arising via construction of the Scheme.	Very High	Negligible	Slight
Groundwater	Effect on Off-site Receptors: exposure to contaminants in surface water or groundwater.	Very High	Negligible	Slight
	Effects on controlled waters (surface	Very High	Negligible	Slight

Source	Description of Resource/ Receptor and Impact	Sensitivity / Importance of Resource/ Receptor	Magnitude of Impact	Significance of Effect
	water); Migration to surface watercourses.			
	Effects on controlled waters (groundwater); lateral migration of contaminants through Aquifer.	High	Negligible	Slight
Agricultural Use	Temporary loss of soil resources.	Very High / High	Negligible	Slight
Offsite Sources: Made Ground (e.g. associated with commercial and industrial land use, infilled areas (landfills, former colliery workings, ponds), and existing road construction).	Effects on Controlled Waters (surface waters). Lateral migration of contaminated groundwater with discharge to surface water. Discharge of contaminants entrained in surface water runoff followed by overland flow and discharge.	Very High	Negligible	Slight
	Effects on Controlled Waters (groundwater); Leaching of contaminants to underlying aquifers.	High	Negligible	Slight
Operation				
Made Ground, soil derived leachate and ground gas	Effect on Off-site Receptors: exposure to contaminants, dust and vapours.	Very High	Negligible	Slight
	Effects on Future Site Users. Workers and future users of the Scheme.	Medium	Negligible	Neutral
	Effect on Controlled Waters (Ground	High	Negligible	Slight

Source	Description of Resource/ Receptor and Impact	Sensitivity / Importance of Resource/ Receptor	Magnitude of Impact	Significance of Effect
	water): reduction in groundwater/ surface water quality due to uncontrolled release of pollutants.			
	Effect on Controlled Waters (Surface Water): reduction in groundwater/ surface water quality due to uncontrolled release of pollutants.	Very High	Negligible	Slight
	Effect on Agricultural Soils Quality: spread of potentially contaminated material/contamination arising via construction of the road.	Very High	Negligible	Slight
Groundwater	Effect on Off-site Receptors: exposure to contaminants in surface water or groundwater.	Very High	Negligible	Slight
	Effects on Future Site Users. Workers and future users of the Scheme.	Medium	Negligible	Neutral
	Effects on controlled waters (surface water); Migration to surface watercourses.	Very High	Negligible	Slight
	Effects on controlled waters (groundwater); lateral migration of contaminants through Aquifer.	High	Negligible	Slight
Agricultural Use	No further loss of Agricultural Land anticipated during the operational phase	Very High / High	Negligible	Slight

Source	Description of Resource/ Receptor and Impact	Sensitivity / Importance of Resource/ Receptor	Magnitude of Impact	Significance of Effect
Offsite Sources: Made Ground (for example, associated with commercial and industrial land use, infilled areas (landfills, former colliery workings, ponds), and existing road construction).	Effect on Maintenance Workers: exposure to contaminated soils.	Medium	Negligible	Neutral
	Effects on Future Site Users. Workers and future users of the Scheme.	Medium	Negligible	Neutral
	Effect on Agricultural Soils: loss of soil resources.	Very High / High	Negligible	Slight
	Effects on Controlled Waters (surface waters). Lateral migration of contaminated groundwater with discharge to surface water. Discharge of contaminants entrained in surface water runoff followed by overland flow and discharge.	Medium	Negligible	Neutral
	Effects on Controlled Waters (surface water); Leaching of contaminants to underlying aquifers.	Very High	Negligible	Slight
	Effects on Controlled Waters (ground water); Leaching of contaminants to underlying aquifers.	High	Negligible	Slight

Monitoring

9.9.35. Only limited environmental data and no gas monitoring data is available for the site However, based upon the information available, the history of the site, and the nature of the proposed development, the desk based assessment has not identified any sources which may pose a significant issue.

9.9.36. However, in part as the available data is limited, as noted in the mitigation measures in section 9.8, it is possible that other Made Ground or contamination exists within the

site footprint that has not been identified as part of the mapping or site investigations. As such a watching brief during all intrusive works should be undertaken by a suitably qualified and experienced person (SQEP) to identify any visual and olfactory evidence for contamination.

10. MATERIALS, ASSETS AND WASTE

10.1. Introduction

10.1.1. This chapter presents the results of an assessment of the likely significant effects of the scheme in relation to material assets and waste. It should be read with reference to the description of the proposed scheme in Chapter 2: The Project.

10.1.2. The assessment has been prepared in accordance with the *Design Manual for Roads and Bridges (DMRB) Volume 11, Section 2, Part 5* (Ref. 10-1) and *Highways England Interim Advice Note (IAN) 153/11 Guidance on the Environmental Assessment of Material Resources* (Ref. 10-2).

10.1.3. For the purpose of this chapter, material assets and wastes are defined as comprising:

- the use of material resources; and,
- the generation and management of waste.

10.1.4. Material resources are defined by IAN 153/11 as “the materials and construction products required for the construction, improvement and maintenance of the trunk road network. Material resources include primary raw materials such as aggregates and minerals, and manufactured construction products”.

10.1.5. Waste is defined as per the Waste Framework Directive (Waste FD) (2008/98/EC) (Ref. 10-3) as “any substance or object which the holder discards or intends or is required to discard."

10.1.6. This chapter of the EAR has been undertaken by competent experts with relevant and appropriate experience:

- Senior Resources and Waste Management Specialist, MSc BSc (Hons) MCIWM (Member Chartered Institution of Wastes Management) CRWM (Chartered Resource and Waste Manager) CEnv (Chartered Environmentalist)
- Technical Practice Lead – Waste, Materials and Resources (Technical Director), BSc, Chartered Chemist (CChem) Member of the Royal Society of Chemistry

10.2. Legislative and Policy Framework

10.2.1. A wide range of legislation, policy and guidance that regulate the control and management of material resources and waste have been considered. The key legislation relevant to the proposed scheme include the following:

- *The Waste (England and Wales) Regulations 2011 (as amended) (Ref. 10-4)*
- *Environmental Permitting Regulations 2010 (as amended) (Ref. 10-5)*
- *Environmental protection Act 1990 (Ref. 10-6)*
- *Hazardous Waste (England and Wales) Regulations 2005 (as amended) (Ref. 10-7)*
- *Waste Framework Directive 2008/98/EC (Ref. 10-3)*

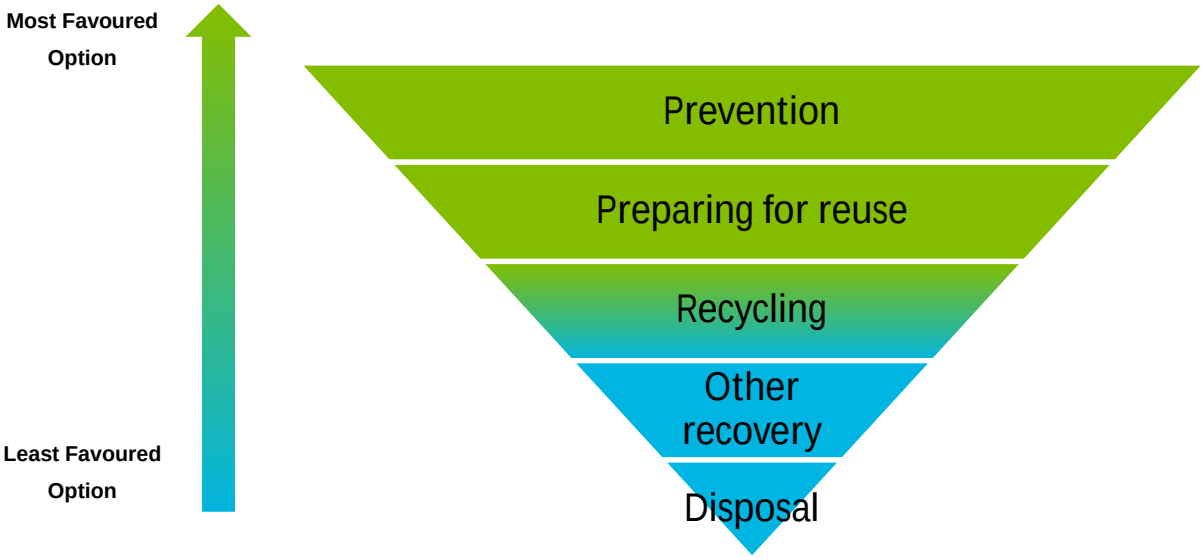
10.2.2. Other policy relevant to the proposed scheme include the following:

- *25 Year Environmental Plan 2018 (Ref. 10-8)*
- *Resources and Waste Strategy 2018 (Ref. 10-9)*

National Policy

10.2.3. *The Waste (England and Wales) Regulations 2011 (as amended)* (Ref. 10-4) transpose the *Waste FD* (Ref.10-3) into UK law. It sets out the duty of care in relation to the Waste Hierarchy, as summarised in Plate 10-1.

Plate 10-1: Waste Hierarchy



10.2.4. The *National Planning Policy Framework (NPPF)* was revised in 2019, (Ref. 10-10) it outlines the government's planning policies for England and how they are expected to be applied. The *NPPF* sets out a number of measures local authorities should take to conserve finite mineral resources and how these should be considered within Local Plans and also whilst determining planning applications. The latest revision has strengthened the requirement that the supply of minerals is conserved, indicating that this is essential. This is supported by the *Planning Practice Guidance for Minerals (2014)* (Ref. 10-11).

10.2.5. The NPPF does not however contain specific waste policies; instead, national waste planning policy is contained within the *Waste Management Plan for England (2013)* (Ref. 10-12) and the *National Planning Policy for Waste (2014)* (Ref. 10-13). The assessment methodology has been informed by a number of policies and guidance relating to waste management and resource use, key national policies are described in further detail below.

10.2.6. The *Waste Management Plan for England* (Ref. 10-12) fulfils the *Waste FD* (Ref.10-3) Article 28 mandatory requirements, and other required content as set out in Schedule 1 of the *Waste (England and Wales) Regulations 2011* (Ref.10-4). The *Waste Management Plan for England* (Ref. 10-12) is a high-level document, which outlines where England is now in terms of the waste that is generated and how those materials are going to be managed. The plan provides an analysis of current waste management practices in England and evaluates implementation of the objectives and provisions of the revised *Waste FD* (Ref.10-3). In terms of demolition and construction waste, the plan details how the UK is committed to meeting its target under the *Waste Framework Directive (Red 10-13)* of recovering at least 70% by weight, of construction and

demolition waste by 2020. Uncontaminated excavated soil and stones (European Waste Catalogue ((EWC) code 17 05 04) are specifically excluded from this target.

10.2.7. The *National Planning Policy for Waste* (Ref 10-13) provides the planning framework to enable local authorities to put forward, through local waste management plans, strategies that identify sites and areas suitable for new or enhanced facilities to meet the waste management needs of their areas. Information is also included concerning non-waste developments, including any development whose end function is not directly related to waste. Waste developments include: landfills; waste disposal; waste treatment; waste recycling plants; and household waste recycling centres.

10.2.8. The *National Planning Policy for Waste* states that when determining planning applications for non-waste developments, local authorities should ensure that:

> *"the likely impact of proposed, non-waste related developments on existing waste management facilities, and on-sites and areas allocated for waste management, is acceptable and does not prejudice the implementation of the Waste Hierarchy and/or the efficient operation of such facilities; and the handling of waste arising from the construction and operation of development maximises reuse/recovery opportunities, and minimises off-site disposal."*

10.2.9. *The National and Regional Guidelines for Aggregates Provision in England 2005 to 2020* (Ref. 10-14) sets out revised national and regional guidelines for aggregates provision in England for the period 2005 to 2020, including assumptions on the proportion contribution of alternative sources of aggregate (secondary and recycled aggregates) to the overall provision.

Warwickshire County Council Policy

10.2.10. *Warwickshire County Council's Draft Minerals Plan (Ref. 10-12)* sets out the recognition that minerals are critical in supporting the development of sustainable and connected communities, including the provision of roads.

10.2.11. *The Warwickshire Waste Core Strategy (Ref. 10-13)* sets out the spatial strategy, vision, objectives, and policies for managing waste for a 15 year plan period up to 2028. It includes eight objectives for the management of waste.

10.2.12. *Policy CS1 Waste Management Capacity* - recognises the requirement for sufficient waste management capacity in relation to construction and demolition waste. The strategy aims to promote the re-use of construction materials and to limit the amount of construction and demolition waste sent to landfill.

Coventry City Council

10.2.13. *Coventry City Council's Local Plan 2017* (Ref. 10-17) includes several policies and objectives pertaining to waste and material management. This includes *Policy EM2: Building Standards*, which includes a requirement for new development to "*minimise waste and maximise recycling during construction and operation*".

10.2.14. The *Local Plan* also includes *Policy EM8 Waste Management*, which sets out that "*the Council's Waste Management Strategy will be supported through… a) encouraging less consumption of raw materials through the reduction and re-use of waste products*".

10.2.15. The *Draft Local Plan* sets out that:

"Development proposals should demonstrate measures to minimise the generation of waste in the construction… and promote more sustainable approaches to waste management, including the reuse and recycling of construction waste."

10.2.16. It is also recognised that "*the continued supply of aggregates and other material, including recycled and secondary materials is required to meet current and future needs of the development and construction industry*". Therefore, as per *Policy EM8*, "*promoting the use of recycled and secondary materials will help to minimise both primary extraction and waste*".

10.2.17. The Local plan includes *Policy EM9 Safeguarding Mineral Resources* which sets out that *"where developments are proposed in these areas, the application needs to acknowledge the presence of these mineral reserves."*

10.2.18. The Local plan includes *Policy EM10 Non Mineral Development in Mineral Safeguarding Areas* which sets out that "*all non-mineral development proposals in the designated Mineral Safeguarding Areas should assess and evaluate the legacy of past mining heritage and should consider this in accordance with Policy EM2. It should also ensure that development does not entirely sterilise any potential future mineral extraction should this become viable and desirable. This should be considered in partnership with the Coal Authority."*

10.3. Study Area

10.3.1. The study area for waste generation is defined by the scheme boundary, within which waste would be generated. The study area is deemed to include the footprint of the proposed scheme, together with any temporary land requirements during the construction. This may include temporary offices, compounds and storage areas.

10.3.2. The study area for waste management comprises the wider region within which waste management infrastructure, specifically landfill capacity is located i.e. the West Midlands region (the shire counties of Staffordshire, Warwickshire, Worcestershire, the unitary counties of Herefordshire, Shropshire, the metropolitan boroughs of Birmingham, Coventry, Dudley, Sandwell, Solihull, Walsall, Wolverhampton, the city of Stoke-on Trent and the borough of Telford and Wrekin).

10.3.3. The study area for the use of material resources in the construction of the proposed scheme and for consideration of the sterilisation of mineral safeguarding areas and mineral site allocations is defined by the scheme boundary.

10.3.4. The study area for alternative materials (secondary and recycled aggregates) is the West Midlands region and England.

10.4. Baseline Conditions

Waste

10.4.1. There are no existing waste management facilities including landfills located within the Proposed scheme boundary. Historic landfills are outlined in the Geology and Soils Chapter (refer to Chapter 9).

10.4.2. Baseline information consists of the current landfill capacity in Warwickshire, and in the wider West Midlands region as defined in paragraph 10.3.2.

10.4.3. The Environment Agency's Waste Management Information for England 2017 (published in 2018 (Ref. 10-18)) includes the following information (Table 9-11 and

Table 9-12) about remaining landfill capacity in Warwickshire, and in the wider West Midlands region in 2017.

Table 9-11 Warwickshire landfill capacity in 2017

Landfill Type	Capacity (000 m^3)
Hazardous Merchant	-
Hazardous Restricted	340
Non-hazardous with SNRHW* cell	4,530
Non-hazardous	5,761
Non-hazardous Restricted	-
Inert	4,299
Total	**14,929**

Table 9-12 West Midlands landfill capacity in 2017

Landfill Type	Capacity (000 m^3)
Hazardous Merchant	-
Hazardous Restricted	535
Non-hazardous with SNRHW* cell	10,010
Non-hazardous	32,360
Non-hazardous Restricted	108
Inert	14,377
Total	**57,390**

*SNRHW = selected non-reactive hazardous waste

Material resources

10.4.4. The baseline target for recovery of construction and demolition waste is 70% by weight, as set out in the *Waste FD* (Ref. 10-3) and the *Waste Plan for England* (Ref. 10-12). Uncontaminated excavated soil and stones EWC code 17 05 04) are specifically excluded from this target.

10.4.5. The baseline target for alternative aggregates (which comprise both secondary aggregates, which are by-products from industrial and mining operations, and recycled aggregates, which are produced from construction waste) are based on the National and Regional Guidelines for Aggregates Provision in England 2005 to 2020 and are

summarised in Table 9-13 below (Ref. 10-14). The relevant target for the scheme is the 27% for the West Midlands region.

Table 9-13 National and regional guidelines for aggregate provision

Region	Total aggregate provision (million tonnes)	Alternative materials targets (secondary and recycled aggregates)
South East	502	26%
London	197	48%
East	382	31%
East Midlands	784	14%
West Midlands	370	27%
South West	656	22%
North West	392	30%
Yorkshire & the Humber	431	31%
North East	193	26%
England (total)	**3,908**	**25%**

10.4.6. Mineral site allocations are listed in the *Warwickshire County Council's Draft Minerals Plan 2016*, none of the mineral site allocations are within the Proposed Scheme boundary. The Proposed Scheme is within a Mineral Safeguarding Area for unconsolidated sand and gravel and deep coal.

10.4.7. As outlined in the *Coventry City Council's Local Plan (Ref. 10-17)*, no Mineral Consultation Areas are proposed for Coventry. The scheme is within a Mineral Safeguarding Area for coal.

10.4.8. The *British Geological Survey's Geoindex Onshore* (Ref. 10-19) does not identify any peat resources located within Proposed Scheme boundary.

Future baseline

10.4.9. There is no available information on any potential changes to landfill capacity by the time of construction of the Proposed Scheme. As outlined in *Coventry City Council's Local Plan (Ref.10-17) "there is no opportunity for existing or future development landfill capacity in the city. Therefore, the city will continue to rely upon landfill capacity in surrounding authorities for the life of the plan period". The Warwickshire Waste Core Strategy (Ref. 10-16)* considers *"that there is sufficient landfill capacity/void within the County to manage the maximum landfill diversion amounts over the plan period."*

10.5. Potential Impacts

10.5.1. Mitigation measures are being incorporated in the design and construction of the proposed scheme; these are set out in Section 10.7. Prior to implementation of

mitigation a summary of the potential impacts associated with the construction and operation of the proposed scheme is outlined below.

Construction

10.5.2. There is potential for the following impacts relating to material resources and waste to occur during construction of the Proposed Scheme:

- impacts on-site generated materials (e.g. soils) and waste arisings have on the existing capacity of landfill; and
- impacts on the use of primary (i.e. non-recycled) material resources used for construction.

10.6. Assessment Methodology

10.6.1. The assessment in this chapter has been undertaken in accordance with the guidance provided in the *IAN 153/11 (Ref.10.2). IAN 153/11* outlines the scope required for both simple and detailed assessments of materials. In scoping it was recorded that the assessment should be progressed to a simple level of detail. However due to the scale of the Proposed Scheme, the potential excavated material deficit and the availability of material resources and waste estimates, a detailed and quantitative assessment has been undertaken.

10.6.2. As part of this detailed assessment, the following tasks have been carried out:

- relevant waste legislation, policies and guidance have been reviewed to identify material resource use and waste management objectives and targets;
- the likely types of material resources and waste arisings have been identified and quantities estimated for the Proposed Scheme;
- impacts have been evaluated against the relevant targets for recovery of material resources; and
- opportunities to reduce, re-use, recover and/ or recycle material resources and waste arisings have been identified through a review of the Proposed Scheme (including proposed materials, construction methods and design, where available) and in accordance with industry best practices.

10.6.3. The main outputs from the detailed assessment are:

- the identification of the environmental impacts associated with material resources and waste arisings; and
- the measures which will be implemented to mitigate the impacts.

10.6.4. The receptors for this assessment are:

- waste management infrastructure in West Midlands region (specifically the landfill capacity); and
- material resources used for construction.

10.6.5. The assessment of material resources and waste related impacts does not follow the approach of identifying receptors and determining their sensitivity as is typical for other topics. Attempting to identify receptors relevant to waste and recycling is problematic since:

- Waste producers have a legal duty of care to manage their waste in accordance with waste management legislation. This means that waste arising on-site is to be

stored and managed in line with legal requirements to minimise potential environmental harm and transferred to a suitably licensed facility for further treatment or disposal

- Facilities transferring, treating or disposing of waste must be either licensed, or apply for an exemption from a license, and impacts arising from the operation of waste management facilities are considered as part of the planning and permitting process for these facilities
- Waste Planning Authorities have a statutory duty to collect household waste arising within their area, and also to treat or dispose of this waste. Furthermore, as part of their planning function, Waste Planning Authorities are required to ensure that sufficient land is available to accommodate facilities for the treatment of all waste arising in their area, either within the Waste Planning Authorities area, or by exporting waste to suitable facilities for treatment and disposal in other areas.

10.6.6. The magnitude of effects and significance of waste management impacts have been assessed by:

- establishing the baseline for landfill capacity in the West Midlands region;
- estimating the likely types and quantities of waste that would be generated by the Proposed Scheme;
- estimating the recovery rates likely to be achieved for each waste type and the quantity of waste that may require off-site management or disposal;
- comparing the likely waste arisings and the quantity requiring off-site disposal to the baseline landfill capacity and assessing the likely impact on capacity; and
- identifying any direct impacts on waste management infrastructure with the Proposed Scheme boundary.

10.6.7. The magnitude of effects and significance of material impacts are assessed by:

- estimating the likely types and quantities of the main construction materials that would be required during construction of the Proposed Scheme;
- estimating the likely proportion of non-hazardous construction and demolition waste that would be recovered;
- estimating the proportion of reused, recycled or secondary aggregate that would be imported to site for use in construction;
- comparing the likely recovery rate and proportion of reused, recycled or secondary aggregate to the relevant national targets; and
- identifying any direct impacts on mineral safeguard sites or peat resources within the Proposed Scheme boundary.

10.6.8. The significance criteria applied are set out in Table 9-14.

Table 9-14 Magnitude and significance of effects

Magnitude of effect	Significance	Material resources	Waste
Neutral	Not Significant	Project achieves >99% overall material recovery (by weight) of non-hazardous	No reduction or alteration in the capacity of waste

Magnitude of effect	Significance	Material resources	Waste
		Construction Demolition Waste (CDW) to substitute use of primary materials; and Aggregates required to be imported to site comprise >99% re-used / recycled content.	infrastructure at a regional scale.
Slight	Not Significant	Project achieves 70-99% overall material recovery (by weight) of non-hazardous CDW to substitute use of primary materials; and Aggregates required to be imported to site comprise re-used/recycled content in line with the relevant regional or national percentage target.	≤1% reduction or alteration in the regional capacity of waste infrastructure; and Waste infrastructure has sufficient capacity to accommodate waste from a project, without compromising integrity of the receiving infrastructure (design life or capacity) within the region.
Moderate	Significant	Project achieves less than 70% overall material recovery (by weight) of non-hazardous CDW to substitute use of primary materials; and Aggregates required to be imported to site comprise re-used/recycled content below the lower of the relevant regional or national percentage target.	>1% reduction or alteration in the regional capacity of waste infrastructure as a result of accommodating waste from a project; and 1-50% of project waste requires disposal outside of the region.
Large	Significant	Project achieves <70% overall material recovery (by weight) of non-hazardous CDW to substitute use of primary materials; and	>1% reduction in the regional capacity of waste infrastructure as a result of accommodating waste from a project; and

Magnitude of effect	Significance	Material resources	Waste
		Aggregates required to be imported to site comprise <1% re-used / recycled content; and Project sterilises ≥1 mineral safeguarding site and/or peat resource.	>50% of project waste requires disposal outside of the region.
Very Large	Significant	Not applicable	>1% reduction or alteration in national capacity of waste infrastructure, as a result of accommodating waste from a project; or Project would require new (permanent) waste infrastructure to be constructed to accommodate waste.

10.6.9. For the purposes of this assessment, only large and very large effects are considered to be significant.

Scope and Level of Assessment

10.6.10. In relation to the above, estimates were quantified for the following aspects of the Proposed Scheme and its construction:

- the types and quantities (where appropriate to the assessment) of materials required for the construction of the Proposed Scheme;
- details of the sources of materials (where appropriate to the assessment);
- the cut and fill balance;
- the types and quantities of forecast waste arisings from the Proposed Scheme;
- waste that requires storage on site prior to reuse, recycling or disposal;
- materials and wastes to be pre-treated on site for reuse within the Proposed Scheme;
- materials and waste requiring treatment and/or disposal off-site; and
- the impacts that may arise from the issues identified in relation to materials and waste.

10.6.11. The assessment also identifies and considers waste management infrastructure in proximity to the Proposed Scheme, specifically their capacity to accept construction waste for disposal.

Assessment Assumptions and Limitations

10.6.12. Data on the waste generated by the proposed scheme and materials required to construct the proposed scheme are based on a schedule of quantities provided by Highways England.

10.6.13. Information on the current permitted regional landfill capacity is provided in Table 9-11 and Table 9-12. There is no available information on any potential changes to this permitted capacity prior to construction of the proposed scheme.

10.6.14. This assessment does not consider the environmental impacts associated with the extraction of raw materials and the manufacture of products, nor the impact at waste management facilities. It is assumed that any such issues would have been subject to the applicable environmental assessment/ permitting and planning approval for the relevant facilities.

10.7. Design, Mitigation and Enhancement Measures

10.7.1. The Proposed Scheme has been designed, as far as possible, to avoid and minimise impacts and effects relating to materials resources and waste through the process of design development, and by embedding measures into the design of the Proposed Scheme.

10.7.2. Several standard measures have been identified, which would be implemented by the contractor to reduce the impacts and effects that construction of the Proposed Scheme would have on material resources and waste.

10.7.3. No additional mitigation measures over and above measures identified in the following sections would be required to reduce the significance of effects reported in section **Error! Reference source not found.**, and no compensation or enhancement measures have been identified as being required.

Embedded mitigation measures

10.7.4. The following mitigation measures have been implemented to date and will be implemented in subsequent design work and during construction:

- Waste arisings will be prevented and designed out where possible;
- Opportunities to reuse material resources will be sought where practicable; and,
- Where prevention and reuse are not possible, waste arisings will be managed in line with the waste hierarchy.

Standard mitigation measures

10.7.5. Construction of the Proposed Scheme would be subject to measures and procedures defined within a Construction Environmental Management Plan (CEMP). The CEMP would be produced prior to the commencement of construction by the appointed contractor and would be based on, and incorporate, the requirements of the PCF Stage 3 Environmental Management Plan (EMP) [HE551486-ACM-EGN-A46_SW_000_Z-RP-LE-0002-S4] and other industry standard practice and control measures, including the approach to material resources and waste management on site.

10.7.6. The EMP sets the following performance targets for material resources and waste:

- At least 27% (by weight) of aggregates imported to site for use within the Proposed Scheme should comprise reused, recycled or secondary aggregates, for those

applications where it is technically and economically feasible to substitute these alternative materials for primary aggregate; and

- Recovery of at least 70% (by weight) of non-hazardous construction and demolition waste (excluding naturally occurring material with EWC code 17 05 04). [

10.7.7. The contractor's CEMP would include a Site Waste Management Plan which would set out a procedure for recording forecast and actual performance against the above targets to confirm the assessment.

10.7.8. The CEMP would require that the appointed contractor is competent in the storage, handling and management of material resources and waste. The contractor would be responsible for ensuring compliance with all legal requirements, both on-site and offsite, including duty of care.

10.7.9. The CEMP would require the appointed contractor to adopt good practice in construction material resources and waste management through the implementation of the following approaches, in order to minimise the quantities of waste requiring disposal:

- Agreements with material suppliers to reduce the amount of packaging or to participate in a packaging take-back scheme,
- Implementation of a 'just-in-time' material delivery system to avoid materials being stockpiled, which increases the risk of their damage and disposal as waste,
- Attention to material quantity requirements to avoid over-ordering and generation of waste materials,
- Reuse of materials wherever feasible, for example, re-use of excavated soil for landscaping. Concrete will be taken off-site for crushing and re-use,
- Segregation of waste at source where practical, and,
- Reuse and recycling of materials off-site where re-use on-site is not practical (for example, through use of an off-site waste segregation facility and re-sale for direct re-use or re-processing).

10.7.10. The following waste management measures will be implemented on-site in order to minimise the likelihood of any localised impacts of waste on the surrounding environment:

- Damping down of surfaces during spells of dry weather and brushing or water spraying of heavily used hard surfaces and access points across the site as required
- Off-site prefabrication, where practical, including the use of prefabricated structural elements,
- Burning of waste or unwanted materials will not be permitted on-site,
- All hazardous materials including chemicals, cleaning agents, solvents and solvent containing products to be properly stored in sealed containers at the end of each day prior to storage in appropriately protected and bunded storage areas,
- Any waste effluent will be tested and where necessary, disposed of at a correctly licensed facility by a licensed specialist contractor, and
- Materials requiring removal from the site will be transported using licensed carriers and records will be kept detailing the types and quantities of waste moved, and the destinations of this waste, in accordance with the relevant regulations.

10.8. Assessment of Effects

10.8.1. The prediction of impacts and the assessment of effects has taken account of the embedded and standard mitigation measure identified with section 10.7.

Construction

10.8.2. Table 9-15 below summarises the types of materials to be used and wastes that may potentially be generated during construction.

Table 9-15 Potential material resource use and waste arisings - construction

Project activity	Material resource use	Potential waste arisings
Site remediation/ preparation/ earthworks	Fill material for construction purposes. Primary aggregates for ground stabilisation. Topsoil and subsoil for landscaping.	Surplus excavated materials. Stripping of topsoil and subsoil. Unsuitable and contaminated soils and excavated materials. Clearance of redundant highway infrastructure including road lighting columns, safety fencing and traffic signs. Vegetation clearance.
Demolition	Materials are not required for demolition works.	Waste arisings from the demolition of any existing buildings, infrastructure or structures including: • Asphalt planings; • Concrete; • Brick and block; • Aggregates; and, • Steel.
Site construction	Main construction materials including: • Aggregates including well graded materials, structural fill, pipe bedding and drainage media; • Asphalt and bituminous materials; • In-situ cast concrete (structure and piles); • Precast concrete products (structural components, kerbs, drainage pipes, chamber and channel);	• Packaging from materials delivered to site. • Excess, offcuts and broken/ damaged construction materials. • Existing highway infrastructure and technology as removed during works. • Waste oils from construction vehicles. • Construction worker generated wastes from offices and rest

Project activity	Material resource use	Potential waste arisings
	• Structural steelwork; and steel reinforcing bar (for reinforced concrete). Other construction materials and construction products including: • Geotextile; • Plastic pipework (drainage filter drains and ducting); • Timber (fencing and formwork); • Safety barrier/road restraint systems; • Traffic signs and road markings, road studs, lighting columns; and, • Electrical distribution infrastructure and communications infrastructure (cable ducts, cable, chambers.	areas/canteens.

10.8.3. The estimated main types and quantities of aggregate anticipated to be used during construction are shown in Table 9-16. For the proportion of aggregates required to be imported to site, an estimate of the likely recycled content (comprising reused, recycled or secondary) is shown.

Table 9-16 Estimated main types and quantities of aggregates used during the construction of the Proposed Scheme and likely proportion of recycled content

Material category	Material subcategory	Material density[7] (tonnes/m^3)	Quantity required to be imported to site		Recycled content (% by weight)[8]
			m^3	tonnes	
Asphalt	Surface, binder and base course	2.4	21,837	52,409	25
Unbound aggregates	Type 1 subbase	1.9	26,098	49,586	50

[7] Data on the bulk density of materials has been used to convert quantities between volume (m^3) and weight (tonnes). Information on the typical bulk density of materials was sourced from WRAP's Designing Out Waste Tool for Civil Engineering (Ref.10-20).
[8] The estimated recycled content for each material is based on the "good practice" recycled content rates from WRAP's Designing Out Waste Tool for Civil Engineering (Ref.10-20). The total recycled content is calculated as a percentage by weight.

Concrete	Insitu and precast products	2.4	5,715	13,716	16
Total			**53,650**	**115,711**	**35% (40,090 tonnes)**

10.8.4. For the majority of highways schemes, the largest quantities of material resources and waste are generally those associated with earthworks, especially in those cases where a balance between excavation ("cut") and material placement ("fill") cannot be achieved.

10.8.5. Although the Proposed Scheme design aims to optimise the requirements for cut and fill to reduce the import and export of material resources and waste, the current design requires the import of approximately 75,000 m^3 of fill material.

10.8.6. As outlined in the Table 9-13 there are mineral sources within the West Midlands and East Midlands regions, such that materials required for the Proposed Scheme could be sourced locally in order to minimise travel distances.

10.8.7. Historic landfills in the site and surrounds which may give rise to chemically or geotechnically unsuitable excavated materials alongside mitigation are outlined in the Geology and Soils Chapter (refer to Chapter 9).

10.8.8. The estimated main types and quantities of waste arisings during construction of the Proposed Scheme and the potential management routes and recovery rates are presented in Table 9-17

Table 9-17 Estimated quantities of waste arising during the construction of the scheme (excluding excavated materials) including potential management routes and estimated recovery rates

Activity	Waste type	Waste classification	Waste density[9] (tonnes/m^3)	Quantity		Potential management route(s)	Potential recovery rate (% by weight)[10]
				tonnes	m^3		
Site remediation/preparation/earthworks	Vegetation and wood from site clearance	Non-hazardous	0.7	999	1,427	Off site composting or recovery	90%
Demolition	Concrete	Non-hazardous	2.4	462	192	Off site recycling	95%
	Steel	Non-hazardous	2	133	67	Off site recycling	100%

[9] Data on the bulk density of waste types has been used to convert waste quantities between weight (tonnes) and volume (m^3). Information on the typical bulk density of waste/materials was sourced from WRAP's Designing Out Waste Tool for Civil Engineering (Ref.10-20). Where data was not available, professional judgement was used.
[10] The estimated recovery rate for each waste type is based on the "good practice quick win" recovery rates published by WRAP (Ref.10-21). The total non-hazardous waste recovery rate is calculated as a percentage by weight.

	Copper	Non-hazardous	2	2	1	Off site recycling	100%
	Iron	Non-hazardous	2	3	1	Off site recycling	100%
	Timber fencing	Non-hazardous	0.7	45	65	Off site recycling or recovery	90%
Site construction	Asphalt	Non-hazardous	2.4	2,620	1,092	Off site recycling	95%
	Unbound aggregates	Non-hazardous	1.9	2,479	1,305	Off site recycling	95%
	Concrete	Non-hazardous	2.4	686	286	Off site recycling	95%
	Steel (other than rebar)	Non-hazardous	2	48	24	Off site recycling	100%
	Steel (rebar)	Non-hazardous	2	37	19	Off site recycling	100%
	Plastic	Non-hazardous	1.4	7	5	Off site recycling or recovery	80%
	Copper	Non-hazardous	2	0.18	0.09	Off site recycling	100%
	Timber	Non-hazardous	0.7	28	40	Off site recycling or recovery	90%
Total		Non-hazardous		7,549	4,523	Total non-hazardous recovery rate	94%

Material resources

10.8.9. The Proposed Scheme would set a target of 27% for the use of recycled and secondary aggregates, for those applications where it is technically and economically feasible to substitute these alternatives for primary aggregates. This target is in accordance with the regional guidelines for the West Midlands region.

10.8.10. The Proposed Scheme would be located in proximity to major urban areas, and therefore there is expected to be a good supply of alternative aggregate materials. The Mineral Products Association (Ref 10.22) estimated that in 2017, 30% of aggregate sales in Great Britain were recycled and secondary aggregates and Table 9-16 indicates that this target is likely to be achievable.

10.8.11. The magnitude of impacts relating to material resources are therefore assessed as being slight, resulting in an effect that is not significant.

10.8.12. By applying good industry practice to the management of the waste arising from the construction of the Proposed Scheme, it is anticipated that an overall recovery rate (by weight) of non-hazardous construction and demolition waste (excluding naturally occurring materials with EWC code 17 05 04) of over 90% may be achieved, as shown in Table 9-17.

10.8.13. This exceeds the Government's target of 70% and the magnitude of impacts are therefore assessed as being slight, resulting in an effect that is not significant.

Excavated materials

10.8.14. Excavated materials would be used within the Proposed Scheme. It is the intention that as much of the reusable cut material would be reused on site as possible. This material would be used in accordance with a Materials Management Plan, prepared under the CL:AiRE Definition of Waste: Code of Practice (Ref.10-23) and would not be classified as waste.

10.8.15. The Proposed Scheme design has been designed to optimise the requirements for cut and fill. However, a net import of approximately 75,000m^3 of material is estimated to be required.

10.8.16. The origin of imported material resources cannot be confirmed at this time as this would be determined by the scheme contractor. However, there are mineral sources within the West Midlands and East Midlands regions, such that materials required for the scheme are anticipated to be sourced locally in order to minimise transportation distances. Other potential material donor sites might include collieries, existing quarries and major development schemes in the West Midlands and East Midlands with a materials surplus.

10.8.17. The magnitude of impacts are therefore assessed as being slight, resulting in an effect that is not significant.

Waste

10.8.18. Construction of the scheme is expected to generate approximately 7,549 tonnes (4,523m^3) of non-hazardous construction and demolition waste, as shown in Table 9-17.

10.8.19. Based on a worst-case assumption that all of the non-hazardous construction and demolition waste is disposed of to landfill this would utilise approximately 0.01% of the permitted regional landfill capacity (defined as the West Midlands region) as shown in Table 9-12.

10.8.20. In practice a large proportion of waste from the Proposed Scheme is likely to be recovered rather than disposed of to landfill, as shown in Table 9-17, further reducing the overall quantity of waste for disposal.

10.8.21. The Proposed Scheme would result in less than 1% reduction or alteration in the regional capacity of waste infrastructure, and there is adequate disposal capacity within the region to accommodate all the waste from the Proposed Scheme (although in practice a high proportion of waste would be recycled or recovered rather than requiring disposal).

10.8.22. The magnitude of impacts are therefore assessed as being slight, resulting in an effect that is not significant.

Operation

10.8.23. Table 9-18 summarises the types of materials used and wastes that may potentially be generated during operation of the proposed scheme.

Table 9-18 Potential material resource use and waste arisings - operation

Project activity	Material resource use	Potential waste arising
Operation and maintenance	Routine maintenance of infrastructure and technology including surfacing asphalt and servicing of electronic equipment.	Waste arising during operation and maintenance expected to be minimal.

10.8.24. Material resource use and waste generation is expected to be very small during operation of the proposed scheme. Routine maintenance will include gully emptying and litter collection. Periodically, maintenance activities such as resurfacing will be required. Wastes arising from these maintenance activities are expected to be generally the same (in both type and quantity) to that generated by the existing road; and the wastes will be managed using the established procedures and facilities that are used across the strategic highways network.

10.8.25. For these reasons, operational waste and materials have been scoped out of the assessment.

10.9. Monitoring

10.9.1. The assessment has recorded that no significant effects would arise from construction of the Proposed Scheme in relation to material resources and waste. Accordingly, there would be no requirement to monitor the effects of the Proposed Scheme during this phase. The EMP sets out monitoring to be undertaken during the construction of the Proposed Scheme to ensure that the embedded and standard mitigation measures are appropriately implemented.

11. NOISE AND VIBRATION

11.1. Introduction

11.1.1. This chapter provides an assessment of noise and vibration impacts associated with the proposed scheme, following the methodology set out in Design Manual for Roads and Bridges Volume 11, Section 3, Part 7 HD 213/11 – Revision 1 (Ref 11-1) (hereafter referred to as "DMRB"), and the associated Interim Advice Note ("IAN") 185-15 (Ref 11-2). It also details the methodology followed for the assessment, summarises the regulatory and policy framework related to noise and vibration and describes the existing environment in the area surrounding the proposed scheme. Following this, the design, mitigation and residual effects of the proposed scheme are discussed, along with the limitations of the assessment.

11.1.2. This chapter of the EAR has been undertaken by competent experts with relevant and appropriate experience:

- Principal Acoustics Consultant, MEng, MSc, MIOA, PIEMA
- Associate (Acoustics), BSc MSc MIOA

11.2. Legislative and Policy Framework

11.2.1. The following planning guidance and legislation have been taken into account as part of identifying the assessment methodology, receptor selection and sensitivity, potential significant environmental effects, and mitigation:

- National Policy Statement for National Networks;
- National Planning Policy Framework;
- Noise Policy Statement for England;
- Web-based resource Planning Practice Guidance on Noise (PPG-N);
- Environmental Noise (England) Regulations 2006 (as amended), and
- Rugby Borough Council Local Plan 2011-2031

11.2.2. The aims set out in paragraph 5.195 of the National Policy Statement for National Networks (NPSNN) (Ref 11-3) provide the guiding principles for the considering the management of noise and vibration, within the context of sustainable development:

- avoid significant adverse impacts on health and quality of life from noise as a result of the new development
- minimise and mitigate other adverse impacts on health and quality of life from noise from the new development
- contribute to improvements in health and quality of life through the effective management and control of noise, where possible

11.2.3. These aims are echoed in the National Planning Policy Framework (NPPF) (Ref. 11-4).

11.2.4. The scope of this assessment is informed by the NPSNN in terms of the requirement to consider construction and operational impacts, and the impacts on quality of life, areas of high landscape value, and biodiversity. The NPSNN also informs the assessment methodology through the requirement to follow the principles of the relevant British Standards and other guidance.

11.2.5. The Explanatory Note to the Noise Policy Statement for England (NSPE) (Ref 11-5) informs the assessment methodology in terms of the guidance on *adverse impacts* and *significant adverse impacts* through the introduction of the following concepts:

- No Observed Effect Level (NOEL): the level below which no effect can be detected. Below this level no detectable effect on health and quality of life due to noise can be established
- Lowest Observable Adverse Effect Level (LOAEL): the level above which adverse effects on health and quality of life can be detected
- Significant Observed Adverse Effect Level (SOAEL): the level above which significant adverse effects on health and quality of life occur

11.2.6. The NPSE recognises that *"it is not possible to have a single objective noise-based measure that is mandatory and applicable to all sources of noise in all situations"*. The levels are likely to be different for different noise sources, for different receptors and at different times of the day, therefore the assessment methodology outlines the proposed LOAEL and SOAEL for each potential impact. The setting of these levels has been informed by the additional guidance in the Planning Practice Guidance on Noise (PPG-N) (Ref. 11-6).

11.2.7. Directive 2002/49/EC, known as the Environmental Noise Directive (hereafter referred to as the END) (Ref 11-7), is transcribed into UK legislation by the Environmental Noise (England) Regulations 2006 (as amended) (Ref 11-8) and sets out the requirement for the strategic noise mapping of major roads, railways, airports and agglomerations (urbanised areas with over 100,000 inhabitants) across the UK every five years. The first round of mapping was completed in 2007, the second round in 2012 and the third round in 2017. Noise Important Areas (NIAs), which are those areas most exposed to noise, have been identified in Noise Action Plans, published by Defra (Ref 11-9) and (Ref 11-10), that are informed from the strategic noise mapping process.

11.2.8. Rugby Borough Council Local Plan (Ref 11-11) highlights noise policy within HS5:- Traffic Generation and Air Quality, Noise and Vibration ensuring the impact of traffic noise from new developments is minimised

11.3. Study Area

11.3.1. The study areas for the assessment of noise impacts of the proposed scheme have been defined in accordance with guidance given in DMRB which are summarised below.

Construction

11.3.2. The study area for the assessment of construction phase noise and vibration impacts focuses on the closest identified potential sensitive properties to the various works. DMRB defines dwellings, hospitals, schools, community facilities, designated areas (such as Sites of Special Scientific Interest (SSSI)) and public rights of way (PRoW) as potentially sensitive to noise and/or vibration. Potentially sensitive receptors within the study area have been determined from Ordnance Survey (OS) data.

11.3.3. Receptors have been chosen based on their potential sensitivity, as defined by DMRB and discussed above, and their proximity to the various works. The selected receptors are also representative of neighbouring properties in their vicinity. By choosing a selection of the closest identified potential sensitive receptors the reported impacts are, therefore, typical of the worst affected receptors and all potentially significant effects are identified. At receptors further away from the works, the impact would be reduced.

Operation

11.3.4. The study area for the assessment of operational phase noise impacts includes the proposed scheme, the existing route replaced by the scheme, and all surrounding

existing roads that are predicted to be subject to a change in traffic noise level as a result of the proposed scheme of:

- 1 decibel (dB(A)) or more in the short term (Do-Minimum opening year to Do-Something (DS)) opening year), or
- 3 dB or more in the long term (Do-Minimum opening year to Do-Something 15 years after opening), subject to a minimum change of 1 dB between the Do-Minimum and Do-Something 15 years after opening

11.3.5. These roads are defined as *affected routes* and are identified by analysis of the traffic data. The identification of affected routes has considered all roads with 18 hour (06:00-00:00) weekday traffic flows above the 1,000 lower cut off of the Calculation of Road Traffic Noise (CRTN) (Ref. 11-12) prediction methodology in all scenarios.

11.3.6. The study area for the detailed quantitative assessment of noise impacts comprises a 600m calculation area corridor either side of the proposed scheme, 600m either side of the existing junction replaced by the scheme, and 600m either side of all affected routes within a 0.62 miles (1km) boundary.

11.3.7. For dwellings and other sensitive receptors that are within the 0.62 miles (1km) boundary around the proposed scheme and existing junction, but more than 600m from an affected route, a qualitative assessment of the traffic noise impacts has been carried out.

11.3.8. For affected routes which are outside the 0.62 miles (1km) boundary around the proposed scheme and existing junction, an assessment has been undertaken by estimating the CRTN Basic Noise Level (BNL) for these routes with and without the proposed scheme. A count of the number of dwellings and other sensitive receptors within 50m of these routes has been undertaken.

11.3.9. The study area for the assessment of operational phase airborne vibration annoyance impacts is defined, in accordance with DMRB, as 40m from the proposed scheme and the existing junction replaced by the proposed scheme.

11.3.10. The 0.62 miles (1km) wider study area and sensitive receptors within this area are illustrated in Chapter 18: Figure 11-1. The 600m calculation area for the detailed quantitative assessment of noise impacts is also shown in Chapter 18: Figure 11-1. No affected routes have been identified either within or outside of the 0.62 miles (1km) wider study area.

11.4. Baseline Conditions

11.4.1. The existing noise climate in the vicinity of the proposed scheme is dominated by road traffic noise. In addition to the A46, there are a number of other potentially significant sources of road traffic noise, including the A428. There are also a number of minor roads, in particular around the Binley Industrial Estate, which will contribute to ambient noise levels. Other noise sources will include noise associated with general urban and rural activities.

11.4.2. There are two Noise Important Areas (NIA) in the vicinity of the proposed scheme. These are located on the A46 in the vicinity of the Cocked Hat Hotel (NIA Ref 14307) and on the A428 Binley Road, approximately 600m to the north-west of the A46/A428 junction (NIA Ref 330). The NIAs are illustrated on Figure 11-1.

11.4.3. The area around the junction is predominantly commercial in nature. Such premises are generally not considered to be sensitive for the purposes of the noise and vibration assessment. However, residential properties are located along the A428 Rugby Road in the immediate vicinity of the junction and to the north of Warwickshire Shopping Park. A number of other noise-sensitive non-residential receptor are

located in the wider area. These include St Bartholomew's Church, St Bartholomew's Church of England Primary School, Bradbury House Respite Unit, Scout Hut on Mill Lane, Clifford Bridge Primary School, John White Community Centre, Cherry Tree Nursery, Binley Woods Village Hall, and Blue Bell Woods Day Nursery. Two hotels, the Cocked Hat and a Premier Inn hotel are located immediately adjacent to the junction to the west. There are four SSSI designated sites close to the existing A46 which fall within the 0.62 miles (1km) study area: Brandon Marsh, Ryton and Brandon Gravel Pits, Herald Way Marsh and Combe Pool. Two public rights of way are located within the study area, both to the south-west of the existing junction. The locations of these receptors in the context of the proposed scheme are provided in Chapter 18: Figure 11-1.

11.4.4. Chapter 18: Figure 11-1 also identifies the 2 locations at which short-term daytime noise measurement were recorded by Highways England in November 2016 (Ref 11-13). $LA_{10,18h}$ measurements are presented in the report, which is the index adopted by the Government in Calculation of Road Traffic Noise (CRTN) to assess traffic noise. This value is determined by taking the highest 10% of noise readings in each of the 18 one-hour periods between 06:00 and 00:00, and then calculating the arithmetic mean. As recorded in DMRB HD 213/11, a reasonably good correlation has been shown to exist between this index and the perception of traffic noise by residents over a wide range of noise exposures. No further baseline monitoring has been undertaken.

11.4.5. $L_{A10,18h}$ levels at these 2 locations have also been calculated using SoundPlan (V8.0) noise modelling software, using available traffic data from 2013. The LA10,18h levels derived from measurements and calculations at these 2 locations are shown in Table 11-1.

Table 11-1: Comparison of Measured and Calculated Noise Levels

Monitoring ID	Location	18 hour $L_{A10,18hr}$ noise level reported from short term measurement data (2016)	Calculated results (2013 traffic flows)
MP1	Rugby Road	75.3	66.4
MP2	Kings Park Drive	67.9	66.1

11.4.6. The $L_{A10,18h}$ levels derived from the measurements taken at MP2 (Kings Park Drive) are within 2dB(A) of the calculated level. However, there is an 8.9dB(A) disparity between the $L_{A10,18h}$ level derived from the measurements undertaken at MP1 (Rugby Road) and the calculated $L_{A10,18h}$ level at this location. Although location MP1 is exposed to traffic noise from both the A46 and Rugby Road, the location is further away from the A46 than location MP2. In addition, traffic flows and speeds on Rugby Road are lower than those on the A46 carriageway. Hence, road traffic noise exposure at MP1 would not be expected to be significantly higher than at location MP2. Therefore, the measurements taken at MP1 to derive the $L_{A10,18h}$ level are not considered to be representative of actual conditions, and no adjustment to the calculated levels has therefore been undertaken.

11.4.7. In addition to calculating baseline road traffic noise levels at the 2 monitoring locations, $L_{A10,18h}$ levels have also been predicted at all sensitive receptors within the 600m calculation area without the proposed scheme, in both the opening year (2021) and the future assessment year (2036). These levels have been used to derive the change in annoyance levels from road traffic noise likely to occur without the proposed scheme in the long term. The predicted changes in road traffic noise in the

long term summarised in Table 11-2; this shows the change in baseline conditions between the forecast opening year (2021), which is referred to as the Do Minimum 2021, and the forecast future year 15 years thereafter known as the Do Minimum 2036.

11.4.8. The likely change in annoyance over the 15 years between 2021 and 2036 is summarised in Table 11-3, which provides an understanding of how the noise environment may change over time without the proposed scheme in place. The data and methodologies used to derive the results in Tables 11-2 and 11-3 are set out in section 11.6.

Table 11-2: Long term Change in Predicted Do-Minimum Traffic Noise Levels (Do Minimum 2021 to Do Minimum 2036)

Change in Noise Level		Daytime		Night-time
		Number of Residential Buildings	Number of Other Sensitive Receptors	Number of Residential Buildings
Increase in noise level Daytime $L_{A10,18h}$ dB Night-time $L_{night,outside}$ dB	0.1 - 2.9	1259	3	147
	3.0 - 4.9	0	0	0
	5.0 - 9.9	0	0	0
	≥10	0	0	0
No change	0	12	0	10
Decrease in noise level Daytime $L_{A10,18h}$ dB Night-time $L_{night,outside}$ dB	0.1 - 2.9	22	0	13
	3.0 - 4.9	0	0	0
	5.0 - 9.9	0	0	0
	≥10	0	0	0

Table 11-3: Long term Change in Annoyance due to Traffic Noise (Do Minimum 2021 to Do Minimum 2036)

Change in Noise Annoyance		Number of Residential Buildings
Increase noise annoyance	<10%	1259
	10 - 20%	0
	20 - 30%	0
	30 - 40%	0
	>40%	0
No change	0%	12
Decrease in noise annoyance	<10%	22
	10 - 20%	0

Change in Noise Annoyance		Number of Residential Buildings
	20 - 30%	0
	30 - 40%	0
	>40%	0

11.4.9. An estimated total of 1293 residential buildings are located with the 600m noise calculation area. However, only 170 properties meet the DMRB criterion of 55dB $L_{night,outside}$ at one or more scenarios in the night-time traffic noise assessment. Further details of this criterion are described in section 11.6.

11.4.10. A total of three noise sensitive non-residential buildings are located within the 600m noise calculation area, consisting of one community facility and two hotels.

11.4.11. Table 11-2 is based on the façade at each building which undergoes the least beneficial change in traffic noise levels from the Do Minimum 2021 scenario to the Do Minimum 2036 scenario. The results are provided for the top floor of each building.

11.4.12. The noise changes from the Do Minimum 2021 to Do Minimum 2036 are presented as a noise difference plot in Chapter 18: Figure 11-2. The map is based on free field noise levels at first floor level, 4m above ground. It should be noted that the noise difference plots are based on a 10m x 10m grid and are provided for illustration purposes only.

11.4.13. In the long term, without the scheme being implemented, a majority of the residential dwellings are expected to experience a negligible increase in noise both during the day and night between the Do Minimum 2021 to Do Minimum 2036. The maximum increase in day-time noise without the proposed scheme being implemented is 2.5dB. All non-residential sensitive receptors are likely to experience a negligible increase in noise. These increases are as a result of predicted increases in traffic flow between the two years.

11.4.14. There are a small proportion of residential properties which are predicted to experience either no change or a decrease in daytime and night-time noise level in the long term without the proposed scheme being implemented. These decreases are at properties in the vicinity of Skipworth Road which is predicted to experience a decrease in traffic flow between the baseline and the future year.

11.5. Potential Impacts

Construction Impacts

11.5.1. The construction of the proposed scheme is likely to result in temporary noise impacts at the closest receptors to the works. The main construction activities include the site compound set up, earthworks, drainage installation, bridge construction, street lighting installation, and road construction.

11.5.2. The use of vibratory rollers has been assumed for a number of construction activities, including earthworks and road construction. Therefore, the assessment of the magnitude of construction vibration impacts has been undertaken, where appropriate, considering both annoyance to occupiers of sensitive receptors and structural impacts.

11.5.3. Construction traffic can have a temporary impact on sensitive receptors located along existing roads used by these vehicles. The potential for such impacts is dependent on the volume and route of construction traffic. Although the routing has not been

finalised at this stage, it has been advised that the majority of the construction traffic will use the A46, as the major access points to the works will be directly off this route.

11.5.4. The impacts from the construction of the proposed scheme are described in more detail in Section 11.9.

Operational Impacts

11.5.5. The proposed scheme has the potential to result in both beneficial and adverse permanent traffic noise impacts. The introduction of new junction slip roads closer to sensitive receptors and the raising of the existing A46 through the junction have the potential to result in increases in traffic noise levels. Conversely the re-routing of traffic from minor roads to the A46 mainline has the potential to decrease noise levels at sensitive receptors close to them. The magnitude of the operational traffic noise impact at a receptor is dependent on a range of factors including the traffic flow, composition and speed, the road surfacing, ground topography and the presence of intervening buildings or structures and the distance to the road. The significance of the effect is dependent on a number of factors, and of most importance are the magnitude of the impact and the sensitivity of the receptor. The impacts from the operation of the proposed scheme are described in more detail in Section 11.9.

11.6. Assessment Methodology

Construction Assessment Methodology

11.6.1. Sufficient details on the proposed construction works have been made available to enable a quantitative assessment of construction noise impacts to be undertaken. Such information includes the type of construction activities likely to be undertaken, the number and type of plant required for each activity, typical *on-times* for each item of plant and working hours. However, it should be noted that at this stage, before the appointed contractor has planned the works out in detail, the information provided is a best estimate of the likely activities and plant. Estimates of typical construction noise levels have been made for a selection of the closest identified receptors to the works in accordance with the methodology in BS 5228: 2009+A1: 2014 *Code of Practice for Noise and Vibration Control on Construction and Open Sites* (Ref. 11-14).

11.6.2. BS 5228 contains a number of example methodologies for identifying significant construction noise effects based on fixed thresholds or noise level changes. For the purposes of this assessment the 'ABC' method has been adopted. This approach is based on setting the threshold for the onset of potentially significant adverse effects (i.e. the SOAEL, as defined in Section 11.2) depending on the existing ambient noise level. Receptors with low existing ambient noise levels (Category A) have a lower threshold than those with high existing ambient noise levels (Category C). Higher thresholds are set for normal daytime construction working hours, compared to the more sensitive evening/weekend and night time periods. As a conservative approach, the threshold for the onset of any adverse effect (i.e. the LOAEL, as defined in Section 11.2) is set at a construction noise level equal to the existing ambient noise level. Construction noise levels between the LOAEL and the SOAEL have the potential to result in adverse effects but would not normally be classed as significant adverse effects. However, noise mitigation measures are still considered/applied in such locations to seek to keep all effects to a minimum. Table 11-4, which is adapted from Table E.1 in BS 5228, sets out the construction noise SOAEL and LOAEL used for this assessment.

Table 11-4: SOAEL and LOAEL for Construction Noise at Residential Receptors

Time of Day	SOAEL $L_{Aeq,T}$ dB (façade)			LOAEL $L_{Aeq,T}$ dB (façade)
	A[1]	B[2]	C[3]	
Daytime (07:00 – 19:00) and Saturdays (07:00 – 13:00)	65	70	75	Existing ambient
Evenings (19:00 – 23:00 weekdays) and Weekends (13:00 – 23:00 Saturdays and 07:00 – 23:00 Sundays)	55	60	65	Existing ambient
Night-time (23:00 – 07:00)	45	50	55	Existing ambient

[1] Category A: threshold values to use when ambient noise levels (when rounded to the nearest 5 dB) are less than these values

[2] Category B: threshold values to use when ambient noise levels (when rounded to the nearest 5 dB) are the same as the category A values

[3] Category C: threshold values to use when ambient noise levels (when rounded to the nearest 5 dB) are higher than the category A values

NOTE: if the ambient noise level exceeds the Category C threshold values then the SOAEL and LOAEL are defined as equal to the existing ambient

11.6.3. To determine the SOAEL and LOAEL, ambient noise levels at the relevant façade of each of the selected receptors have been determined based on predicted 2021 Do Minimum traffic noise levels.

11.6.4. Construction traffic noise impacts along existing roads have been estimated based on the Calculation of Road Traffic Noise (CRTN) methodology Basic Noise Level (BNL) at a reference distance of 10m from the nearside carriageway, both with and without construction traffic. Construction traffic data has been provided in the form of the number of additional HGV movements per day resulting from construction activities.

11.6.5. Construction vibration impacts have been assessed where any construction activities which are a potentially significant source of vibration, such as piling and vibratory rollers, are proposed in close proximity of any identified sensitive receptors. Impacts are considered for both damage to buildings and annoyance to occupiers.

11.6.6. The transmission of ground-borne vibration is highly dependent on the nature of the intervening ground between the source and receptor and the activities being undertaken. BS 5228 provides data on measured levels of vibration for various construction works, with particular emphasis on piling.

11.6.7. Table 11-5 details Peak Particle Velocity (PPV) vibration levels and provides a semantic scale for the description of construction vibration effects on human receptors, based on guidance contained in BS 5228.

Table 11-5: Construction vibration criteria for human receptors (annoyance)

Peak Particle Velocity Level	**Description**	**Magnitude of Impact**
>= 10 mms^{-1}	Vibration is likely to be intolerable for any more than a very brief exposure to this level.	Major
1.0 to < 10 mms^{-1}	It is likely that vibration of this level in residential environments will cause complaint, but can be	Moderate

	tolerated if prior warning and explanation has been given to residents.	
0.3 to < 1 mms^{-1}	Vibration might be just perceptible in residential environments.	Minor
0.14 to < 0.3 mms^{-1}	Vibration might be just perceptible in the most sensitive situations for most vibration frequencies associated with construction. At lower frequencies, people are less sensitive to vibration.	Negligible

11.6.8. For human receptors the LOAEL is defined as a Peak Particle Velocity (PPV) of 0.3 mms^{-1} (millimetres per second), this being the point at which construction vibration is likely to become perceptible. The SOAEL is defined as a PPV of 1.0mms^{-1}, which is the level at which construction vibration can be tolerated with prior warning.

11.6.9. In addition to human annoyance, building structures may be damaged by high levels of vibration. The levels of vibration that may cause building damage are far in excess of those that may cause annoyance. Consequently, if vibration levels within buildings are controlled to those relating to annoyance (1.0mms^{-1}), then it is highly unlikely that buildings will be damaged by construction vibration levels.

11.6.10. BS 7385-2: 1993 *Evaluation and measurement for vibration in buildings – Part 2: Guide to damage levels from groundborne vibration* (Ref. 11-15) provides guidance on vibration levels likely to result in cosmetic damage and is referenced in BS 5228. Guide values for transient vibration, above which cosmetic damage could occur, are presented in Table 11-6.

Table 11-6: Transient Vibration Guide Values for Cosmetic Damage

Type of Building	**Peak Component Particle Velocity in Frequency Range of Predominant Pulse**	
	4Hz to 15Hz	**15Hz and above**
Reinforced or framed structures Industrial and heavy commercial buildings	50 mms^{-1} at 4Hz and above	
Unreinforced or light framed structures Residential or light commercial buildings	15 mms^{-1} at 4Hz increasing to 20 mms^{-1} at 15Hz	20 mms^{-1} at 15Hz increasing to 50 mms^{-1} at 40Hz and above

NOTE 1: Values referred to are at the base of the building.

NOTE 2: For un-reinforced or light framed structures and residential or light commercial buildings, a maximum displacement of 0.6 mm (zero to peak) is not to be exceeded.

11.6.11. BS 7385-2:1993 states that the probability of building damage tends towards zero for transient vibration levels less than 12.5mms^{-1} Peak Particle Velocity (PPV). For continuous vibration, such as from vibratory rollers, the threshold is around half this value.

11.6.12. It is also noted that these values refer to the likelihood of cosmetic damage. ISO 4866:2010 *Mechanical vibration and shock. Vibration of fixed structures. Guidelines for the measurement of vibrations and evaluation of their effects on structures* (Ref. 11-16) defines three different categories of building damage:

- Cosmetic, such as formation of hairline cracks in plaster or drywall surfaces and in mortar joints of brick and concrete block constructions

- Minor, which includes the formation of large cracks or loosening and falling of plaster or drywall surfaces or cracks through brick or block
- Major. This includes damage to structural elements, cracks in support columns, loosening of joints, splaying of masonry cracks

11.6.13. BS 7385-2:1993 defines that minor damage occurs at a vibration level twice that of cosmetic damage and major damage occurs at a vibration level twice that of minor damage. Therefore, this guidance can be used to define the potential impact identified in Table 11-7 below for continuous vibration.

Table 11-7: Construction vibration criteria for assessing building damage

Damage Risk	Continuous Vibration Level PPV mms^{-1}
Major	30
Minor	15
Cosmetic	6
Negligible	<6

Operational Assessment Methodology

11.6.14. The general principle of DMRB is to allocate an assessment method according to risk. This process uses three levels of assessment: scoping, simple, and detailed. The assessment approach that has been carried out for the proposed scheme is the detailed assessment. This is the most comprehensive of the three approaches.

11.6.15. Noise from a flow of road traffic is generated by both the vehicle engines and the interaction of tyres with the road surface. The traffic noise level at a receptor, such as an observer at the roadside or residents within a property, is influenced by a number of factors including traffic flow, speed, composition (percentage of heavy goods vehicles (HGV)), gradient, type of road surface, distance from the road, and the presence of any obstructions between the road and the receptor.

11.6.16. Noise from a stream of traffic is not constant, but to assess the noise impact a single figure estimate of the overall noise level is necessary. The index adopted by the Government in Calculation of Road Traffic Noise (CRTN) to assess traffic noise is $L_{A10,18h}$. This value is determined by taking the highest 10% of noise readings in each of the 18 one-hour periods between 06:00 and 00:00, and then calculating the arithmetic mean. As recorded in DMRB, a reasonably good correlation has been shown to exist between this index and the perception of traffic noise by residents over a wide range of noise exposures.

11.6.17. CRTN provides the standard methodology for predicting the $L_{A10,18h}$ road traffic noise level. Noise levels are predicted at a point measured 1m horizontally from the external façade of buildings.

11.6.18. DMRB also requires an assessment of night-time (i.e. between 23:00 and 07:00) traffic noise levels ($L_{night,outside}$). However, this parameter is not calculated by the standard CRTN methodology. DMRB refers to three methods for calculating night-time traffic noise levels developed by the Transport Research Laboratory (TRL). The most widely used is *Method 3* which factors the L_{night} from the $L_{A10,18h}$, based on the typical diurnal pattern of traffic flows in the UK; this method has been used in this assessment.

11.6.19. Daytime and night-time traffic noise levels have been generated using the SoundPLAN (V8.0) noise modelling software. Inputs into the noise modelling software include traffic data, the ground topography, ground type, and buildings to form a 3D representation of the study area. Details of the modelling software and datasets used in this assessment are presented in section 11.7.

11.6.20. The traffic noise levels predicted have been used to provide an indication of the magnitude of the impact at each receptor and the likely annoyance to residents caused by traffic noise, in both the short and long term. Individuals vary widely in their response to the same level of traffic noise. However, the average or community response from a large number of people to the same level of traffic noise is fairly stable and, therefore, a community average degree of annoyance caused by traffic noise can be related to the long-term steady state noise level. In addition, research recorded in DMRB has shown that people are more sensitive to abrupt changes in traffic noise, for example, following the opening of a new road, than would be predicted from the steady state relationship between traffic noise and annoyance (as described above). These effects last for a number of years. However, in the longer term, the perceived noise annoyance tends towards the steady-state level due to familiarisation.

11.6.21. The objective of the assessment, as set out in DMRB, is to gain an overall appreciation of the noise and vibration climate, both with (Do-Something) and without (Do-Minimum) the proposed scheme, to identify where noise impacts occur and to determine where mitigation to reduce these impacts may be appropriate. These conditions have been assessed for the baseline year (the year of the proposed scheme opening) and the future assessment year (15 years after the proposed scheme opening).

11.6.22. DMRB outlines the steps to be carried out at the detailed assessment stage which have been followed for this assessment:

a) Identify the study area (see section 11.3) and predict 18-hour (06:00 - 00:00) and night-time (23:00 - 07:00) traffic noise levels at all residential properties within the 600m calculation area for all assessment scenarios

b) Carry out the following comparisons for each property in order to identify the number of properties where residents may experience an increase or decrease in traffic noise levels and annoyance

- The Do-Minimum scenario in the baseline year against the Do-Minimum scenario in the future assessment year (long-term)
- The Do-Minimum scenario in the baseline year against the Do-Something scenario in the baseline year (short-term)
- The Do-Minimum scenario in the baseline year against the Do-Something scenario in the future assessment year (long-term)

c) For night-time traffic noise levels, undertake comparisons for the two long-term scenarios and for properties where the $L_{night,outside}$ level is 55 dB(A) or more in the relevant scenarios

d) Assess the impact on sensitive receptors, other than residential properties, within the 600m calculation area. This is based on 18 hour (06:00 - 00:00) traffic noise levels and considers the same three comparisons as outlined in (b) above for residential properties

e) Complete a qualitative assessment of sensitive receptors which are within 0.62 miles (1km) of the proposed scheme boundary, but outside the 600m calculation area

f) For affected routes which are outside the 0.62 miles (1km) boundary, complete an assessment by estimating the CRTN Basic Noise Level (BNL) on these roads (the traffic noise level at 10m) with and without the proposed scheme. Count the number of dwellings and other sensitive receptors within 50m of these routes

11.6.23. Different façades of the same property can experience different changes in traffic noise level depending on their orientation to the noise source. DMRB requires that each of the above comparisons of traffic noise levels is based on the façade which experiences the least beneficial change, that is the largest increase, or, if all façades undergo a decrease, the smallest decrease. Additionally, DMRB requires that the above comparisons of annoyance use the highest levels of annoyance in the first 15 years. For properties which experience an increase in noise due to the proposed scheme, the greatest annoyance is likely to be immediately after the proposed scheme opening. For properties which experience a decrease in noise (and also in the Do-Minimum comparison), the greatest annoyance is the steady-state level of annoyance in the long term.

11.6.24. A preliminary indication of any properties likely to qualify under the Noise Insulation Regulations (Ref 11-17) is provided in the assessment. A full assessment would be completed once the detailed design is finalised and in accordance with the timescales set out in the Regulations.

11.6.25. The introduction of recent planning guidance (described in Section 11.2) has increased the focus on consideration of absolute noise levels as well as the change in noise levels due to a road scheme. The current version of DMRB only considers the change in noise level when determining the magnitude of impact of a road scheme. In light of the introduction of the National Planning Policy Framework, National Policy Statement for National Networks, and National Policy Statement for England a greater consideration of absolute noise levels is considered appropriate.

11.6.26. For daytime, the SOAEL is set at 68 dB LA10,18h (façade), which is consistent with the daytime trigger level in the Noise Insulation Regulations. For consistency with the Noise Insulation Regulations, levels of 67.5 dB are rounded up to 68 dB. The Noise Insulation Regulation threshold has a history of use in UK noise policy as it has previously been incorporated into planning guidance on the acceptability of sites for new residential developments. It is the external level which corresponds to an internal level, with a closed single glazed window, which would meet the internal daytime criteria of 35 dB LAeq,16h specified in BS 8233 (Ref 11-18) as desirable for resting in living rooms. It also correlates with the results of Defra Study NANR316 (Ref 11-19) which proposed a SOAEL value for road traffic noise based on annoyance at 66 dB LAeq,16h and due to cardiovascular effects at 67 dB LAeq,16h. LAeq,16h is converted to LA10,18h by the addition of +2dB. Therefore, the SOAEL of 68 dB LA10,18h correlates to annoyance and is slightly less than the DEFRA suggested SOAEL for cardiovascular effects.

11.6.27. The daytime LOAEL is set at 50 dB LAeq,16h (free field), based on the guidance provided in the 1999 WHO Guidelines for Community Noise regarding the onset of moderate community annoyance (Ref 11-20). The WHO published the Environmental Noise Guidelines for the European Region in 2018 (Ref 11-21) which provides guidelines for specific noise sources including road traffic. The 2018 WHO Guidelines suggests a recommended 53 dB Lden for road traffic noise (note Lden correlates approximately to LA10,18h) based on a 10% risk of being Highly Annoyed. The 2018 WHO guidelines state they are "not meant to identify effect thresholds". Instead, they are based on the "smallest relevant risk increase" for various effects, and therefore lie slightly above the LOAEL. On this basis a LOAEL of 50 dB LAeq,16h (free-field) is consistent with the latest WHO Guidelines.

11.6.28. For night-time, the SOAEL is set at 55 dB $L_{night,outside}$ (free field) this corresponds to an internal level, with a closed single glazed window, which would be slightly below the night time criteria of 30 dB LAeq,8h specified in BS 8233 as desirable for sleeping in bedrooms. The WHO 2009 Night Noise Guidelines for Europe (Ref 11-22) explicitly identify the night time LOAEL as 40 dB LAeq,8h (free-field). Therefore, this LOAEL has been adopted in the assessment. Levels between 40 and 55 dB are identified in the guidelines as where 'adverse' but not significant adverse, health effects are observed among the exposed population. 55 dB is identified in the guidelines as when the risk of cardiovascular disease increases.

11.6.29. Defra Study NANR316 suggested SOAEL values for road traffic noise based on sleep disturbance as 56 dB L_{night} which is slightly higher than the SOAEL level adopted (note L_{night} is equivalent to LAeq,8h).

11.6.30. The 2018 WHO Guidelines complement the WHO 2009 Night Noise Guidelines and suggest a recommended 45 dB L_{night} for road traffic noise based on a 3% risk of being Highly Sleep Disturbed. However, as discussed above the 2018 WHO guidelines state they are "not meant to identify effect thresholds". Instead, they are based on the "smallest relevant risk increase" for various effects, and therefore lie slightly above the LOAEL, as explicitly defined in the WHO 2009 Night Noise Guidelines.

11.6.31. The road traffic noise SOAEL and LOAEL are used to consider how the Proposed Scheme complies with the three policy aims in paragraph 5.195 of the NPSNN, within the context of Government policy on sustainable development:

a. to avoid significant adverse impacts i.e. reduce traffic noise levels at receptors in the study area to below the SOAEL;

b. to mitigate and minimise other adverse impacts i.e. reduce traffic noise levels at receptors in the study area which are between the LOAEL and the SOAEL; and

c. to contribute to improvements where possible, i.e. reduce traffic noise levels at all receptors in the study area where possible.

11.6.32. The assessment sets out what mitigation measures have been incorporated into the Proposed Scheme to meet the three aims, and also any measures which were not considered reasonable or practical to include.

11.6.33. Vibration from traffic can be transmitted through the air or through the ground. Airborne vibration is produced by the engines and exhausts of road vehicles, with dominant frequencies typically in the range of 50 - 100 hertz (Hz). Ground borne vibration is produced by the interaction of the vehicle tyres and the road surface with dominant frequencies typically in the range of 8 - 20 Hz. The passage of vehicles over irregularities in the road surface can also be a source of ground borne vibration.

11.6.34. Traffic vibration can potentially affect buildings and disturb occupiers. DMRB reports that extensive research on a wide range of buildings has found no evidence of traffic

induced ground borne vibration being a source of significant damage to buildings and no evidence that exposure to airborne vibration has caused even minor damage.

11.6.35. Airborne vibration is noticed by occupiers more often than ground borne vibration, as it may result in detectable vibrations in building elements such as windows and doors.

11.6.36. DMRB states that perceptible vibration only occurs in rare cases and identifies that the normal use of a building, such as closing doors and operating domestic appliances, can generate similar levels of vibration to that from traffic in most circumstances.

11.6.37. It is a requirement of new highway constructions that the highway surface be smooth and free from any discontinuities. Paragraph A5.26 of DMRB states, in relation to ground borne vibration: *"Such vibrations are unlikely to be important when considering disturbance from new roads and an assessment will only be necessary in exceptional circumstances"*. Hence, no significant effects from traffic induced ground borne vibration due to the passage of vehicles over irregularities on the proposed scheme are anticipated and no further assessment is proposed.

11.6.38. To assess the magnitude of the impact of traffic induced airborne vibration on residents, a parameter is needed which reflects a person's subjective rating of vibration disturbance. DMRB recommends the use of the $L_{A10,18h}$. The relationship between the $L_{A10,18h}$ and annoyance due to vibration is similar to that for annoyance due to steady state traffic noise, except that the percentage of people bothered by vibration is lower. For a given level of noise exposure, the percentage of people bothered very much or quite a lot by vibration is 10% lower than the corresponding figure for annoyance due to traffic noise. Below 58 dB(A) the percentage of people bothered by traffic induced vibration is assumed to be zero.

11.6.39. The potential for vibration impacts is limited to the immediate vicinity of a road, and the relationship between annoyance due to vibration and traffic noise level in DMRB is based on properties located within 40m of a road. Therefore, at each property within 40m of the proposed scheme and existing junction, and at which traffic noise levels are predicted to be 58 dB, $L_{A10,18h}$ or more, the percentage of people likely to be bothered very much or quite a lot by vibration has been calculated.

Assessing Significance of Effect

Construction

11.6.40. The main factor in identifying construction noise and vibration annoyance significant effects is the magnitude of the impact relative to the SOAEL. In general, construction noise or vibration levels above the SOAEL would be considered significant, and levels below the SOAEL not significant. However, in line with best practice this initial decision on the significance of an effect is then combined with professional judgement which takes into account a range of other factors including:

a. the duration of the impact. Based on the guidance in BS 5228 construction noise or vibration levels above the SOAEL for less than 10 days (or 10 evenings/weekends or nights) in any 15, or less than 40 days (or 40 evenings/weekends or nights) in any 6 month period would not normally be considered significant. At this stage, detailed construction information on the exact timing and duration of individual activities is not known, therefore a conservative judgement has been made of the likelihood of the duration criteria being exceeded based on the available information;

b. the timing of the impact, night time impacts being more likely to be considered significant than daytime impacts;

c. the location of the impact at the receptor, for example, a receptor may contain areas which are more or less sensitive than others, e.g. in a school, office spaces or kitchens would be considered less sensitive than classrooms; and

d. the nature, times of use and design of the receptor, e.g. a receptor which is not used at night would not be considered sensitive to night time construction works.

11.6.41. The magnitude of the impact of construction traffic on public roads is assigned based on the anticipated change in traffic noise level, in accordance with the same criteria as used for short term operational road traffic noise impacts, as detailed in Table 11-8. The significance of the effect of construction traffic is considered in the same way as operational traffic noise as detailed in the Operational traffic – significance of effect section below.

Operational traffic noise

11.6.42. An initial identification of significant effects is carried out based on the magnitude of change in traffic noise levels due to the Proposed Scheme. DMRB provides two example classifications for the magnitude of the traffic noise impact of a proposed road scheme, as shown in Table 11-8. These relate to both short-term changes and long-term changes in noise levels. The short-term classification detailed in Table 11-8 is the main driver of the initial identification of significant effects.

Table 11-8: Magnitude of traffic noise impacts

Short term change		Long term change	
Noise level change (rounded to 0.1dB) $L_{A10,18h}$ dB	**Magnitude of impact**	**Noise level change (rounded to 0.1dB) $L_{A10,18h}$ dB**	**Magnitude of impact**
0	No change	0	No change
0.1 – 0.9	Negligible	0.1 – 2.9	Negligible
1.0 – 2.9	Minor	3.0 – 4.9	Minor
3.0 – 4.9	Moderate	5.0 – 9.9	Moderate
5.0+	Major	10.0+	Major

11.6.43. In general, a negligible or minor magnitude of impact is not normally considered significant and a moderate or major magnitude of impact is normally considered significant. However, in line with best practice this initial decision on the significance of an effect is then combined with professional judgement which takes into account a range of other factors including:

a. the absolute noise levels e.g. if traffic noise levels are already very high (above the SOAEL) then a smaller noise level change than outlined in Table 11-8 may be considered significant. Conversely if traffic noise levels are very low (below the LOAEL) then a larger noise level change may be required to be considered significant;

b. where the magnitude of change in the short term lies relative to the boundaries between the bands outlined in Table 11-8, e.g. in some circumstances a change of e.g. 2.9 dB, which just falls into the minor category, may be considered significant;

c. if the magnitude of change in the long-term is different than the short term, e.g. if the short-term change is minor (not significant) but the long-term change is moderate (significant) then a significant effect may be identified;

d. the circumstances of the receptor, e.g. a receptor may contain areas which are more or less sensitive than others, e.g. office spaces or kitchens in a school, would be considered less sensitive than classrooms. Alternatively, if a receptor is particularly vulnerable, such as a school for hearing impaired children;

e. the acoustic character of an area, e.g. if a scheme introduces road noise into an area where road noise is not currently a major source;

f. the likely perception of a traffic noise change e.g. does the noise change combine with other changes, such as an increase in the visibility of a road, which may increase the perceived impact; and

g. the proportion of a designated site that is affected, e.g. comparing the proportion of a designated site within the noise study area, such as SSSIs, that is above the LOAEL or SOAEL in each assessment scenario.

11.7. Assessment Assumptions and Limitations

Construction

11.7.1. The assessment of construction noise and vibration impacts has been undertaken using information provided on main construction activities, including their programming, types of plant likely to be used, and their on-times. The main activities are summarised in Table 11-9. However, the exact number, type and location of the noise and vibration sources for each construction activity and screening requirements will not be determined until the approach to construction is finalised.

11.7.2. Although many of the construction activities will take place during day-time hours, it may be necessary to carry out some of these works, such as road planing, resurfacing and piling, during the night-time.

Table 11-9: Construction Activities

Construction Activity	Description
Compound set up	Earthworks, Drainage installation, surfacing works
Construction of overpass ramps	Earthworks, Drainage installation, surfacing works, ducting, kerb installation, piling, structures work, street light installation
Construction of slip roads and junction tie-in	Earthworks, surfacing works, street lighting installation
Bridge pier construction	Piling, structures work
Overpass bridge construction	Structures works, drainage installation, surfacing, kerb installation, street lighting installation
Slip road tie ins to main line	Surfacing works

11.7.3. Construction noise and vibration levels likely to occur from these activities have been predicted at a number of receptors close to the proposed scheme. For the purposes of the calculations, the source of the noise from any given construction activity has been assumed to be located at the closest approach to the receptor. Construction noise levels have also been calculated to predict the effects of on-site screening, where appropriate, such as in the vicinity of sensitive receptors. In the absence of more detailed information, the ground floor of buildings has been assumed to be of suspended slab construction when predicting levels of vibration due to construction activities.

Operation

11.7.4. Ground height information used in the assessment for areas outside the scheme boundary has been derived from Ordnance Survey Digital Terrain Model (5m grid) processed into 2m contours. An existing ground height topographic survey and the proposed 3D scheme design have been utilised to define the existing and proposed ground heights within the Proposed Scheme boundary.

11.7.5. The assessment of daytime traffic noise impacts has been based on Annual Average Weekday traffic (AAWT) 18-hour (06:00-24:00) flows and the appropriate speed band, the latter as set out in Highways England Interim Advice Note 185/15. The assessment of night time traffic noise impacts has been completed in accordance with *Method 3* as detailed in DMRB.

11.7.6. Road surfaces on the A46 carriageway in all scenarios have been assumed to be low noise, based on information provided. Hot rolled asphalt has been assumed on all other routes in all scenarios. For Low Noise Surfacing, a correction factor of -3.5 dB for speeds at or above 75kph has been modelled as prescribed in Annex 4 of HD 213/11. For standard hot rolled asphalt the corresponding correction at speeds at or above 44.6mph (75kph) is -0.5 dB. At speeds below 44.6mph (75kph) the correction is -1 dB for all surfaces.

11.7.7. Building receptors have been identified by cross-referencing OS Mastermap building footprints with AddressBase Premium data. Building heights for residential receptors have been assigned according to the number of floors within the building, which has been estimated from Ordnance Survey data. Building heights for non-residential receptors, and all other buildings, have been assigned using Ordnance Survey data.

11.7.8. Façade noise levels have been calculated at the top floor for all residential and non-residential sensitive receptors within the 600m calculation area.

11.7.9. Traffic Forecasting Report (SGA R3) (Ref. 15-3) has been used to inform the traffic data used for the air quality and noise and vibration chapters. This uses the Coventry Area Strategic Model (CASM) to assess the impact of the proposed scheme in combination with forecast developments on the surrounding transport infrastructure. The traffic model is currently being updated to reflect regular reviews and updates, which include updates for recent developments. It is planned for the output of this model to be included in a revised air quality and noise assessment in early 2020 to confirm the findings in this environmental assessment report remain valid.

11.8. Design, Mitigation and Enhancement Measures

Construction

11.8.1. As set out in the previous section, the assessment of construction noise and vibration levels has been undertaken using currently available information relating to construction activities. This information does not include details on the exact siting of construction plant and mitigation which will be determined at the construction stage.

11.8.2. However, Best Practicable Means will be applied by the contractor, so that noise and vibration levels resulting from the construction of the Proposed Scheme are minimised as far as reasonably practicable. Examples of Best Practicable Means include:

- Monitor existing ambient noise levels prior to works commencing
- Review of construction programme and methodology to consider low noise and low vibration methods (including non-vibratory compaction plant and low vibration piling methods, where required)
- Optimal location of equipment on site to minimise noise disturbance

- Provision of acoustic enclosures around static plant, where necessary
- Use of less intrusive alarms, such as broadband vehicle reversing warnings
- Local screening of equipment and employment of perimeter hoarding
- Agree Section 61 *Prior Consent* or other restrictions with the relevant local authority prior to works commencing
- Communicate details of any noisy works or those likely to cause vibration to neighbours prior to works commencing
- Monitor noise/vibration levels where required

11.8.3. The contractor will investigate measures to reduce construction noise levels at nearby receptors by 10dB during detailed design, for example through selection of quieter machinery or change in working practices. Where this is not possible, temporary and mobile noise screening will be installed during the construction phase to block the line of sight between the construction works and residential receptors along Kings Park Drive, Cocked Hat Hotel and Restaurant, and the Premier Inn. It is anticipated this screening will reduce noise levels by approximate 10dB at these receptors. If necessary, the affected rooms in the Cocked Hat Hotel and Restaurant, and the Premier Inn will be booked out by the contractor to remove these receptors from experiencing significant construction noise effects.

11.8.4. Additional measures will be applied to avoid significant adverse effects from vibration during construction; this is proposed to comprise using non-vibratory rollers to compact earthworks and surfacing layers. Should this not be feasible, the contractor will block book the affected receptors where significant effects have been predicted (the Cocked Hat Hotel and Restaurant and the Premier Inn) to effectively remove these receptors so no visitors or customers experience the predicted level of effect.

Operation

11.8.5. The proposed scheme vertical and horizontal alignment, together with the use of low noise surfacing materials throughout its length, have been incorporated into the assessment to minimise the likely operational noise impacts.

11.8.6. However, the proposed scheme alignment and surfacing alone are not sufficient to avoid likely significant adverse effects on residential properties north of the Warwickshire Shopping Centre. Therefore, a 2.5m high noise barrier of approximately 300m in length is included in this location to avoid such an effect. The location of this barrier is shown in Chapter 18: Figure 11-1.

11.8.7. Measures to further minimise the likely operational noise impacts from the proposed viaduct passing over the junction, such as the provision of solid parapets, are being considered as part of the detailed design phase.

11.9. Assessment of Effects

Construction noise

11.9.1. An assessment has been undertaken of the impacts likely to occur from key activities during the construction of the proposed scheme. A number of receptors have been identified which are closest to the proposed scheme and therefore expected to be worst affected by the construction works. Details of these receptors and the distance between them and key construction activities are set out in Table 11-10. Receptor locations are identified on Figure 11-1.

Table 11-10: Distances (m) between Construction Activities and Closest Receptors

Receptor Name/ Construction activities	R1: Rugby Road (North)	R2: Kings Park Drive	R3: Cocked Hat Inn	R4: Rugby Road (South)	R5: Dowley Croft	R6: Premier Inn*	R7: Rugby club*
Compound set up	280	150	125	330	135	320	360
Construction of overpass ramp	200	75	15	235	255	25	30
Construction of slip roads and junction tie-in	150	30	5	195	225	10	25
Bridge pier construction	190	285	60	255	550	35	60
Overpass bridge construction	190	285	60	255	550	35	60
Slip road tie ins	500	45	195	415	165	220	215

11.9.2. The current construction programme indicates that there are a number of activities which will take place simultaneously, in part or in whole. These include the following:

- Construction of slip road and junction tie-ins in the four junction quadrants
- Bridge pier construction and construction of overpass ramps

11.9.3. Construction noise levels likely to arise from these combined activities have been predicted at individual receptors close to the proposed scheme.

11.9.4. The noise levels predicted to arise from construction activities at receptors close to the proposed scheme and whether the LOAEL and/or SOAEL are predicted to be exceeded, are summarised in Table 11-11. The predicted noise levels shown are worst-case based on all plant working and represent the highest noise level from construction activities. As detailed in section 11.3, to define the SOAEL and LOAEL ambient noise levels at the relevant façade of each of the selected receptors have been determined based on predicted 2021 baseline traffic noise levels.

11.9.5. Night time works are likely to take place during the construction period, but will be restricted to planing and surfacing works at slip road tie-ins. The noise levels predicted to arise from this particular construction activity at receptors close to the proposed scheme are shown in Table 11-12.

Table 11-11: Daytime Construction Noise Levels at Closest Affected Receptors

	LAeq,12h dB (façade)						
	R1: Rugby Road (North)	R2: Kings Park Drive	R3: Cocked Hat Hotel	R4: Rugby Road (South)	R5: Dowley Croft	R6: Premier Inn*	R7: Broad Street Rugby Club (residential receptor)
Compound set up	63	68	70	62	69	62	61

Construction of overpass ramps	67	65*	79*	65	65	75*	72*
Construction of slip roads and junction tie-in	65	69*	85*	63	62	79*	71*
Bridge pier construction	64	60	74	61	54	68*	74
Overpass bridge construction	65	62	65*	63	56	70*	65*
Slip road tie ins	54	65*	62	56	64	61	62
Combined Impact: Construction of slip road and junction tie-ins in all junction quadrants	67	70*	85*	65	64	79*	72*
Combined Impact: Bridge pier construction and construction of overpass ramps	68	65*	79*	67	65	76*	74*
Daytime SOAEL	70	70	75	70	65	70	70
Daytime LOAEL	65	65	69	65	58	63	65
Any construction noise activity Exceed SOAEL	N	N	Y	N	Y	Y	Y
Any construction noise activity Exceed LOAEL	N	N	Y	N	Y	Y	Y

*Assumes screening is in place close to receptors which blocks line of sight, or equivalent measure, which reduce noise levels by approximate 10dB

Table 11-12: Night time Construction Noise Levels at Closest Affected Receptors

	LAeq,8h dB (façade)						
	R1: Rugby Road (North)	**R2: Kings Park Drive**	**R3: Cocked Hat Hotel**	**R4: Rugby Road (South)**	**R5: Dowley Croft**	**R6: Premier Inn**	**R7: Broad Street Rugby Club (residential receptor)**
Night SOAEL/ Night LOAEL	55/55	58/58	60/60	57/57	55/52	58/58	56/56
Slip road tie ins	54	65*	52*	56	54*	53*	52*
Any construction noise activity Exceed SOAEL/ Exceed LOAEL	N/N	Y/Y	N/N	N/N	N/Y	N/N	N/N

** Assumes screening is in place close to receptors which blocks line of sight, or equivalent measure, which reduce noise levels by approximate 10dB*

11.9.6. The results in Table 11-11 indicate that during the construction works, the SOAEL is predicted to be exceeded at a number of receptors during the day. The results in Table 11-12 indicate that the SOAEL is predicted to be exceeded during the night at receptor R2 (Kings Park Drive). The predicted noise levels for individual activities represent the highest that would be expected to occur. The nature of the construction phase means that the worst case situation predicted may exist only for a matter of days or even hours. There would be regular periods during which the assumed plant would not be in operation, for example during breaks or changes in working routine.

11.9.7. At receptors at the northern extent of the scheme (R2) as well as to the east along Rugby Road (R1 and R4), there are no exceedances of daytime SOAEL predicted to occur from any of the construction operations during the day. However, an exceedance of the SOAEL during the night at receptor R2 is predicted to occur due to slip road tie in works. Such works are of limited duration, lasting a few nights and therefore when taking the level and short duration of these works into account, the adverse effect on this receptor is not considered significant.

11.9.8. Construction noise levels at receptors close to the works (R5) are predicted to exceed SOAEL during the day due to the compound construction. However, due to the nature of these works, the risk of levels of SOAEL occurring for more than 10 days in 15, or 40 days in 6 months is low, and therefore a significant adverse construction noise effect is considered unlikely to occur at this receptor.

11.9.9. At the very closest receptors to the junction (R3, R6 and R7), the SOAEL is predicted to be exceeded due to the construction of the overpass ramps, slip roads and bridge piers. There is a risk of levels above the SOAEL occurring for more than 10 days in 15, or 40 days in 6 months and therefore the adverse construction noise effect is classed as significant at these receptors.

Construction traffic

11.9.10. Information provided on construction traffic likely to be generated for the proposed scheme has indicated that an average of 33 additional HGV movements per day in each direction is likely for the duration of the construction. In determining the impact of these additional HGV movements on road traffic noise levels at nearby sensitive receptors, traffic flows predicted for the 2021 Do-Minimum situation have been assumed as those likely to occur immediately prior to construction. The additional HGVs have also been assumed to be travelling solely on either the A46 northbound carriageway or A46 southbound carriageway.

11.9.11. Using these assumptions, two-way traffic flows on the northbound A46 would increase from 61766 to 61832 during construction with %HGV increasing from 5.0% to 5.1% respectively. Similarly, two-way traffic flows on the A46 southbound carriageway would increase from 60313 to 60379 during construction with %HGV increasing from 4.0% to 4.1%. These increases in flows and HGVs result in no increase in the CRTN Basic Noise Level alongside either the A46 northbound or southbound carriageways and therefore no impacts as a result of construction traffic are likely to occur at any receptor close to the works. Therefore, a significant adverse effect from construction traffic is not considered likely.

Construction vibration

11.9.12. Both residential and non-residential properties have been identified close to the construction works with the potential to be affected by vibration. In all cases, the closest construction activity to these receptors which is likely to give rise to vibration is the use of vibratory rollers for earthworks and surfacing compaction associated with nearby slip road construction. These properties, the approximate closest distance to the source of vibration and the Peak Particle Velocity (ppv) levels likely to arise from this construction activity are set out in Table 11-13. Predictions of vibration have been undertaken at two points along the facades of the Cocked Hat Hotel and Restaurant and Premier Inn, to provide a range of ppv levels these receptors are likely to be exposed to.

Table 11-13: Continuous Vibration Level Predictions from use of Vibratory Rollers

Receptor	Peak Particle Velocity (mms^{-1}) at different floors in building	
	Foundation (Building damage)	First Floor (Annoyance)
Cocked Hat Hotel (5m from vibration source)	4.40	10.46
Cocked Hat Hotel (13m from works)	1.45	2.89
Premier Inn (10m from vibration source)	1.98	2.08
Premier Inn (24m from vibration source)	0.64	0.6
Kings Park Drive (40m from vibration source)	0.36	0.29
Broadstreet Rugby Club residential receptor (25m from vibration source)	0.64	0.56

11.9.13. The predicted ppv at the foundation at all receptors is below 6mm/s and therefore, significant adverse effects resulting from building damage are unlikely to occur due to construction vibration.

11.9.14. In terms of annoyance to occupiers, the predicted maximum ppv is between LOAEL and SOAEL at four receptors which are close to earthworks and pavement works associated with slip road construction. These vibration levels are expected to be experienced regularly during periods when their nearby slip road construction is planned to take place.

11.9.15. At the closest approaches to the Premier Inn and Cocked Hat Hotel and Restaurant, the predicted maximum ppv is above the SOAEL at first floor levels and above. These vibration levels are expected to be experienced regularly during the 6 months period which the nearby slip road construction is planned to take place. There is a risk of levels above the SOAEL occurring for more than 10 days in 15, or 40 days in 6 months and therefore the adverse construction vibration effects at these receptors is classed as significant. Additional measures will therefore be applied to avoid these significant adverse effects; this is proposed to comprise using non-vibratory rollers to compact earthworks and surfacing layers. Should this not be feasible, the contractor will consider other measures, such as temporary rehousing or block booking the affected non-residential receptors to effectively remove these receptors so no visitors or customers experience the predicted level of effect.

Operation – Direct Noise and Vibration Impacts

11.9.16. Noise modelling has been undertaken for the Do-Minimum and Do-Something in both the opening year of the proposed scheme, 2021 and in the future assessment year (2036).

11.9.17. The short term change in predicted daytime road traffic noise levels in 2021 between the Do-Minimum and Do-Something scenarios, at both residential and non-residential sensitive receptors within the 600m noise calculation study area, are summarised in Table 11-14.

Table 11-14: Short term Daytime Noise impacts with the Proposed Scheme

Change in Noise Level		Daytime	
		Number of Residential Buildings	Number of Other Sensitive Receptors
Increase in noise level Daytime $L_{A10,18h}$ dB/	0.1 - 0.9	920	1
	1.0 - 2.9	358	2
	3.0 - 4.9	0	0
	≥5	0	0
No change	0	9	0
Decrease in noise level Daytime $L_{A10,18h}$ dB	0.1 - 0.9	6	0
	1.0 - 2.9	0	0
	3.0 - 4.9	0	0
	≥5	0	0

11.9.18. The long term change in predicted daytime and night-time road traffic noise levels Do-Minimum scenario in 2021 and Do-Something scenario in 2036, at both residential and non-residential sensitive receptors within the 600m noise calculation study area, are summarised in Table 11-15.

Table 11-15: Long term Daytime and Night-time Noise impacts with the Proposed Scheme

Change in Noise Level		Daytime		Night time
		Number of Residential Buildings	Number of Other Sensitive Receptors	Number of residential buildings
Increase in noise level Daytime LA10,18h dB/ Night-time $L_{night,outside}$ dB	0.1 - 2.9	1254	2	152
	3.0 - 4.9	19	1	0
	5.0 - 9.9	0	0	0
	≥10	0	0	0
No change	0	5	0	5
Decrease in noise level Daytime LA10,18h dB/ Night-time $L_{night,outside}$ dB	0.1 - 2.9	15	0	13
	3.0 - 4.9	0	0	0
	5.0 - 9.9	0	0	0
	≥10	0	0	0

11.9.19. An assessment of the change in annoyance to residents likely to occur from the proposed scheme has been undertaken. The likely worst case change in traffic noise annoyance (between the Do Minimum 2021 to Do Something 2036) is summarised in Table 11-16.

Table 11-16: Worst Case Changes in Traffic Noise Annoyance (Do Minimum 2021 to Do Something 2036)

Change in Noise Annoyance		Number of Residential Buildings
Increase noise annoyance	<10%	51
	10 - 20%	823
	20 - 30%	419
	30 - 40%	0
	>40%	0
No change	0%	0
Decrease in noise annoyance	<10%	0
	10 - 20%	0
	20 - 30%	0
	30 - 40%	0
	>40%	0

11.9.20. An estimated total of 1293 residential buildings are located within the 600m noise prediction area. However, in the night-time only 170 properties meet the DMRB criterion of 55 dB $L_{night,outside}$ at one or more facades in one or more scenarios for inclusion in the night-time assessment.

11.9.21. A total of three non-residential buildings are located within the 600m noise calculation area, consisting of one community facility and two hotels.

11.9.22. The noise changes due to the scheme in the short term (Do Minimum 2021 to Do Something 2021) and long-term (Do Minimum 2021 to Do Something 2036) are presented as noise difference contour plots in Chapter 18: Figures 11-3 and 11-4 respectively. These maps are based on free-field traffic noise levels at first floor level. These plots are based on a 10m x 10m grid and are provided for illustration purposes only.

11.9.23. In the short term, 1278 residential properties are expected to experience an increase in noise level due to the proposed scheme. 358 of these are expected to experience a minor increase in noise level, with the maximum increase being +2.8dB(A). The remaining 920 experience a negligible increase. Those experiencing minor increases include properties located to the south-east and north-west of the proposed scheme, and these increases are attributable to the main A46 carriageway being raised from its current position which carries traffic at increased speeds through the junction, as well as realigned slip roads bringing traffic closer to residential properties.

11.9.24. 15 residential properties experience either no change or negligible decreases in noise level in the short term due to the proposed scheme. The majority of these decreases are at properties to the north-west of the scheme in the vicinity of Kings Park Drive and surrounding roads, and are attributable to the 2.5m noise barrier proposed alongside the proposed northbound on-slip.

11.9.25. All non-residential sensitive receptors within the 600m calculation area are expected to experience an increase in noise in the short-term due to the proposed scheme. A negligible increase in noise is likely to occur at the John White Community Centre, with the Cocked Hat Hotel and Restaurant and the Premier Inn likely to experience minor increases. The predicted minor increases in daytime noise level at the Cocked Hat Hotel and Restaurant and the Premier Inn are likely to result from realigned slip roads bringing traffic closer to these receptors.

11.9.26. Taking into account the magnitude of the impacts likely to occur at receptors significant adverse effects are unlikely to occur due to road traffic noise in the day time from the proposed scheme in the short term.

11.9.27. In the long term, a vast majority of residential buildings are expected to experience an increase in traffic noise level due to the proposed scheme, during both the day and night. 19 of these properties are predicted to experience a minor increase in noise during the daytime, with the remainder predicted to experience a negligible increase in noise during the day or night. In contrast, a small number of properties are expected to experience a negligible decrease in traffic noise levels during the day and night due to the proposed scheme. Those expected to experience minor increases include properties located to the south-east and north-west of the proposed scheme, and these increases are attributable to the main A46 carriageway being raised from its current position which carries traffic at increased speeds through the junction, as well as realigned slip roads bringing traffic closer to residential properties.

11.9.28. Those predicted to experience negligible decreases in noise are those properties in the vicinity of Skipworth Road, where a decrease in road traffic flows is forecast as a result of the proposed scheme.

11.9.29. All non-residential sensitive receptors within the 600m calculation area are expected to experience a negligible increase in noise in the long term due to the proposed scheme, except for the Premier Inn hotel, which is predicted to experience a minor increase in noise. This minor increase is attributable to the movement of road traffic closer to this receptor.

11.9.30. Taking into account the magnitude of the impacts likely to occur at receptors, significant adverse effects are unlikely to occur due to road traffic noise during the daytime and night-time from the proposed scheme in the long term.

Operational Traffic Noise – Above SOAEL

11.9.31. Table 11-17 details the number of residential buildings in the 600m study area which would have one or more facades above the daytime or night-time SOAEL in the four assessment scenarios.

Table 11-17: Number of residential buildings above the SOAEL

Scenario	Day	Night
2021DM	150	124
2021DS	145	122
2036DM	154	124
2036DS	138	120

11.9.32. The proposed scheme would result in an overall reduction in the number of buildings with one or more façade experiencing traffic noise above the SOAEL in the long term. This is due to the proposed scheme resulting in a reduction in road traffic noise levels at properties along Skipworth Road. As a consequence, the traffic noise levels at a number of properties along this road reduce below SOAEL. No residential building in the vicinity of the proposed scheme which experiences noise levels above the SOAEL experiences an increase of 1dB or more in the short term.

11.9.33. The majority of residential buildings which remain above the SOAEL with the proposed scheme are in close proximity to Brinklow Road, Rugby Road, Skipworth Road and a number of residential roads connecting with Skipworth Road. However, these residential properties experience only a negligible change in traffic noise levels due to the Proposed Scheme both in the short and long term.

11.9.34. A preliminary consideration of properties which may qualify for noise insulation works under the Regulations has been undertaken. No properties are predicted to meet all the criteria required to be eligible for noise insulation under the Regulations. However, a detailed Noise Insulation Regulations assessment would be completed at a later stage of the project when the proposed scheme design is finalised and in accordance with the timescales set out in the Regulations.

Operational Traffic Noise – Designated Sites

11.9.35. The traffic noise modelling area covers approximately 91% of Herald Way Marsh SSSI. The north east corner of the SSSI is a minimum of 300m to the south west of the scheme. As illustrated in Figure 11-3, the magnitude of change in traffic noise levels in the opening year across the SSSI is negligible. Table 11-18 details the percentage of the area of the SSSI within the noise modelling area which falls below the daytime LOAEL, between the LOAEL and SOAEL and above the SOAEL, as defined in paragraphs 11.6.26-11.6.28 with regards to impacts on human receptors.

Table 11-18 Percentage of area of Herald Way Marsh SSSI within modelling area

Daytime traffic noise levels LAeq,16hr dB (free field)	Scenario % of area			
	2021 DM	2036 DM	2021 DS	2036 DS
Below LOAEL (50dB)	0	0	0	0
Between LOAEL and SOAEL (50-63 dB)	78	74	74	69
Above SOAEL (63dB)	22	26	26	31

11.9.36. The proximity of the SSSI to the A46 results in a small percentage increase of the area increasing to above the SOAEL in operation. Further details of the impact of the Proposed Scheme on biodiversity features are provided in Chapter 8 Biodiversity.

11.9.37. The traffic modelling area covers approximately 25% of the Combe Pool SSSI. Table 11-19 details the percentage of the area of the SSSI within the modelling area which falls below the daytime LOAEL, between the LOAEL and SOAEL and above the SOAEL as defined in paragraphs 11.6.26-11.6.28 with regards to impacts on human receptors.

Table 11-19 Percentage of area of Combe Pool SSSI within modelling area

Daytime traffic noise levels LAeq,16hr dB (free field)	Scenario % of area			
	2021 DM	2036 DM	2021 DS	2036 DS
Below LOAEL (50dB)	0	0	0	0
Between LOAEL and SOAEL (50-63 dB)	94	96	94	96
Above SOAEL (63dB)	6	4	6	4

11.9.38. The negligible increase in traffic noise levels along the Brinklow Road results in no material change in the area of the SSSI above SOAEL in operation. Further details of the impact of the Proposed Scheme on biodiversity features are provided in Chapter 8 Biodiversity.

Operational Traffic Vibration

11.9.39. A summary of the change in annoyance in the long term, due to airborne vibration from road traffic between the 2021 Do Minimum and 2036 Do Something scenarios, is provided in Table 11-20. Two residential properties have been identified within 40 m of the proposed scheme, these being in Kings Park Drive to the north-west of the proposed scheme and the residential receptor at Broadstreet Rugby Club. The property in Kings Park Drive is likely to experience a negligible decrease in annoyance due to airborne vibration, as a result of the 2.5m noise barrier proposed along the northbound on-slip. The residential property at Broadstreet Rugby Club is likely to experience a negligible increase in annoyance due to airborne vibration as a result of the main A46 carriageway being raised from its current position which carries traffic at increased speeds through the junction.

Table 11-20: Worst Case Change in Airborne Vibration Annoyance

Change in Annoyance		Number of Residential Buildings
Increase in airborne vibration annoyance	<10%	1
	10 - 20%	0
	20 - 30%	0
	30 - 40%	0
	>40%	0
No change	0%	0
Decrease in airborne vibration annoyance	<10%	1
	10 - 20%	0
	20 - 30%	0
	30 - 40%	0
	>40%	0

Summary of Operational Traffic Environmental Effects

11.9.40. A summary of the identified traffic noise environmental effects, including a summary of the justification for the significance conclusion is provided in Table 11-21.

Table 11-21: Summary of operational traffic environmental effects

Receptor	Magnitude of Impact in short term	Significance	Justification
358 residential buildings within Binley Woods and the Morrisons Estate, plus The Cocked Hat Hotel and Premier Inn	Minor Increase	Not significant	Minor increase in road traffic noise. Levels below SOAEL. Increases are attributable to the main A46 carriageway being raised from its current position which carries traffic at increased speeds through the junction, as well as realigned slip roads bringing traffic closer to residential properties. Moderate increases in the vicinity of Kings Park Drive reduced to minor as a result of noise barrier along northbound on-slip. Unlikely to change residents and users of non-residential receptors response to traffic noise.
Remainder of receptors in the study area, including majority of residential buildings and non-residential receptors.	Negligible increase and decrease/no change	Not significant	Magnitude of change not significant. Unlikely to change residents and users of non-residential receptors response to traffic noise.

11.9.41. The key policy within NPSNN is in paragraph 5.195 *'The Secretary of State should not grant development consent unless satisfied that the proposals will meet the following aims, within the context of Government policy on sustainable development:*

a) *Avoid significant adverse impacts on health and quality of life from noise as a result of new development;*

b) *Mitigate and minimise other adverse impacts on health and quality of life from noise from the new development; and*

c) *Contribute to improvements to health and quality of life through the effective management and control of noise, where possible.'*

11.9.42. To maintain consistency with EIA and DMRB terminology used throughout the assessment the discussion below refers to adverse effects rather than impacts.

11.9.43. With regards to identifying sustainable mitigation measures, factors including the cost versus the benefit, engineering practicality, any other impacts (such as landscape/visual) and consultation/stakeholder engagement responses are considered.

Construction

11.9.44. Significant adverse effects occur for construction noise and vibration levels above the SOAEL (see Tables 11-4 and 11-5) which potentially occur for more than 10 days in 15, or 40 days in 6 months. Adverse effects occur at construction noise or vibration levels between the LOAEL and SOAEL. The third aim applies to all construction noise levels.

11.9.45. With regard to the first aim, significant adverse effects are predicted at this stage to occur at three locations:

(a) Residential receptor at Broadstreet Rugby Club

(b) Premier Inn

(c) Cocked Hat Hotel

11.9.46. These significant adverse effects are due to the close proximity of these receptors to construction activities and duration of works. The assessment includes a range of mitigation measures as detailed in section 11.8 including: selection of quiet and low vibration equipment and methodologies; review of construction programme and methodology to consider low noise/low vibration methods; optimal location of equipment on site to minimise noise disturbance; the provision of acoustic enclosures around static plant, where necessary; use of less intrusive alarms, such as broadband vehicle reversing warnings.

11.9.47. As detailed above, the contractors would review the proposed working methods to consider all sustainable mitigation measures, with the aim of avoiding significant effects. However, at this stage it is anticipated that significant adverse effects are likely to remain. This is acceptable in the context of sustainable development as factors such as engineering practicality, cost versus benefit as outlined above must be considered. On this basis, the first aim is met during construction.

11.9.48. With regard to the second aim, adverse effects between LOAEL and SOAEL are predicted at this stage at a range of receptors. The mitigation and minimisation measures outlined above and detailed in section 11.8 would be applied throughout the works, and therefore would benefit all receptors experiencing construction noise and vibration, including those with levels between LOAEL and SOAEL. Construction impacts between LOAEL and SOAEL are acceptable in the context of sustainable development as factors such as engineering practicality, cost versus benefit as outlined above must be considered. On this basis, the second aim is met during construction.

11.9.49. Construction noise and vibration by its nature introduces a new noise of vibration source into the existing environment and is temporary in duration, therefore the opportunity to improve existing noise levels is very limited.

Operation

11.9.50. Significant operational adverse effects occur at traffic noise levels above SOAEL (see paragraphs 11.6.26-11.6.28) and adverse effects occur at traffic noise levels between LOAEL and SOAEL. The third aim applies to all traffic noise levels. Table 11-17 details the number of residential buildings which are above the SOAEL with and without the proposed scheme. Most of the remaining buildings are between the LOAEL and SOAEL with and without the Proposed Scheme.

11.9.51. With regards to the first aim, the proposed scheme has resulted in a reduction in road traffic noise levels at a number of properties along Skipworth Road to below SOAEL in the long term due to a reduction in traffic flow along this route.

11.9.52. The majority of the remaining residential buildings above the SOAEL, following the opening of the proposed scheme, are in close proximity to existing roads such as Rugby Road and Brinklow Road. Such routes are already above the SOAEL without the Proposed Scheme and only experience a negligible change in traffic noise levels due to the scheme. The introduction of mitigation measures along existing roads which already experience high noise levels, to mitigate the effect of the proposed scheme, is not sustainable. Such roads in built up areas have residential buildings fronting onto the road, therefore mitigation measures such as barriers are not a practical engineering option and would have other adverse impacts such as visual and access difficulties.

11.9.53. With regard to the second aim, a range of further mitigation measures have been incorporated into the design as outlined in section 11.8. These include using a thin surfacing which results in lower levels of noise generation than a standard hot rolled asphalt surface at speeds at and above 75km/h and inclusion of a 300m long, 2.5m high noise barrier along the northbound on-slip.

11.9.54. The decision to include a noise barrier alongside the northbound on-slip was made in part to demonstrate the second aim is met. The horizontal alignment of the barrier has been determined to ensure physical constraints between the verge and highway boundary are met. The proposed height has resulted from determining a balance between the noise benefit and visual impact.

11.9.55. The inclusion of all the above identified mitigation and minimisation measures demonstrate that, within the context of sustainable development, at receptors between LOAEL and SOAEL the Proposed Scheme meets the requirements of the second aim.

11.9.56. With regard to the third aim to ‘improve where possible’, the opportunities to improve noise levels has been limited. A reduction in traffic flow on Skipworth Road forecast to occur over the long term is predicted to improve noise levels at a number of properties along the route. However, the provision of mitigation alongside other existing roads to improve existing noise levels, in addition to increasing the extent and height of the proposed noise barrier alongside the northbound on-slip, are not considered to be sustainable.

Summary of residual significant effects

11.9.57. Table 11-22 summarises the residual significant effects during construction. No significant adverse effects have been identified as likely to occur during operation.

Table 11-22: Summary of significant effects - construction

Receptor	Attribute	Impact	Design and Mitigation Measures	Impact Magnitude	Residual effect
Residential receptor at Broadstreet Rugby Club	Noise	Noise levels exceeding SOAEL for short periods during construction of slip roads	Use of BPM and compliance with control measures detailed in the CEMP	Exceeds SOAEL	Significant adverse
Premier Inn	Noise	Noise levels exceeding SOAEL for short periods during construction of slip roads	Use of BPM and compliance with control measures detailed in the CEMP	Exceeds SOAEL	Significant adverse
Cocked Hat Hotel	Noise	Noise levels exceeding SOAEL for short periods during construction of slip roads	Use of BPM and compliance with control measures detailed in the CEMP	Exceeds SOAEL	Significant adverse
Premier Inn	Vibration	Vibration levels exceeding SOAEL for short periods during construction of slip roads	Use of BPM and compliance with control measures detailed in the CEMP	Exceeds SOAEL	Significant adverse
Cocked Hat Hotel	Vibration	Vibration levels exceeding SOAEL for short periods during construction of slip roads	Use of BPM and compliance with control measures detailed in the CEMP	Exceeds SOAEL	Significant adverse

11.10. Monitoring

11.10.1. Monitoring of noise and vibration levels will be undertaken during the construction phase at locations to be determined by the contractor. Such monitoring will inform the contractor when action is necessary, such as shutting down plant or machinery, to reduce the risk of significant adverse effects from occurring. As detailed in section 11.8 the performance specification of specific operational mitigation measures would be confirmed at the detailed design stage to ensure the performance assumed in the assessment is achieved, and surveys to ensure that measures are installed as required would be undertaken.

12. PEOPLE AND COMMUNITIES

12.1. Introduction

12.1.1. This chapter considers the impacts of the Proposed Scheme on people and communities.

12.1.2. In accordance with Highways England's Interim Advice Note (IAN) 125/15 (Ref. 12-1), this chapter considers the proposed scheme's impact upon people and communities and has been undertaken in accordance with guidance provided in the *Design Manual for Roads and Bridges (DMRB) Volume 11 (Section 3 Part 6: Land Use; Part 8: Pedestrians, Cyclists, Equestrians and Community Effects; and Part 9: Vehicle Travellers)* (Ref. 12-2).

12.1.3. The assessment considers any impacts that the Proposed Scheme may have on:

- All Travellers, including Motorised Travellers (MT) (drivers and passengers of both public and private vehicles) and Non- Motorised Users (NMU) (pedestrians, cyclists and equestrians), including amenity and journey length
- Communities, including development land, agricultural land, private and community land and human health

12.1.4. This chapter of the EAR has been undertaken by competent experts with relevant and appropriate experience:

- Principal Consultant, MSc BSc MRTPI
- Consultant, BA (Hons) MIED

12.2. Legislative and Policy Framework

National Policies

National Planning Policy Framework (NPPF), 2019

12.2.1. The revised National Planning Policy Framework (NPPF) was published in July 2018 and revised in February 2019 (Ref. 12-3). The NPPF sets out the Government's economic, social and environmental planning policies for England. It provides a framework within which locally-prepared plans for housing and other development can be produced. The 2019 NPPF replaces the first NPPF published in March 2012.

12.2.2. Chapter 2: 'Achieving Sustainable Development' outlines the NPPF's vision of sustainable development, which the Government states should be seen as a common theme running through plan-making and decision-taking. The NPPF outlines that there are three dimensions to achieving sustainable development: economic, social, and environmental.

12.2.3. With respect to community and social infrastructure, the NPPF identifies key principles that local planning authorities should take into account, including an emphasis on the importance of promoting healthy and safe communities.

National Practice Policy Guidance, 2019

12.2.4. Accompanying the revised NPPF, updates to the National Planning Practice Guidance (PPG) (Ref. 12-4) were also made, the PPG adds further context to the NPPF in respect of land use, communities and accessibility. Specifically, the PPG provides guidance on the following:

- Health and well-being; and

- Open spaces, sports and recreational facilities, public rights of way and local green spaces.

National Policy Statement for National Networks (NPSNN), 2014

12.2.5. The National Policy Statement for National Networks (Ref. 12-5) sets out the need for Government's policies to deliver road and rail network developments in England. It provides planning guidance for promoters of nationally significant infrastructure projects on the road and rail networks, and the basis for the examination by the Examining Authority and decisions by the Secretary of State. Although the Proposed Scheme is not a nationally significant infrastructure projects the following paragraphs within the NPSNN are still relevant to this chapter:

- Para. 5.165 – *'Identify existing and proposed land uses near the project, any effects of replacing an existing development or use of the site with the proposed project or preventing a development or use on a neighbouring site from continuing'*. An assessment is required of any effects of precluding a new development or use proposed in the development plan. The assessment should be proportionate
- Para. 5.166 – *'Existing open space, sports and recreational buildings and land should not be developed unless the land is surplus to requirements or the loss would be replaced by equivalent or better provision in terms of quantity and quality in a suitable location'*
- Para. 5.168 - Consider the *'economic and other benefits of the best and most versatile agricultural land (defined as land in grades 1, 2 and 3a of the Agricultural Land Classification). Where significant development of agricultural land is demonstrated to be necessary'* it is advised to use areas of poorer quality land in preference to that of a higher quality. To identify any effects, and seek to minimise impacts, on soil quality, taking into account any mitigation measures proposed. Where possible, developments should be on previously developed (brownfield) sites provided that it is not of high environmental value.

Regional Policies

12.2.6. The Proposed Scheme falls across two regional authorities: West Midlands County Council and Warwickshire County Council. As such, policies from both are considered in this section.

Movement for Growth: The West Midlands Strategic Transport Plan, 2016

12.2.7. The West Midlands Strategic Transport Plan (2016) (Ref. 12-6) sets out the long term strategy for transport within the wider West Midlands to ensure that it supports economic growth and development within the region.

12.2.8. The overarching vision for the strategy aims to *"make great progress for a Midlands economic 'Engine for Growth', clean air, improved health and quality of life for the people of the West Midlands."*

12.2.9. Objectives within the Plan have been set in order to meet the core challenges faced in the West Midlands region. The challenges and associated objectives that are relevant to the Proposed Scheme include:

- Economic Growth and Economic Inclusion:

- *"ECON2: to support improved levels of economic well-being for people with low incomes in the West Midlands Metropolitan Area to help make it a successful, inclusive, European city region economy"*

- Environment:
  - *"ENV1: To significantly improve the quality of the local environment in the West Midlands Metropolitan Area"*
  - *"ENV2: To help tackle climate change by ensuring large decreases in greenhouse gas emissions from the West Midlands Metropolitan Area."*
- Public Health:
  - *"PUBH2: To significantly reduce the number and severity of road traffic casualties in the West Midlands Metropolitan Area"*
  - *"PUBH3: To assist with the reduction of health inequalities in the West Midlands"*
- Social Well-Being
  - "SOC1: To improve the well-being of socially excluded people."

Warwickshire Local Transport Plan, 2011-2026

12.2.10. The Warwickshire Local Transport Plan (2011) (Ref. 12-7) identifies overarching transport strategies and policies for the county from 2011 to 2026.

12.2.11. Overall objectives relevant to the scheme include:

- *"To seek reliable and efficient transport networks which will help promote full employment and a strong, sustainable local and sub-regional economy*
- *To reduce the impact of transport on people and the [built and natural] environment and improve the journey experience of transport users*
- *To improve the safety, security and health of people by reducing the risk of death, injury or illness arising from transport, and by promoting travel modes that are beneficial to health"*

12.2.12. Specific policies relevant to the Proposed Scheme are as follows:

- *Policy CS1: Congestion improvements and other highway users - states that "Improvements to reduce congestion will not normally be implemented if they are detrimental to the safety and/or convenience of pedestrians, cyclists and public transport users"*
- *Policy CS2: Use of the Traffic Management Act - indicates that the Council will use its powers to limit "congestion arising from temporary works, events and offences affecting the free movement of traffic on the highway"*
- *Policy LUT10: Appropriate Development - seeks to ensure that "all developments are appropriate in terms of accessibility, design and layout, and that they can contribute to the local area and improve connectivity, with new footways, cycleway and public transport where required"*
- *Policy RW1: Managing the network - states that "the County Council will assert and protect the rights of the public to use and enjoy the rights of way and recreational highway network, by maintaining the asset and taking enforcement action where necessary"*

Local Policies

12.2.13. The Proposed Scheme falls across two local authorities: Coventry City Council and Rugby Borough Council. Local policies and relevant plans from both local authorities are therefore considered below.

Coventry City Council Right of Way Improvement Plan, 2007-2017

12.2.14. In line with the Countryside and Rights of Way Act 2000 (Ref. 12-8), Coventry City Council has released a Right of Way Improvement Plan for the period 2007-2017 (Ref. 12-9) so as to address the local community's current and future needs.

12.2.15. The Coventry City Council Right of Way Improvement Plan is centred on four objectives:

- *Improving accessibility* - it is seeking to guarantee that public right of ways are safe and accessible to everyone, regardless of their health conditions or social status.
- *Reducing congestion and improving air quality* - encouraging walking and cycling will help to tackle road congestion and pollution
- Improving *safety* - it recognises the need to safeguard pedestrians, cyclists and horse riders. Crossing points, separate cycling paths and regular speed limit will improve non-motorised users' safety, and so support the use of public right of ways
- Improving *quality of life* - public right of way networks stimulate physical activity as well as mental well-being thanks to stress relief and social interaction.

Coventry City Council Local Plan

12.2.16. The Coventry City Council Local Plan (2016) (Ref. 12-10) forms part of the wider Development Plan and sets the overarching spatial vision and identifies policies and proposals to develop the city until 2031.

12.2.17. The following objectives of the Local Plan are considered relevant in the context of the Proposed Scheme:

- Health and Wellbeing - the Local Plan aims at supporting active travel and reducing social isolation. Proposing reliant and safe networks for walking and cycling is a key component of this strategy
- Accessibility - although walking and cycling are the preferred commuting option within Coventry, it is acknowledged that a reliable car network should be in place so as to ease the journey of people living or working in the periphery of Coventry
- Green Belt - Coventry Green Belt land is safeguarded and development will not be permitted except under exceptional circumstances.

Rugby Borough Council Core Strategy, 2011

12.2.18. The Rugby Borough Council Core Strategy was published in 2011 and guides future development up to 2026 (Ref. 12-11). As identified within the Core Strategy, part of the Proposed Scheme falls within Rugby Borough Council's Green Belt boundaries.

12.2.19. Overarching objectives and policies within the Core Strategy that are considered relevant to the Proposed Scheme are as follows:

- Expansion of the cycle network and improvement of public transport should be prioritised in the borough due to the current increase of car-based journeys

- Green Belt land should be safeguarded according with national planning legislation. As such, the Core Strategy indicates that development within the Green Belt will be allowed only under exceptional circumstances
- Protection, restoration and enhancement of existing Green Infrastructure assets should be a key objective to support sustainable communities

12.3. Study Area

12.3.1. The study area for motorised travellers and non-motorised users comprises of the roads, connecting roads, public rights of way, and footpaths within the extent of the Proposed Scheme, or within 100m of the Proposed Scheme boundary.

12.3.2. The study area for private assets (including private assets, agricultural land and community assets) will consist of the footprint of the Proposed Scheme.

12.3.3. The study area for residential and commercial receptors is the area within the Proposed Scheme and surrounding area within 200m of the Proposed Scheme boundary.

12.3.4. The context of the study area is predominantly arable farmland to the east of the A46 and more commercial and industrial land to the West and directly surrounding the junction. The residential community of Binley Woods exists further east of the junction.

12.4. Baseline Conditions

Motorised Travellers: Views from the Road

12.4.1. The existing views at the A46/A428 Binley Junction are described as being limited by the surrounding built form and blocks of woodland adjacent to the route. It is noted that some commercial properties, including the Cocked Hat Restaurant and Hotel, TGI Friday's restaurant, and the retail units off Kynner Way limit motorised travellers' sight capacities at the north-western point of the roundabout.

12.4.2. To the south-east of the A46 corridor the visual context is more developed due to the open space associated with the Broadstreet Rugby Club, contrasting with the extensive woodland that exists to the south of the A428. Binley Woods which comprises several local roads and housing lies to the east of the Binley Junction and south of the A428.

12.4.3. As the existing A46 road is at grade, it does not allow motorised travellers to see beyond commercial properties and woodlands located near the junction. As a result, the current view experience by motorised travellers from both the A46 and A428 is described as intermittent, as per the *Design Manual for Roads and Bridges* category descriptions.

Motorised Travellers: Driver Stress

12.4.4. The section of the A46 within the site considered within this report suffers from congestion and poor journey time reliability issues.

12.4.5. The A46 south of Coventry is the busiest section of the A46, between the A452 and the A45. It is in the top 10% for vehicle-hour delay nationally, is in the worst 45% of strategic roads for total casualties, and in the worst 250 collision locations in England. The Binley junction in particular carries a significant volume of freight traffic and has a number of collision clusters.

12.4.6. Average speeds of vehicles travelling along the A46 approaching the Binley junction, both northbound and southbound, range between 25mph and 37mph. When combined with average vehicle flows under 1,200 vehicles per hour per lane, the existing level of driver stress is estimated as 'High'. For Motorised Users on the A428 the current levels of driver stress is also estimated as 'High', both eastbound and westbound, due to the low average speeds between 3mph and 27mph on the east and westbound respectively.

12.4.7. It is anticipated that due to the level of fear and frustration experienced by motorised users, as a result of the features described above, the level of driver stress experienced is currently considered *high*.

Non-Motorised Users

12.4.8. The following public rights of way or footpaths and/or cycle paths are located within the Proposed Scheme boundary or within 100m:

Binley Roundabout Crossing

12.4.9. A footpath and a cycling lane cross the junction, south of Binley roundabout. The crossing is currently controlled by traffic lights. It is the only point that allows non-motorised users to cross the A46 within the boundary of the Proposed Scheme. The nearest alternative formal pedestrian crossing point is located 1.86 miles (3km) south at the Tollbar End junction. The sensitivity is considered to be medium given it is a primary crossing point across the A46, for community to the east.

Piles Coppice Public Right of Way

12.4.10. There is one formally identified public right of way which runs parallel to the east of the A46, and leads into Piles Coppice, where it runs along the western boundary. The public right of way terminates approximately 100m north of Piles Coppice where it joins an informal footpath which runs northwards to the car park at the south-eastern corner of the junction. The footpath runs through agricultural fields. Given that this is primarily a route used for recreational purposes the sensitivity is considered to be medium.

A428 Footpaths

12.4.11. Pedestrian footpaths exist on the north and south side of the A428, east of the Binley Roundabout, towards Binley Woods. Given that two footpaths exist, providing alternatives, the sensitivity of the individual footpaths is considered to be low.

12.4.12. The non-motorised users currently using the footpaths or public right of ways identified above are likely to experience some loss of amenity through existing traffic noise of both the A46 and A428.

Private Assets

12.4.13. Agricultural fields are located to the east of the A46 study area. The Agricultural Land Classification is used to classify agricultural land in 5 categories from Grade 1 ('excellent quality') to Grade 5 ('very poor quality').

12.4.14. The Agricultural Land Classification at the northern part of the scheme is Grade 2. This is defined by the Department for Environment, Food & Rural Affairs (Defra) as *very good* quality land with minor limitations which affect crop yield, cultivations or harvesting. The Agricultural Land Classification across the rest of the scheme is Grade 3. This is defined as *good to moderate* quality land with moderate limitations which affect the choice of crops, timing and type of cultivation, harvesting or the level of yield.

Residential Properties

12.4.15. There are a number of residential properties within the study area. Residential properties alongside Kings Park Drive are located approximately 70m from the A46 and 350m north the Binley roundabout. Dwellings alongside Newstead Way, Hulme Close and Hepworth Road are located approximately 100m away from the boundary of the Proposed Scheme and more than 500m north of the Binley roundabout. These properties are separated from the A46 carriageway by a public open space and by a buffer of thick trees. East of the junction, numerous properties alongside the A428 are located, the nearest of which are situated approximately more than 150m away from the junction. Given these are properties people reside in, sensitivity assigned to residential properties is very high.

Commercial Properties

12.4.16. Some commercial properties are located within close proximity of the study area. Approximately 170m north-west of the Binley junction, there is the Warwickshire Shopping Park which comprises 20 retail stores, a gym and a café. Approximately 50m north-west from the junction, there is a hotel, Premier Inn (with 96 rooms); and a restaurant, TGI Fridays.

12.4.17. To the south-west of the junction, approximately 50m from the Binley roundabout, there is the Cocked Hat Restaurant and Hotel which serves as a hotel (with 25 rooms) and a restaurant and pub. Approximately 150m south-west of the junction, there is a large store selling home and garden-related goods. Leofric Business Park, which hosts manufacturing, engineering, automotive and equipment supplier firms, is located about 350m south-west of the junction and hence outside the study area. A private access route runs alongside the back of the Cocked Hat Restaurant and Hotel and joins Progress Way next to Leofric Business Park.

12.4.18. In the south-eastern corner of the junction, approximately 30m away the roundabout, there is a home furniture store, named Greens Home and Garden, which also provides a café serving drinks and food, open to the public. Victoria Ornate Gardens, a garden furniture shop, has a sale point at Greens Home & Garden. There is also a sweet shop named Humbugs in the Greens Home & Garden's building. There is vehicle parking available for Greens Home & Garden which is only accessible from the A428. Given that the route is primarily used for recreational purposes sensitivity is described as medium.

Community Land

12.4.19. The Broadstreet Rugby Football Club is located to the north-eastern corner of the junction. The club has six rugby pitches, including two floodlit pitches. The club provides football coaching for children and adult teams and also organises matches with external teams. Large sporting events are also run on these grounds, such as the match between the England Deaf Rugby Union and the Welsh Deaf Rugby Union in 2008. The Broadstreet Rugby Football Club is also home of the Ivor Preece Centre. This conference centre has 4 conference rooms and can be booked for wedding receptions hosting up to 100 invitees. The Broadstreet Rugby Football Club and Ivor Preece Centre's facilities are accessible from a small road off the A428, whose entrance is located 130m away from the junction. Vehicle parking is available on the Broadstreet Rugby Football Club site. Given the high usage and only faculty within close proximity, the sensitivity assigned to the Broadstreet Rugby Football Club is high.

12.4.20. Piles Coppice is located directly to the east of the A46, south of the Binley junction. It provides recreational space to the public which is managed by the Woodland Trust. Piles Coppice is linked to a larger area of public open space comprising Brandon woods and the Warwickshire Wildlife nature reserve named Brandon Marsh (where there is parking and a visitor centre), located approximately 400m to the south-east of Piles Coppice. Given lack of alternatives and the recreational purposes it provides, the sensitivity assigned to Piles Coppice is high.

Development Land

12.4.21. No land alongside the A46, within the study area, is currently allocated for development. Therefore, development land is not considered any further within this chapter. The A46 and areas to the east form part of the Rugby Borough Council's Green Belt, so as to prevent urban sprawl.

Health

12.4.22. There are no healthcare facilities located within or adjacent to the site boundary. The nearest GP surgeries are located further east towards Coventry, with the closest being Kenyon Medical Centre on the A428, approximately 800m to the east. The nearest hospital, University Hospital Coventry, is located approximately 1.9 miles (3km) to the north of the junction.

12.4.23. Coventry had an estimated resident population of 352,900 in 2016, of which 50.6% are males and 49.4% are females. In 2016, 66.4% of Coventry residents are of working age (defined by the Office for National Statistics as men and women aged 16 to 64), which is higher than in West Midlands as a whole (62.2%) (Ref. 12-12).

12.4.24. Within Coventry, 80.7% of residents report that their health is very good or good, and 6.1% of residents report that their health is bad or very bad. This is in line with self-reported levels of health levels in the West Midlands of 79.8% and 6.1% respectively (Ref. 12-13). Despite this however, the Coventry Health Profile (Ref. 12-13) reports that the health of people in Coventry is generally worse than the England average, with more than 30% of Coventry residents belonging to the English most deprived quintile and about 25% (16,700) of children living in low income families.

12.4.25. Rugby Borough had an estimated resident population of 103,800 in 2016 of which 49.7% were male and 50.3% are female. In 2016, 61% of Rugby residents were of working age, which is in line with Warwickshire as whole (61%).

12.4.26. Within Rugby Borough, 83% of residents think that their health is very good or good, and 4.5% of residents report that their health is bad or very bad. This is in line with self-reported levels of health levels in Warwickshire of 82.2% and 4.9% respectively (Ref. 12-13). In addition to this, the Rugby Health Profile (Ref. 12-13) reports that less than 5% of Rugby borough residents belong to the English most deprived quintile and about 13% (2,600) of children live in low-income families.

12.5. Potential Impacts

Construction

12.5.1. During the construction phase the potential impacts which could occur are as described below.

12.5.2. Potential impacts on motorised users could include:

- Additional traffic congestion as a result of traffic or route diversions could affect motorised travellers through increased driver stress (particularly at peak times)

- Views experienced by motorised travellers may also be affected temporarily by visual impacts

12.5.3. Potential impacts on non-motorised users could include:

- Temporary diversions or closures to the pedestrian footpaths, public right of way which could add additional journey length and potential difficulties with accessibility issues for certain users
- There is also the potential for amenity effects on non-motorised users, particularly associated with air quality and noise

12.5.4. Community and Private Assets could include:

- Temporary land take during the construction phase resulting in the temporary loss of commercial facilities
- Temporary severance or disruption of access to commercial facilities during construction which could result in loss of business or increased journey times for employees and users
- The potential for temporary air quality, noise, and vibration effects arising from construction activities to adversely impact on the amenity of local residents, employees, and users of community facilities

12.5.5. Potential impacts on agricultural land could include:

- Temporary disruption to agricultural and development land within and adjacent to the scheme boundary, or location of site compounds. This could include the temporary use of land for construction activities currently used for agriculture, and thus potential effects may be experienced by farming operations
- Dust could affect crops and noise could disturb livestock.

12.5.6. Potential impacts on Human Health could include:

- Temporary severance of access to community facilities potentially leading to deterioration of social cohesion and affecting mental health for certain groups, particularly the young, old, or disabled
- Amenity effects on human health as a result of adverse air quality and noise, particularly for the young, old, and disabled

Operation

12.5.7. During operation, potential impacts on motorised travellers may include:

- Significant benefits to motorised travellers as a result of the Proposed Scheme, due to improved journey times and reliability brought by reduced congestion. This is also likely to permanently reduce driver stress
- Temporary effects on vehicular congestion and reduction of views for motorised travellers would no longer occur during the operational phase

12.5.8. Potential impacts on non-motorised users may include:

- Temporary effects on non-motorised users which could be experienced during the construction phase would no longer occur during the operational phase. No operational effects are anticipated to occur

12.5.9. Potential impacts on community and private assets could include:

- Permanent land take and disruption of access to commercial assets which could result in significant adverse effects, dependent on the level of land take, alterations to access arrangements, and potential for loss of business and earnings
- Temporary effects on the amenity of residents, employees, and users of community facilities would no longer occur during the operational phase
- Temporary effects on agricultural and development land which could be experienced during the construction phase would no longer occur during the operational phase. No operational effects are anticipated to occur

12.5.10. The health effects associated with the Proposed Scheme will be assessed at the population level, through the consideration of exposure to the environmental and socio-economic impacts of the Proposed Scheme and evaluation of the potential for these impacts to affect health.

12.6. Assessment Methodology

12.6.1. This section explains the methodology for the people and communities assessment.

Motorised Travellers: Views from the Road

12.6.2. Using the category description in the *Design Manual for Roads and Bridges* (DMRB), views from the road have been assessed according to travellers' ability to see the surrounding landscape on a four point scale, presented in Table 12-1.

Table 12-1: Views from the Road Categories

View Categories	Description
No view	Road is in a deep cutting or contained by earth bunds, environmental barriers or adjacent structures
Restricted view	Frequent cuttings or structures blocking the view
Intermittent view	Road generally at ground level but with shallow cuttings or barriers at intervals
Open view	View extending over many miles, or only restricted by exiting landscape features

Source: (Ref. 12-4)

12.6.3. There are no specific assessment significance criteria or magnitude of impact assessment frameworks associated with *views from the road* as set out in the DMRB therefore a qualitative assessment using professional judgment, based on the above criteria is considered appropriate. The assessment has taken into account findings from Chapter 7: Landscape of this assessment, including the landscape character, quality of the view experience and route type.

12.6.4. The full landscape and visual assessment can be found in Chapter 7: Landscape of this report.

Motorised Travellers: Driver Stress

12.6.5. Driver stress is defined in *Volume 11 of DMRB* as the adverse mental and psychological effects experienced by a driver traversing a road network. There are three main components of driver stress as follows:

- Driver frustration – caused by an inability to drive at a speed consistent with the standard of the road, which increases as speed falls in relation to expectations
- Driver fear – the main factors are the presence of other vehicles, inadequate sight distances, and the likelihood of pedestrians such as children stepping into the road. Fear is highest when speeds, flows, and the proportion of heavy vehicles are all high, becoming more important in adverse weather conditions
- Driver uncertainty – caused primarily by signing that is inadequate for the individual's purposes

12.6.6. As an indicator of the magnitude of drivers' stress and frustration, DMRB *Volume 11, Section 3, Part 9* V*ehicle Travellers* tabulates the relationship between average peak hourly flow per lane and average journey speed, in order to describe the magnitude of drivers' stress on a three point scale. The DMRB guidance states that on account of available research evidence, the use of a finely graded assessment of driver stress is not appropriate and a three point scale of Low, Medium and High, is recommended and therefore used within this assessment.

Table 12-2: Magnitude of Impact Scale for Driver Stress Calculations

For Dual Carriageway Roads			
Average Peak Hourly Flow (per lane, in flow units/ hr)	**Average Journey Speed (km/hr)**		
	Under 60	**60 – 80**	**Over 80**
Under 1,200	High	Medium	Low
1,200 – 1,600	High	Medium	Medium
Over 1,600	High	High	High

Source: (Ref. 12-4)

12.6.7. For the purposes of this assessment, relative levels of value (sensitivity) have not been assigned to receptors (vehicle travellers) and all drivers are considered to have the same sensitivity in relation to drivers' stress.

Non-Motorised Users

12.6.8. The potential for effects on non-motorised users has been considered in accordance with the relevant sections of the *DMRB Volume 11, Section 3, Part 8.* The assessment concentrates on changes in amenity, journey length, and severance. Amenity is defined as the relative pleasantness of a journey. The assessment is, therefore, concerned with changes in the degree and duration of people's exposure to traffic (safety, noise, air quality etc.), the impact of the Proposed Scheme on non-motorised user journey lengths, plus any additional visual intrusion as associated with the Proposed Scheme.

12.6.9. The assessment involves a desk study to identify whether non-motorised user activity is likely to be impacted by the construction and operation of the Proposed Scheme.

12.6.10. Table 12-3 sets out how the magnitude of impact is assessed for impacts on non-motorised users using a five-point scale, based on the DMRB guidance. The magnitude can be both positive (beneficial) or negative (adverse) and also takes into account the permanence and reversibility of the impact. Professional judgement will be used to assign the correct level of impact.

Table 12-3: Magnitude of Impact Scale for Non-Motorised Travellers

Magnitude of Impact	Criteria
No change	No Change
Negligible	The journey pattern will remain the same, but there may be some minor hindrance of movement for a limited amount of time.
Minor	In general, the current journey pattern is likely to be maintained, but there will probably be some hindrance to movement for a limited amount of time. For example, • A new bridge will need to be climbed or subway traversed; or • Journeys will be increased by up to 250m.
Moderate	Some people are likely to be dissuaded from making trips. Other trips will be made longer or less attractive. For example: Journeys will be increased by 250m – 500m.
Major	People are likely to be deterred from making trips to an extent sufficient to induce reorganisation of their habits, alternatively considerable hindrance will be caused to people trying to make their existing journeys for a prolonged period of time. For example: • Journeys will be increased by more than 500m

Source: (Ref. 12-4)

12.6.11. The sensitivity of the Public Right of Way or footpath will be determined as shown in Table 12-4.

Table 12-4: Sensitivity of the Non-motorised Traveller

Sensitivity	Description
Very High	• Key routes used by pedestrians, cyclists and other non-motorised users. Routes record very high numbers of journeys and connect communities with employment land uses and other services with a direct and convenient route.
High	• Key national or regional trails, routes used by pedestrians, cyclists and other non-motorised users. Routes record very high numbers of non-motorised user journeys or connect communities with employment land uses and other services with a direct and convenient non-motorised users route. No suitable equivalent alternative resources exist.
Medium	• Public rights of way and other routes close to communities which are used mainly for recreational purposes (for example dog walking), but for which alternative routes can be taken. Moderate or occasional use of a resource, limited alternative resources used by the receptor are reasonably available.
Negligible	• Routes have fallen into disuse or very infrequently used. Multiple equivalent or better alternatives are freely and easily available.

Source: (Ref. 12-14)

12.6.12. The relationship between the sensitivity of the receptor and the magnitude of impact from the Proposed Scheme is considered to determine the significance of the effect. As demonstrated in Table 4-3 of Chapter 4: Environmental Assessment Methodology,

very large, large or moderate effects are considered significant whereas slight, slight/neutral and neutral effects are not considered significant. Effects can be either adverse or beneficial.

Land Use

12.6.13. The assessment for loss of these land uses and receptors will be undertaken in accordance with the guidance provided in the *DMRB Volume 11 Section 3 Part 6 Land Use* The magnitude of impact is assessed as the amount of land to be taken, using the five-point scale identified in Chapter 4: Environmental Assessment Methodology of this report, of major, moderate minor, negligible and no change. The methodology for assessing non-motorised users will be used for assessment of affected land.

12.6.14. Private property consists of the property required to accommodate the Proposed Scheme. Private property is land outside the existing highways boundary that does not accommodate public open space or any other community facility or asset. It can be residential or commercial property.

12.6.15. Community land is any area of public open space and other facilities such as schools, hospitals, libraries and recreation facilities relied upon for community health and well-being.

12.6.16. Agricultural land is land devoted to the rearing of livestock and production of crops to produce food and products. This assessment is covered in full within Chapter 9: Geology and Soils.

12.6.17. Development land is land designated within the development plan for particular development purposes, or for which planning permission has been granted or is pending.

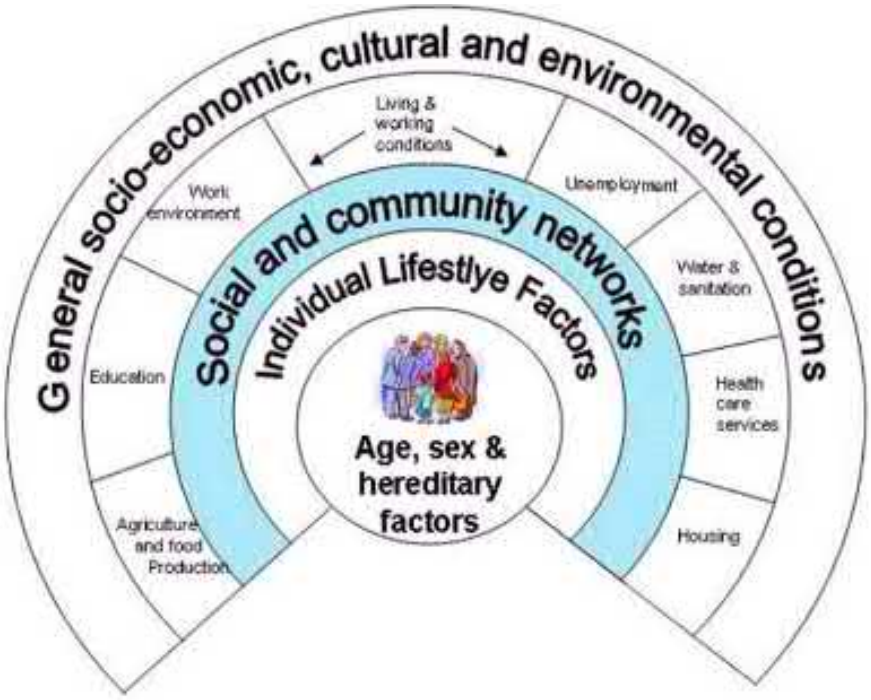
12.6.18. The study area for all private assets consists of the land parcels required to accommodate the Proposed Scheme, both during construction and operation.

Health

12.6.19. The World Health Organisation (WHO) Europe defines health as *"a state of complete physical, mental and social wellbeing and not merely the absence of disease or infirmity"* (Ref. 12-15). Consequently, public health encompasses general wellbeing, and not just the absence of illness. Some effects are direct and obvious, others are indirect, and some may be synergistic, with different types of impact acting in combination.

12.6.20. Factors that have the most significant influence on the health of a population are called determinants of health; these include an individual's genetics and their lifestyle, the surrounding environment, as well as policy, cultural and societal issues. The interrelationship between these factors is shown in Plate 12-1.

Plate 12-1: The Wider Determinants of Health



Source: Ref. 12-6

12.6.21. There is no definitive guidance or methodology for assessing the health impacts of projects. A desktop assessment of the impacts on human health and wellbeing of the Proposed Scheme will be undertaken. Health effects may arise when a Proposed Scheme impacts health determinants, which have an influence on health and wellbeing.

12.6.22. Seven likely health determinants have been identified and will be assessed in this chapter. It is noticed that access to healthcare services and other social infrastructure, as well as relative proximity to open space and nature and good air quality, reasonable level of noise, and neighbourhood amenity have a beneficial impact on health. In addition to these determinants, accessibility and active travel, access to healthy food, access to work, training and social cohesion, and neighbourhoods have positive effects on individuals' wellbeing and health.

12.6.23. The assessment of the potential impacts and effects of the Proposed Scheme on human health has considered the following health and well-being determinants of relevance as identified from those set out in the London Healthy Urban Development Unit (HUDU) Rapid Health Impact Assessment Tool Third Edition (Ref.12-16):

- access to healthcare services and other social infrastructure;
- access to open space and nature;
- air quality, noise and neighbourhood amenity;
- accessibility and active travel;
- access to work and training;
- access to healthy food and;
- social cohesion and neighbourhoods.

12.7. Assessment Assumptions and Limitations

12.7.1. The assessment is based on professional judgement and takes into account both the adverse and beneficial contribution a proposed development can have upon the existing and surrounding receptors.

12.7.2. The report provides broad, high level indication of effects, reporting on the potential effects to people and community based on simple assessment. No site visit or surveys have been undertaken by the persons writing this chapter and the findings are based upon a desk based study of the area using professional judgement and the consultants' knowledge based on previous similar schemes and assessments. Information, where relevant, has been used from other specialist topic inputs to aid the assessment of the impact of the Proposed Scheme on receptors.

12.8. Design, Mitigation and Enhancement Measures

12.8.1. This assessment of effects is based on the description of the Proposed Scheme presented in Chapter 2: The Project of this report. This includes maintaining the crossing at the Binley Junction during the entire construction period and delivering a temporary diversion around the construction compound for non-motorised users accessing Piles Coppice from the A428.

12.8.2. Other mitigation measures include the appropriate noise and visual interventions in order to mitigate against any potential impacts on any receptors.

12.9. Assessment of Effects

12.9.1. The purpose of this section is to assess the likely effect of the Proposed Scheme on motorised travellers, non-motorised users and private and community assets, during both the construction and operational phases.

12.9.2. The construction phase for the Proposed Scheme will last approximately two years and is planned to begin in March 2020.

Motorised Travellers: Views from the Road

12.9.3. With the elevated nature of the Proposed Scheme, motorised travellers would have a far-reaching view to the East. Built form on the west would continue to restrict views for road users. It is assumed that motorised travellers travelling on the elevated section of the Proposed Scheme would have an open view to the east and an intermittent view to the west.

12.9.4. For motorised travellers using the A46 and A428, the assessment concludes that the change in view for users during construction will be large adverse, however, this is not anticipated to result in a significant effect given the temporary nature of the construction phase. During operation, the change in view for users is concluded as slight adverse effect, which is not considered significant.

Motorised Travellers: Driver Stress

12.9.5. In terms of driver stress, the Proposed Scheme objectives seek to improve the operation and efficiency of the existing transport network and deliver capacity enhancements. Existing levels of driver stress within the study area are all high, due to the peak hourly traffic lows which can increase journey times. Driver stress is expected to be temporarily adversely impacted by the construction works.

12.9.6. The Proposed Scheme aims to make the network safer by reducing the number of incidents at Binley and supporting the smooth flow of travel. The Proposed Scheme will involve a grade separation of the existing junction and the raising of the A46 over the A428 Rugby Road. Entry and exit slip roads will be provided to the grade separated junction for local traffic. This will allow speeds to be maintained on the A46 as those remaining on the road will not need to slow down for a roundabout. It is considered that the national speed limit will be provided for this section of the A46.

12.9.7. Driver stress is expected to be reduced during operation through the provision of an uninterrupted link on the A46, allowing speeds to be maintained and reducing driver frustration for all motorised users.

12.9.8. As a part of the Proposed Scheme, road signs and lane markings will also be improved, improving the operation of the A46 and reducing the potential for congestion and accidents, therefore reducing driver stress.

12.9.9. Based on the DMRB guidance (refer to Table 12-2), the Proposed Scheme is predicted to have low driver stress levels for users on the A46, both northbound and southbound, as the average speeds would be in excess of 56mph (90kmph) but under 1,200 peak hourly flows. The A428 is predicted to remain as high driver stress, due to low vehicle speeds. However, driver stress on the A428 is still expected to be improved given slight increases in speeds and reduced frustration, compared to a do-nothing scenario. The Proposed Scheme will have a moderate beneficial effect during operation, which is considered to be significant.

12.9.10. **Non-Motorised Users**

Binley Roundabout Crossing

12.9.11. During construction, a temporary crossing south of the Binley Junction, adjacent to the existing crossing point, will be provided for the entire construction phase. Whilst the crossing would be maintained during construction period, and therefore not impede access, pedestrians and cyclists may experience additional loss in amenity due to construction works. As such, the construction works would have a temporary slight adverse effect on non-motorised users using this public right of way.

12.9.12. During the operational phase, a new crossing point would be provided replacing the existing one. Two toucan road crossings would be set up at the southbound on-slip and the northbound off-slip. In addition, and to join these crossing points, there is a proposed cycle path and pavement for non-motorised users that would go underneath the newly elevated A46 and connects the A428 to the east and west of the junction. The existing east-west footway to the south of the junction will be retained through the widening of the footway along the A428 to Oakdale Road. Improvements are also proposed on the eastern portion of the Proposed Scheme and include footway widening along the Rugby Road to improve access for non-motorised users.

12.9.13. The Proposed Scheme would therefore have a slight beneficial effect on non-motorised users using this public right of way.

Piles Coppice Public Right of Way

12.9.14. The footpath which begins at Greens Home and Garden's car park and leads southwards to Piles Coppice, to adjoin the formal public right of way, will be closed during construction phase for a period of approximately two years. During this period, a temporary diversion route would be set up around the construction compound, to the east, allowing non-motorised users to continue to access Piles Coppice from the north.

12.9.15. The temporary diversion route will extend the journey to Piles Coppice from the north by approximately 450m. Whilst the journey will be temporarily extended, it is not expected that it will dissuade people from making trips and the effect on non-motorised users utilising the Piles Coppice footpath and public right of way is considered to have a slight adverse effect during the construction phase.

12.9.16. During the operational phase, the construction compound would be removed and the agricultural land on which the footpath and public right of way crosses would be returned to its existing use, the footpath and public right of way would be accessible for non-motorised users again. As such, the Proposed Scheme would have a neutral effect on non-motorised during the operational phase.

Private Assets

Agricultural Land

12.9.17. In accordance with the Chapter 9: Geology and Soils of this report, a total of 8 hectares (ha) of best and most versatile land may be temporarily lost during construction of the Proposed Scheme if both options for the construction compounds are utilised (although it is planned only one or the other would be used). The loss of less than 20ha of best and most versatile agricultural land constitutes a low magnitude impact, and therefore a slight adverse and not significant impact on agricultural land is reported.

12.9.18. During the operational phase of the Proposed Scheme, the construction compounds would be removed, and agricultural land would be returned, therefore there would be a neutral effect upon agricultural land in the operational phase of the scheme.

12.9.19. The full assessment for agricultural land can be found within Chapter 9: Geology and Soils of this report.

Residential Properties

12.9.20. No residential properties or land from residential properties would be taken as part of the Proposed Scheme; therefore, a neutral impact is reported during the construction and operational phases.

12.9.21. There is potential for residents living in close proximity to the Proposed Scheme to experience some loss in amenity. The landscape and noise impacts are considered separately within Chapter 7: Landscape and Chapter 11: Noise and Vibration of this report.

Commercial Properties

12.9.22. Commercial properties situated in the south-eastern corner of the junction would remain accessible during construction works, for both car and pedestrian access. The Proposed Scheme is therefore considered to have a neutral impact during construction or operational phase of the Proposed Scheme on properties to the south-east of the junction.

12.9.23. Greens Home and Garden Centre would remain accessible to users during the construction phase; however, some land ownership covering the size of 6 parking spaces would be permanently lost to accommodate part of the Proposed Scheme, although the spaces themselves would be re-provided by reconfiguring the car park markings. Given the relatively large size of the Greens Home & Garden's car park, a slight adverse effect is reported to the Greens Home and Garden Centre during the construction phase of the scheme.

12.9.24. As part of the Proposed Scheme, a permanent drainage pond will be constructed in the agricultural field adjacent to the Greens Home and Garden Centre with a

permanent land take area of approximately 4,300m^2 excluding maintenance requirements. There is also a thin strip (approximately 1,100m^2) of land take from Greens Home and Garden Centre which will require the relocation of 6 car parking spaces within the car park. However, it is not considered that this will materially impact the operation of the Centre itself, permanent land take is likely to result in a slight adverse effect during operation.

12.9.25. No other temporary or permanent land take will impact commercial properties within the study area. The private access route running alongside the back of the Cocked Hat Restaurant and Hotel before joining Leofric Business Park would be maintained and accessible during construction works.

12.9.26. Commercial properties surrounding the junction may experience some temporary decrease in amenity during the construction period. Landscape and noise assessments are presented within Chapter 7: Landscape and Chapter 11: Noise and Vibration of this report.

Community Land

12.9.27. Broadstreet Rugby Football Club and Ivor Preece Centre's facilities would remain open and accessible during the entire construction phase. A small portion of land within the Broadstreet Rugby Football Club ownership, adjacent to the west part of the rugby pitches, would be required. Part of this land is required on a permanent basis and part on a temporary basis, however this does not encroach onto the rugby pitches. This loss of land is considered to have a slight adverse effect on the Broadstreet Rugby Football Club during construction.

12.9.28. As part of the Proposed Scheme, a drainage pond will be constructed at the Broadstreet Rugby Club and will require 2,700m^2 of permanent land take. This land take includes the pond, maintenance track and associated earthworks. The land required for the drainage pond is not expected to impact on the functionality of the rugby club, therefore the permanent loss of land will result in a slight adverse effect during operation.

12.9.29. Users' experiences may be impacted by construction noise, dust or vibration and a loss of amenity may be experienced. Detailed landscape and noise assessments are presented within Chapter 7: Landscape and Chapter 11: Noise and Vibration of this report.

12.9.30. No other community land would be lost during the construction or operational phases of the Proposed Scheme.

Development Land

12.9.31. No development land would be affected by the Proposed Scheme during the construction or operational phases.

Health

Access to Healthcare Services and Other Social Infrastructure

12.9.32. Although the Proposed Scheme would not provide any health or community facilities, no existing health or community facilities would be lost or disrupted during the construction phase.

12.9.33. Once the Proposed Scheme is operational, accessibility to healthcare services and other social infrastructure is considered to be improved due to reduced congestion and eased north to south and east to west traffic flows.

Access to Open Space and Nature

12.9.34. All local open and natural spaces would remain accessible during the construction phase although there will be a temporary diversion for those accessing Piles Coppice.

12.9.35. During the operational phase, accessibility to open and natural spaces is considered likely to be improved due to reduced congestion and improved infrastructure for pedestrians. This is also likely to encourage physical activity and improve mental health.

Air Quality, Noise and Neighbourhood Amenity

12.9.36. Potential health impacts are unlikely to arise due to noise and traffic impacts from the Proposed Scheme. Impacts related to noise, vibration and dust would be felt locally, in the immediate vicinity of the site, and would be temporary (approximately two years). Mitigation measures such as noise barriers and screenings can contribute to reducing the overall impacts.

12.9.37. During the operational phase, it is predicted that the Proposed Scheme would not have any significant impact on air quality or noise.

Accessibility and Active Travel

12.9.38. During the construction phase, accessibility would be maintained; pedestrians and cyclists would be able to cross the A46 route at the junction.

12.9.39. Once completed, the Proposed Scheme would improve overall accessibility within the local area. The risk of road injuries would be minimised through appropriate safety measures incorporated in the design and traffic management. By guaranteeing that a safe crossing point would be provided, the Proposed Scheme would also encourage active travel modes. Although likely to support car usage due to reduced congestion, overall it is estimated that the Proposed Scheme would have positive health impacts.

Access to Healthy Food

12.9.40. During the construction phase, the Proposed Scheme may deter local residents to go to restaurants and cafes located nearby the junction due to noise, dust, or longer journey time, although this is not anticipated. Plenty of alternative restaurants also exist in close proximity to the study area, meaning that the Proposed Scheme would not significantly impact the ability of local residents to access healthy food.

12.9.41. During the operational phase, the Proposed Scheme would not have any impact on the ability of local residents to access healthy food.

Access to Work and Training

12.9.42. The Proposed Scheme could have a positive impact on local employment if local workforce and suppliers are preferred for construction works.

12.9.43. The Proposed Scheme would result in increased job opportunities through supporting economic growth in the region, and improved accessibility to jobs particularly through improving connectivity as well as reducing commuting time.

Social Cohesion and Neighbourhoods

12.9.44. Connectivity between communities could be temporarily and partially limited due to the construction works.

12.9.45. Once the Proposed Scheme is operational, connectivity between communities would be improved as a result of reduced congestion and eased east to west and north to south flows.

12.9.46. The key considerations relevant to health and wellbeing associated with the Proposed Scheme which should be considered are as follows:

- The Proposed Scheme will ensure that crossing points are maintained and any opportunities to encourage walking and cycling are fully considered
- The Proposed Scheme will ensure that accessibility to open spaces and social and healthcare infrastructures would be maintained during the construction phase and improved during the operational phase
- The Proposed Scheme will support connectivity between communities and neighbourhoods
- The hiring of local workforces and offer of training is promoted by Highways England when considering Contractors

Monitoring

12.9.47. No significant effects have been reported for the people and communities assessment during the construction and operational phases of the Proposed Scheme. No monitoring is therefore proposed.

13. ROAD DRAINAGE AND THE WATER ENVIRONMENT

13.1. Introduction

13.1.1. This section presents an assessment of the proposed scheme on the water environment. The water environment includes water quality, hydromorphology, flood risk, and drainage. Baseline information has been reviewed in the context of the proposed scheme in order to identify potentially significant effects. Where potentially significant effects are identified a method of assessment to determine the significance of those effects has been described.

13.1.2. This chapter of the EAR has been undertaken by competent experts with relevant and appropriate experience:

- Senior Environmental Scientist, MSc BSc (Hons), CEnv
- Associate Director/ Water Scientist, BSc (Hon) MSc CEnv MCIWEM

13.2. Planning and Legislative Context

13.2.1. A summary of the legislation, policy, and guidance documents relevant to the assessment of effects of the proposed scheme options on road drainage and the water environment is presented in the sections below, whilst the main EU Directives relevant to the proposed scheme are summarised in Table 13-1.

Table 13-1: Relevant EU Directives

European Directives	Description	Implemented in the UK by:
Water Framework Directive 2000/60/EC (Ref. 13-1)	The directive makes provision for the maintenance and improvement of the *ecological and chemical status* of the water environment, which includes rivers, lakes, wetlands, groundwater, estuaries and coastal waters. Chemical status is determined from compliance with environmental standards for chemicals that are classed as *priority hazardous substances*. The ecological status of a surface waterbody is measured through a range of biological quality elements, supported by measurements of physicochemistry, hydromorphology and compliance with environmental standards for chemicals that are classed as *specific pollutants*. For groundwater the overall status has a quantitative and a chemical component. The aim is for designated waterbodies to achieve *good overall status*. Certain surface waterbodies may be designated as artificial or heavily modified and will have less stringent targets to meet; however, these will still need to demonstrate *good overall potential*.	The Water Environment (Water Framework Directive) (England and Wales) Regulations 2017 (Ref. 13-7) (superseding the 2003 Regulations) (Ref. 13-8)
Priority Substances Directive	This directive sets out the Environmental Quality Standards (EQS) for substances in surface waters (river, lake, transitional and coastal). It confirmed their designation as priority or priority hazardous	The Groundwater (England and Wales)

European Directives	Description	Implemented in the UK by:
2008/105/EC (Ref .13-2)	substances, the latter being a subset of particular concern. Annex I of the directive tabulates limits on concentrations of priority substances in surface waters. This includes 33 priority substances and 8 other pollutants.	Regulations 2009 (Ref. 13-9)
Groundwater Directives 2008/105/EC and 2006/118/EC (Ref. 13-3)	This directive introduces procedures for assessing the *Chemical Status* of groundwater as per the Water Framework Directive, and protects groundwater by preventing direct discharge of *hazardous pollutants* and limiting the direct discharge of non-hazardous pollutants.	
Floods Directive 2007/60/EC (Ref. 13-4)	This directive makes provision for the assessment of flood risk, mapping its potential impact and planning measures to reduce potential and significant flood risk.	The Floods and Water Management Act 2010 (Ref 13-10)
The Environmental Liability 2004/35/EC (Ref. 13-5)	This directive aims to ensure those causing damage to the environment (including the water environment) are legally and financially responsible for that damage. It covers environmental damage caused by or resulting from occupational activities to: • Species and natural habitats protected under the 1992 Habitats Directive and the 1979 Wild Birds Directive • Designated Water Framework Directive water bodies other than effects justified under Article 4.7 of the Water Framework Directive • Land contamination that creates a significant risk of harming human health	The Environmental Damage (Prevention and Remediation) Regulations 2015 (Ref 13-11)
The Freshwater Fish Directive 2006/44/EC (Ref. 13-6)	This directive was subsumed by the Water Framework Directive in December 2013. However, it is considered that the previous classification of a watercourse as a Salmonid or Cyprinid fishery under the Directive still provides useful information on the characteristics and quality of a water feature and thus we have sought to review previous classifications and to take them into account when determining the importance of a water body.	Original implementing national legislation has since been superseded by the Water Framework Directive Regulations 2017 (Ref 13-7).

National Legislation

13.2.2. The objectives of the EU Directives listed in Table 13-1 are achieved through the following UK Legislation:

- Water Act 2014 (Ref. 13-12)
- Floods and Water Management Act 2010 (Ref. 13-10)
- Land Drainage Act 1991 (Ref. 13-13)
- Water Resources Act 1991 (Ref. 13-14)
- Salmon and Freshwater Fisheries Act 1975 as amended (Ref. 13-15)
- The Water Environment (Water Framework Directive) (England and Wales) Regulations 2017 (superseding the 2003 Regulations) (Ref. 13-7)
- The Environmental Permitting (England & Wales) Regulations 2016 (Ref.13-16)
- The Environmental Damage (Prevention and Remediation) Regulations 2015 (Ref. 13-11)
- The Eels (England and Wales) Regulation 2009 (Ref. 13-17)
- The Groundwater (England and Wales) Regulations 2009 (Ref. 13-9);
- The Control of Pollution (Oil Storage) (England) Regulations 2001 (Ref. 13-18).

13.2.3. Under the Environmental Permitting (England & Wales) Regulations (2016) an Environmental Permit (flood risk activity) is required from the Environment Agency if a regulated activity is to be undertaken on or near a Main River, on or near a flood defence structure, or in a flood plain, and exemptions do not apply. This includes any activity within 8m of the bank of a main river, flood defence structure or culvert on a main river, or activities carried out on the floodplain of a main river, more than 8m from the river bank, culvert or flood defence structure if you do not have planning permission.

13.2.4. An Environmental Permit may also be required for the discharge to surface waters or ground of any 'unclean' (i.e. poisonous, noxious or polluting matter, waste matter, or trade or sewage effluent) construction site runoff, again where exemptions do not apply. However, highways authorities do not require permission from the Environment Agency to discharge surface water runoff from highways to Controlled Waters (i.e. all watercourses, canals, lakes, groundwater etc.) under the Highways Act 1980 providing they do not cause water pollution.

13.2.5. If water is required for construction works, then depending on the source of water and volumes required, this may require an abstraction licence from the Environment Agency. This also includes dewatering of excavations, unless exemptions for emergency situations or where they are very small apply. A temporary abstraction licence is required to abstract more than 20 metres cubed (m^3) of water per day lasting less than 28 days, and a full abstraction licence is required to abstract more than $20m^3$ of water per day for a period of more than 28 days. Any licence issued could contain conditions requiring abstraction to cease at times of lower flows.

13.2.6. Land drainage consent will be required from Coventry City Council as the Lead Local Flood Authority (LLFA) for certain works that may affect the flow in Ordinary

Watercourses (i.e. all other watercourses that are not Main Rivers) under the Flood and Water Management Act 2010 (Ref 13-9) and the Land Drainage Act 1991 (as amended) (Ref 13-13). Land drainage consent is usually only required when the flow in an Ordinary Watercourse may be affected, although this and any byelaws that may apply will need to be confirmed with Coventry City Council at a later stage.

National Policy Guidance

National Planning Policy Framework (NPPF)

13.2.7. The National Planning Policy Framework (NPPF) was updated in February 2019 (Ref 13-19), thereby superseding the original document published in 2012. The NPPF has three overarching objectives to contribute to the achievement of sustainable development, one of which is the 'environmental objective'. This objective includes the requirement of "helping to improve biodiversity, using natural resources prudently, and minimising waste and pollution" (Paragraph 8c). In addition, the NPPF contains a number of statements which are relevant to water quality. These include:

- Strategic policies should set out an overall strategy for the pattern, scale and quality of development, and make sufficient provision for …(d) conservation and enhancement of the natural, built and historic environment. This includes landscapes and green infrastructure, and planning measures to address climate change mitigation and adaptation (paragraph 20d);

- Plans should take a proactive approach to mitigating and adapting to climate change, taking into account the long-term implications for flood risk, coastal change, water supply, biodiversity and landscapes, and the risk of overheating from rising temperatures. Policies should support appropriate measures to ensure the future resilience of communities and infrastructure to climate change impacts. Development should not cause unacceptable levels of water pollution and should help improve water quality wherever possible (paragraph 149);

- Planning policies and decisions should contribute to and enhance the natural and local environment by preventing new and existing development from contributing to, being put at unacceptable risk from, or being adversely affected by, unacceptable levels of soil, air, water or noise pollution or land instability. Development should, wherever possible, help to improve local environmental conditions such as water quality, taking into account relevant information such as river basin management plans (paragraph 170e).

13.2.8. The requirements of the NPPF have been taken into account in the assessment, with particular regard given to potential impacts in relation to flood risk and water quality.

National Planning Practice Guidance (NPPG)

13.2.9. NPPG (Ref. 13-20) provides guidance for local planning authorities on assessing the significance of water environment effects of proposed developments. The guidance highlights that adequate water and wastewater infrastructure is needed to support sustainable development.

13.2.10. The NPPF and the Flood Risk and Coastal Change NPPG recommends that Local Plans should be supported by a Strategic Flood Risk Assessment and should develop policies to manage flood risk from all sources taking account of advice from the Environment Agency and other relevant flood risk management bodies, such as Lead Local Flood Authorities (LLFAs) and Internal Drainage Boards. Local Plans should apply a sequential, risk-based approach to the location of development to avoid, where possible, flood risk to public and property and manage any residual risk, taking account of the impacts of climate change.

National Policy Statement for National Networks (NPSNN)

13.2.11. NPSNN (Ref. 13-21) statements 5.90 - 5.115 and 5.219 - 5.231 specifically apply to flood risk and water quality respectively, and how impacts on the water environment affect the decision making process.

13.2.12. The NPSNN states that when determining an application, the Secretary of State should be satisfied that flood risk will not be increased elsewhere, and only consider development appropriate in areas at risk of flooding where it can be demonstrated that the most vulnerable development is located in areas of lowest flood risk, unless there are overriding reasons to prefer a different location; and development is appropriately flood resilient and resistant, including safe access and escape routes where required, and that any residual risk can be safely managed, including by emergency planning. Priority is given to the use of Sustainable Drainage Systems (SuDS).

13.2.13. With regard to water quality, NPSNN states that the Secretary of State should be satisfied that a proposal has had regard to the River Basin Management Plans (RMBPs) and the requirements of the Water Framework Directive (including Article 4.7 which describes various tests that need to be met to justify new physical modification to a water body when that modification could lead to deterioration or prevent improvement) and its daughter directives, including those on priority substances and groundwater.

A Green Future: Our 25 Year Plan to Improve the Environment

13.2.14. In 2018 Defra published 'A Green Future: Our 25 Year Plan to Improve the Environment (Ref 13-23) setting out the UK Government's goals for improving the environment within a generation and leaving it in a better state than we found it. The plan covers the provision of clean air and water; protection and enhancement of habitats, wildlife and biosecurity; reducing the risk from environmental hazards and mitigating and adapting to climate change; using resources more sustainably and efficiently, minimizing waste and managing exposure to chemicals; and enhancing beauty, heritage and engagement with the natural environment. With regards to the water environment, the Plan includes specific goals to reduce the environmental impact of water abstraction, meet the objectives of River Basin Management Plans under the Water Framework Directive, reduce leakage from water mains, improve the quality of bathing waters, restore protected freshwater sites to a favourable condition, and do more to protect communities and businesses from the impact of flooding, coastal erosion and drought. At the heart of the Plan's delivery is the natural capital approach with the aspiring goal that there should always be a net gain in biodiversity from new development.

Future Water

13.2.15. The Government's Future Water strategy (Ref. 13-23) published in June 2011 sets out the Government's long-term vision for water and the framework for water management in England. It aims to permit the supply of secured water supplies whilst ensuring an improved and protected water environment. Future Water brings together the issues of water demand, water supply, water quality in the natural environment, surface water drainage, and river/coastal flooding into a single coherent long-term strategy, in the context of the need to reduce greenhouse gas emissions. The strategy also considers the issue of charging for water. The water environment and water quality have great economic, biodiversity, amenity and recreational value, playing an important role in many aspects of modern day society, and thus the functions provided must be sustainably managed to ensure they remain available to future generations without compromising environmental quality.

Sustainable Drainage Systems Guidance

13.2.16. Planning policy encourages developers to include SuDS in their proposals where practicable. SuDS provide a way to attenuate runoff from a site to the rate agreed with the Environment Agency or LLFA to avoid increasing flood risk, but they are also important in reducing the quantities and concentration of diffuse urban pollutants found in the runoff.

13.2.17. Defra have published guidance on the use, design and construction of SuDS *(Non-statutory technical standards for SuDS, Defra (2015)) (Ref. 13-24)*. Current best practice guidance on the planning for and design of SuDS treatment is provided by *C753 The SuDS Manual (Ref. 13-25), Design Manual for Roads and Bridges (DMRB) HA 103/06 Vegetated Drainage Systems for Highway Runoff (Ref. 13-26), and DMRB HD 33/06 Surface and Subsurface Drainage Systems for Highways (Ref. 13-27).*

Local Policy

13.2.18. The proposed scheme falls within the administrative area of Coventry City Council and Rugby Borough Council. The Coventry City Council's Local Plan (Ref. 13-28) includes the following relevant policies with regard to environmental management:

- Policy EM1 - Planning for Climate Change Adaptation: All development is required to be designed to be resilient to, and adapt to the future impacts of, climate change. For example, by minimising vulnerability to flood risk
- Policy EM4 – Flood Risk Management: All major developments must be assessed in respect of the flood risk from all sources. All opportunities must be taken to reduce flood risk in the surrounding area, including the creation of additional flood storage. All opportunities to undertake river restoration and enhancement including de-culverting, removing unnecessary structures and reinstating a natural, sinuous watercourse will be encouraged
- Policy EM5 – All development must apply SuDS and should ensure that surface water runoff is managed as close to its source as possible
- Policy GE3 – Biodiversity, Geological, Landscape and Archaeological Conservation: Sites of Special Scientific Interest (SSSIs), Local Nature Reserves (LNRs), Ancient Woodlands, Local Wildlife Sites and Geological Sites will be protected and enhanced. Opportunities will be sought to restore or recreate habitats, or enhance the linkages between them, as part of the strategic framework for green infrastructure

13.2.19. Rugby Borough Council's policies mimic the above and also emphasises the importance of appropriate drainage systems and sustainability.

13.3. Study Area

13.3.1. For the purposes of the water quality assessment, a study area of approximately 0.62 miles (1km) around the proposed scheme has been considered, in order to identify surface water bodies that could reasonably be affected by direct impacts associated with the proposed scheme. However, since watercourse flow and quality impacts may propagate downstream, where relevant the assessment has also considered a wider study area of up to 1.24 miles (2km) downstream of the proposed scheme boundary. As flood risk impact can also impact upstream and downstream, the assessment has also considered a wider study area, where relevant. Professional judgement has been applied to identify the extent to which such features are considered.

13.3.2. The study area contains the following receptors:

- Surface watercourses: River Sowe, tributary to Upper Avon (Main river); Smite Brook – source to confluence with River Sowe; tributary of the River Avon (Claycoton Yelvertoft Brook to River Sowe); Brandon Wood Brook, and Birchley Wood Brook;
- Groundwater Water Framework Directive body: Warwickshire Avon – Secondary Mudrocks;
- Combe Pool, Herald Way Marsh and Brandon Marsh SSSI's;
- Several unnamed ponds and field drains; and
- Land at potential risk of fluvial flooding associated with flood risk: Smite Brook.

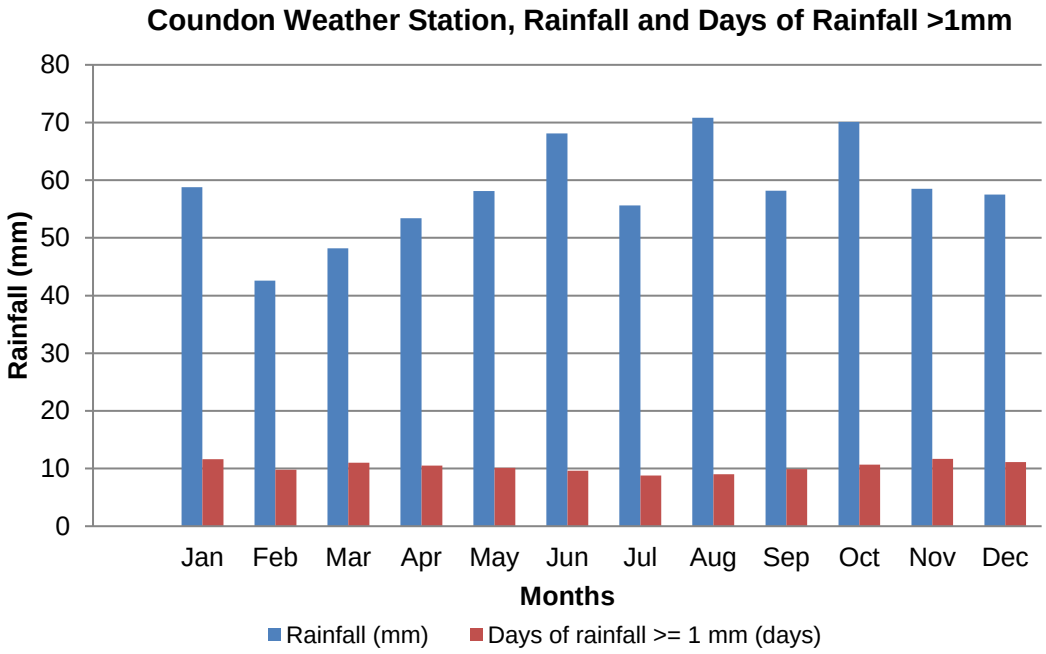
13.3.3. The study area also includes any surface water or groundwater bodies or water dependent sites outside this study area if it is considered they are hydraulically linked. This follows the guidance within DMRB Volume 11 Section 3 Part 10 HD45/09 (Ref. 13-29).

13.4. Baseline Conditions

Rainfall, Topography and Land Use

13.4.1. The rainfall data for the period 1981 – 2010 for the area has been obtained from the nearest Meteorological Office weather station (Ref. 13-30), which is located close to Coventry at Coundon, approximately 7.5km northwest of the proposed scheme. An average of 700mm of rainfall fell per year in this period. Diagram 13-1 shows how average rainfall varies throughout the year. The drier months of the year with under 50mm rainfall are February and March only, with the rainiest months being June, August and October.

Diagram 13-1: Local Weather Station Rainfall Data



13.4.2. The topography within the study area is characterised by gentle undulations. Ordnance Survey mapping (Ref. 13-31) shows a high point elevation of 93m above ordnance datum (AOD) to the immediate east of the A46 at Piles Coppice. The land slopes gradually away from this in all directions, falling to 65m in the south at the River Avon, 75m just south of Coombe Abbey Country Park and 80m in Binley Industrial Estate to the west. There are shallow valleys around the watercourses in the area, characterised by low gradients.

13.4.3. The land to the east of the proposed scheme has a predominantly rural character, including of a mix of agricultural land, Coombe Abbey Country Park, and woodland. There is also an area of residential development at Binley Woods around the A428. To the west of the proposed scheme the land use is of a mixed urban nature, including Binley Industrial Estate, a recreational ground and residences.

Surface Water Features

13.4.4. A diagram of the surface water features and their attributes are shown in Figure 13.1. Surface waterbodies were visited during a site visit to the study area on the 5 October 2017 in dry, overcast conditions with occasional outbreaks of sunshine, following several days of dry weather. The watercourses would therefore have been at relatively low flow conditions.

13.4.5. The Environment Agency's Catchment Data Explorer website (Ref. 13-32) indicates that the study area is situated within the Severn River Basin Management Plan (RBMP), with three river catchments classified under the Water Framework Directive:

- Smite Brook – source to confluence River Sowe
- Sowe – confluence Withy Bk to confluence River Avon
- Avon – Claycoton Yelvertoft Brook to confluence River Sowe

13.4.6. The proposed scheme must not cause deterioration of any relevant Water Framework Directive parameter for these waterbodies (that is, the reduction in class of any parameter), or prevent the improvement to meet future Water Framework Directive objectives. In addition, Water Framework Directive requirements apply to all inland waters and not just these classified reaches. Where a new physical modification might result in non-compliance with the main objectives of the Water Framework Directive, development might still be feasible if it meets the requirements of Water Framework Directive Article 4.7 which includes stringent tests in terms of need, alternative options, and costs to be considered.

13.4.7. The A46 has current outfalls within the *Avon - Claycoton/Yelverton Brook to River Sowe* (GB109054043920), and *Smite Brook Source to confluence with River Sowe* (GB109054044630) catchments. Both Smite Brook and the tributary of the Avon, which runs through the site beneath the A46, are ordinary watercourses.

Smite Brook

13.4.8. Smite Brook flows through Coombe Pool to the north of the proposed scheme boundary, within the study area, and then flows westwards beneath the A46 approximately 750m north of the proposed scheme boundary. It then flows in a north westerly direction to meet the River Sowe 550m downstream of the A46.

13.4.9. The crossing of Smite Brook below the A46 could not be accessed on the site visit but the watercourse was observed 460m downstream as it crosses the B4082 and at its confluence with the River Sowe, which is a further 75m downstream. As it passes beneath the B4082 the channel is 1.5m in width with a wider capacity of up to 8m mainly taken up with reed vegetation. The channel depth was approximately 0.4m at the time of the visit in low flow conditions. Fine sediment was not abundant at this point in the channel, and the bed was mainly fine gravel of 3-4mm diameter. The channel has been straightened under the bridge and on to the River Sowe downstream. There was a significant amount of slab debris and litter in the channel. The marginal vegetation is thick and overhanging into the channel.

13.4.10. At its confluence with the Sowe, Smite Brook has widened to around 3m wide (Plate 1a) and was shallow at around 0.3m. There was a significant amount of marginal vegetation which has been flattened by recent higher flows.

River Sowe

13.4.11. The River Sowe is approximately 0.62 miles (1km) to the northwest of the proposed scheme and is a Main River. The Environment Agency's powers to carry out flood defence works apply to Main Rivers only. In England Main Rivers are designated by Defra and works that can affect the flow in them are controlled through Water Activity Permits for Flood Defence enforced by the Environment Agency in accordance with the requirements of the Environmental Permitting (England and Wales) Regulations 2016 (Ref. 13-16) and the Water Resources Act 1991 (as amended) (Ref. 13-14). The River Sowe does not enter into the proposed scheme site but could potentially be influenced by impacts propagating downstream.

13.4.12. At its confluence with Smite Brook the River Sowe was 7m wide and around 0.3m deep (Plate 1b). There was a significant amount of submerged macrophytic vegetation on the bed and some, although not extensive, fine sediment accumulations. Approximately 30m downstream of the confluence the Sowe flows

beneath a road bridge of around 25m length with steep concrete banks alongside a footpath.

13.4.13. The Sowe was observed again further downstream as it crosses the footpath adjoining Bridgeacre Gardens Road. The channel looked to be straightened at this location with more abundant fine sediment than observed upstream. The channel was turbid with a depth of around 0.6-0.7m. The width was around 6m upstream of the footpath bridge, and widened downstream to nearer 10m.

Plate 1a Smite Brook immediately upstream of confluence with River Sowe (left) and Plate 1b River Sowe adjacent to the confluence with Smite Brook



Birchley Wood Brook

13.4.14. A tributary of Smite Brook known as Birchley Wood Brook flows around the edge of the southwest corner of Coombe Pool before meeting Smite Brook, which then flows west beneath the A46 to meet the Sowe as described above.

13.4.15. Birchley Wood Brook was observed on the site visit from the southern extent of Coombe Country Park close to the angling club. The watercourse was between 2m and 3m wide with a bank full depth of up to 0.5m (Plate 2a). Flow was very slow to standing at the time of the site visit. The watercourse has been straightened around Coombe Pool and is separated from the pool by an embankment that is around 2m above the watercourse, on top of which is a footpath. There are not expected to be flow pathways between the watercourse and adjacent pool through this embankment. The bed of the watercourse is blanketed in fine sediment. The watercourse is culverted under a road at the angler's car park, with surface water runoff assumed to discharge to the brook via a pipe of approximately 500mm diameter. No discharge was being made at the time of the visit.

Plate 2a (left) Birchley Wood Brook adjacent to Coombe Pool and Plate 2b (right) Drainage channel (tributary of Birchley Wood Brook) at B4428 culvert, with outfall




Brandon Wood Brook

13.4.16. Further south, Brandon Wood Brook, which is a tributary of the Water Framework Directive designated River Avon (Claycoton Yelvertoft Brook to River Sowe) has its source within the Binley Industrial Estate to the immediate west of the proposed scheme and continues south under the A46 and railway line and finally meets the Avon approximately 1 mile (1.6km) southeast of the A46 close to Ryton-on-Dunsmore.

13.4.17. Brandon Wood Brook was observed in the Herald Way Marsh SSSI (also known as The Bogs), downstream of the Binley Industrial Estate (Plate 3a). The area is deciduous woodland with a series of interconnected channels weaving through it. Brandon Wood Brook is around 1.5m wide with variable depth of between 0.05-0.2m observed on the site visit. This channel was very straight with a gravel bed, as well as a lot of woody debris and litter (for example oil bottles, beer cans, and so on). Some of the interconnected channels have embryonic gravel bar features, and regular blockages due to the logs and debris. Road outfall drains could not be located but are mapped within this area. The southern extent of the LNR includes Herald Way Marsh SSSI, which is crossed by a boardwalk, surrounded by tall emergent reeds.

13.4.18. South of the A46 the channel flows directly south and intersects the railway line that crosses the A46. The railway line is in a deep cutting and it is not clear what happens to the flow at this point. It is assumed that flow from the brook (including highway runoff) would merge with drainage from the railway. OS mapping indicates that drainage from the railway flows south to a large pool located north of Brandon Lane at Long Spinney. This was inaccessible on the site visit. The outflow from the pool flows south and is a tributary of the Avon.

Other Waterbodies

13.4.19. The River Avon is located approximately 1 mile (over 1.5km) south of the proposed scheme. Due to its distance away from the proposed scheme and the fact that its tributary Brandon Wood Brook combines with railway drainage before flowing through a large pool 80m upstream of the Avon, it is considered that the proposed scheme will not have significant effects upon this watercourse, and it is scoped out of further assessment.

13.4.20. A small drainage channel that receives outfalls from the A46 flows beneath the B4428 to meet Birchley Wood Brook adjacent to Coombe Pool (Plate 2b). It flows beneath the B4428 through a box culvert (approximately 2m x 1m). The channel is 2-3m wide

downstream of the culvert, and the bed is thick with fine sediment. The drainage channel meets Birchley Wood Brook 20-30m downstream of the culvert. There is a small outfall from the B4428 entering the channel adjacent to the culvert (Plate 2b). There is a build-up of exposed fine sediment on the right bank downstream of the culvert, indicating that sediment accumulation is a problem at this location.

13.4.21. There are a number of standing water bodies within the study area including Combe Pool SSSI which is located 280m northeast of the proposed scheme, Herald Way Marsh LNR/SSSI which is adjacent to the southern extent of the proposed scheme to the west of the A46, and Brandon Marsh SSSI located approximately 605m south east of the proposed scheme. There are also a number of ponds and field drains in the study area.

13.4.22. Combe Pool (Plate 3b) viewed from the Country Park pathways was around 30-40cm depth at the lake margins, becoming deeper further away from the lake edge, although turbidity prevented any visibility of the bed. A large number of wildfowl were observed and sediments appeared to be fine and organic rich. Woody debris was scattered across the pool in patches. There are extensive stands of emergent reeds at the margins and some floating macrophytic vegetation. Smite Brook enters the pool at its northeast corner near the hotel. Birchley Wood Brook flows around the southern edge of Combe Pool, but does not flow into it. As such, Combe Pool will not receive drainage from the proposed scheme and so is scoped out of further assessment.

13.4.23. The Environment Agency's What's In My Backyard Website (Ref. 13-33) indicates that the whole study area is within surface water Nitrate Vulnerable Zone (NVZ), this is listed as that decided post appeal in 2017. These are areas of land that drain into a freshwater body which have or could have, if action is not taken, a nitrate concentration greater than 50 milligrams per litre (mg/l).

Plate 3a (left) Brandon Wood Brook within Herald Way Marsh SSSI, and Plate 3b (right) Coombe Pool





13.4.24. The study area is not within a surface water or groundwater drinking water safeguard zone (i.e. zones that indicate areas where the use of certain substances must be carefully managed to prevent the pollution of raw water sources that are used to provide drinking water).

Surface Water Quality

13.4.25. The Smite Brook (GB109054044630) Water Framework Directive water body is not designated artificial or heavily modified, is 8.2 miles (13.23km) long and drains a catchment of 17.7 miles squared (45.9km^2). It is designated as being at Moderate Ecological Status within the 2016 assessment cycle (Ref. 13-32). It is failing to meet Good Ecological Status on the basis of Macrophytes and Phytobenthos combined which are at Moderate status, and also phosphate which is at Moderate status. Fish and invertebrates are at Good status. The waterbody is at Good Chemical Status. The Environment Agency have set a lower objective of Moderate Ecological Status that this water body met by 2015.

13.4.26. The *Sowe – Withy Brook to River Avon* (GB109054044540) Water Framework Directive water body is not designated artificial or heavily modified, is 10.2 miles (16.37km) long, and drains a catchment of 7.5 miles squared (19.4km^2). It is designated as being at Moderate Ecological Status with the aim of Good by 2016. It is failing to meet Good Ecological Status on the basis of Macrophytes and Phytobenthos combined, which are at Moderate status, and also phosphate which is at Moderate status. Fish and invertebrates are at Good status. The waterbody is at Good Chemical Status.

13.4.27. The proposed scheme must not cause deterioration of any relevant Water Framework Directive parameter (the reduction in class of any parameter) in the waterbodies described above, or prevent the improvement to meet future Water Framework Directive objectives. This also means that any discharges to the non- Water Framework Directive waterbodies must not impact on the Water Framework Directive waterbodies further downstream (the River Avon in this instance).

13.4.28. The Environment Agency has provided water quality data for watercourses in the vicinity of the proposed scheme. Average data for the period spanning 2016-2019 as most indicative of current conditions is summarised in Table 13-2 for a monitoring station on the River Sowe (national grid reference (NGR) SP 38126 79492), Smite Brook (NGR SP 38030 79410), and Coombe Pool (NGR SP 38526 79323).

13.4.29. The water quality in the River Sowe based on the available data suggest that the water quality is slightly alkaline and elevated in orthophosphate and nitrates, which are indicative of agricultural pressures from use of fertilisers on agricultural land.

Table 13-2: Summary Water Quality Data (mean average) for the period 2016-2019 (data provided by the Environment Agency)

Site	pH	Conductivity (us/cm)	Ammonia (mg/)	Alkalinity (mg/l)	Nitrate (mg/l)	Ortho-phosphate (mg/l)	Dissolved Oxygen (%Sat)
River Sowe, Hungerley Hall Farm	8.06	797.63	0.131	217	4.14	0.196	85.09
Smite Brook Confluence with River Sowe	8.26	756.18	0.17	174.45	2.77	0.27	79.65
Coombe Pool	No data	629.5	No data	161.71	No data	No data	No data

Surface Water Flow

13.4.30. Surface water flow data were requested from the Environment Agency for all watercourses up to 0.62 miles (1km) from the proposed scheme. The Environment Agency confirmed that no monitoring is undertaken for any of the watercourses within the study area.

13.4.31. The nearest monitored station on the UK Government River Levels website (Ref. 13-34) and the National River Flow Archive website (Ref. 13-35) is the River Avon at Stareton, approximately 3.9 miles (10km) downstream of the proposed scheme. The mean flow at this station was 2.564 cubic metres per second (m^3/s) and Q95 was 0.492m^3/s for the period 1962-2018.

13.4.32. An analysis of the flows in the streams adjacent to the proposed scheme has been undertaken using LowFlows software (www.hydrosolutions.co.uk), and the Q95 values are shown in Table 13-3.

Table 13-3: Mean and Q95 Discharges for Watercourses Immediately surrounding the Site

Watercourse	Mean Flow	Q95
Brandon Wood Brook (through Herald Way marsh SSSI)	0.003 m^3/s	0.001 m^3/s
Ditch NW of A46-A428 Junction	0.001 m^3/s	0.000 m^3/s
Birchley Wood Brook (ditch draining to Smite Brook)	0.008 m^3/s	0.002 m^3/s

13.4.33 The Q95 flows in these watercourses are very low. When Brandon Wood Brook was visited on the site walkover in Herald Way Marsh the watercourse was flowing only very slowly, with ponding in places due to debris causing blockages of the channel, and was almost dry in other patches. Birchley Wood Brook also had low flow and almost appeared to be standing water, which is again in agreement with the LowFlows data. The small ditch north west of the Binley junction was not accessible, but the Q95 suggests that it is essentially dry.

Ecology

13.4.33. Ecological data for watercourses in the study area were requested from the Environment Agency. Details of a 500m^2 fish survey undertaken in September 2016 were provided for the River Sowe at Walsgrove (NGR SP 38305 80280). The following species of fish were caught in the survey, in descending order by weight: Bullhead (*Cottus gobio*) 84.6%, Minnow (*Phoxinus phoxinus*) 10.85%, European eels (*Anguilla anguilla*) 2.37%, 3-spined stickleback (*Gasterosteus aculeatus*) 2.09%, Stone loach (*Barbatula barbatula*) 0.08%, and Bleak (*Alburnus alburnus*) 0.01%. Of the recorded species, bullhead (*Cottus gobio*) is an Annex II species under Habitats Directive. European eels (*Anguilla anguilla*) are also protected under The Eels (England and Wales) Regulations 2009.

13.4.34. Invertebrate data has been provided for Smite Brook just upstream of the confluence with the River Sowe (NGR SP 38030 79340). Data provided are from two surveys in May and September 2013. A total of 16 and 24 taxa were recorded for each survey, respectively. Biological Monitoring Working Party (BMWP) scores are also provided, which can be used to evaluate sensitivity of macroinvertebrate communities to pollution (mainly organic pollution and nutrient enrichment). The BMWP scores reflect the sensitivity of macroinvertebrates to oxygen depletion, with scores below 10 suggesting that the watercourse is heavily polluted, and BMWP scores above 100 indicating water that is unpolluted. Scores from the two surveys were 80 and 114, respectively. The May survey was therefore suggestive of clean but slightly impacted water, while the September survey was indicative of unpolluted water.

Surface Water Abstractions

13.4.35. There is one surface water abstraction located within 0.62 miles (1km) of the proposed scheme site according to the Environment Agency *What's In Your Backyard* website (Ref 13-33). It is located to the north of Binley Wood close to Old Lodge Farm (license 18/54/11/0122). The abstraction appears to be from a tributary of Smite Brook and is for the purpose of spray irrigation storage from December to March inclusive from NGR SP 3965 7857. This is labelled on Figure 13-1 as *A1*. This is upstream of the proposed scheme and so can be scoped out of further assessment.

13.4.36. Information on Private Water Supplies in the study area was requested from Coventry City Council and Rugby Borough Council. There is one property that these councils are aware of which is located Brandon Lane, approximately 750m south of the southern extent of the proposed scheme, to the south of Long Spinney. This is labelled on Figure 13-1 as *P1*.

Pollution Incidents

13.4.37. The Environment Agency have provided details of pollution incidents in the study area for the period 2012-2018, and these are shown in Table 13-4 and Figure 13-1.

Table 13-4: Pollution Incidents within the Study Area provided by the Environment Agency for the period 2012-2018

Label in Figure 13-1	Date	NGR	Location	Watercourse	Pollutant
PI1	21/10/15	SP 38142 77176	Binley Industrial Estate	Brandon Wood Brook (tributary of Avon)	SuDS oil from storage tank/container failure
PI2	18/11/15	SP 38232 77024	Oak Tree Road Garage	Brandon Wood Brook (tributary of Avon)	Unidentified unauthorised discharge
PI3	07/10/15	SP 38232 77141	Binley Industrial Estate	Brandon Wood Brook (tributary of Avon)	Unknown from vehicle garage
PI4	02/05/14	SP 39635 77180	Binley Woods	Unclear	Grey water from foul sewer (authorised)
PI5	04/11/15	SP 38124 77174	Binley Industrial Estate	Brandon Wood Brook (tributary of Avon)	SuDS oil from unauthorised discharge
PI6	13/08/15	SP 38135 77172	Binley Industrial Estate	Brandon Wood Brook (tributary of Avon)	Runoff from swarf - inadequate containment
PI7	11/04/17	SP 38048 77283	Binley Industrial Estate	Brandon Wood Brook (tributary of Avon)	Potential water runoff from chemical manufacturing
PI8	04/12/13	SP 39062 77574	Binley Woods Service Centre	Ditch to Birchley Wood Brook (tributary of Smite Brook)	Vehicle and Plant Washings
P9	15/04/18	SP38147 77559	Binley Industrial Estate	Brandon Wood Brook (tributary of Avon)	Fire in retail premises, firefighting runoff
P10	21/05/18	SP38260 77091	Binley Industrial Estate	Brandon Wood Brook (tributary of Avon)	Sewage materials grey water from unauthorised activities

13.4.38. The majority of incidents have occurred in Binley Industrial Estate, and are therefore contributing to water quality pressures in the downstream Herald Way Marsh SSSI/Claybrookes Marsh SSSI.

Groundwater Features

13.4.39. Groundwater is a protected resource and its vulnerability to pollution is classified depending on the geology of the area (which determines the aquifer status) and the leaching potential of overlying soils (which determines how easily pollution from above ground sources may filter through to the aquifer).

13.4.40. The bedrock and superficial geology for the area is identified by the British Geological Survey (BGS) online mapping (Ref. 13-36). The bedrock consists of Mercia Mudstone

Group – Mudstone. The superficial geology consists of a mix of Alluvium (clay, silt, sand and gravel) around the watercourses, Baginton Sand and Gravel Formation, River Terrace Deposits (Sand and Gravel) and small patches of Thrussington Member – Diamicton.

13.4.41. The groundwater within the study area is contained within the Warwickshire Avon – Secondary Mudrocks Water Framework Directive groundwater body. This waterbody is classified as being at Good status under the 2016 Cycle 2 Water Framework Directive classification.

13.4.42. The Mercia Mudstone bedrock is classified as Secondary B aquifer, overlain by sands and gravels, alluvium and river terrace deposits classified as Secondary A and Secondary B aquifer. Secondary A aquifers are permeable layers capable of supporting water supplies at a local rather than strategic scale. Secondary B aquifers are predominantly lower permeability layers which may store and yield limited amounts of groundwater due to localised features such as fissures, thin permeable horizons and weathering. There are some areas with no superficial deposits, and hence no superficial aquifer designation. The proposed scheme area features areas of Minor Aquifer High groundwater vulnerability.

13.4.43. There is one groundwater abstraction located outside of the study area, approximately 1500m south of the proposed scheme site boundary, marked on the Environment Agency What's In Your Backyard website as being located south of Brandon Road at Brandon Marsh SSSI. This is labelled on Figure 13-1 as G1. The Environment Agency has confirmed that there are no further groundwater abstractions in the study area. The EA What's in Your Backyard website no longer contains abstraction information. Within the EA response for an updated baseline search, they stated there was a current groundwater abstraction, but that it was outside of the study area.

13.4.44. There are no groundwater Source Protection Zones within the study area.

13.4.45. The site is not within a groundwater safeguard zone. These zones indicate areas where the use of certain substances must be carefully managed to prevent the pollution of raw water sources that are used to provide drinking water. However, this is not applicable at this site.

Discharge Consents

13.4.46. Information provided by the Environment Agency shows that there are two discharge consents in the study area:

- Consent TSC3785 on Progress Close within Binley Industrial Estate, approximately 500m southwest of the Binley junction. This is a pumping station on the sewerage network (NGR SP 38373 77346). The discharge location appears to join Brandon Wood Brook, which flows south through Claybrookes Marsh LNR/Herald Way Marsh SSSI. This is labelled as D1 on Figure 13-1
- Consent DS/832 at the Old Lodge and Roseycombe Farm approximately 900m northeast of the A46-A428 junction. This is for a domestic property and farm buildings (NGR SP 39600 78206), and would appear to discharge to a drain that flows to Birchley Wood Brook (tributary of Smite Brook). This is labelled as D2 on Figure 13-1

13.4.47. Consent TSC3785 appears to be a sewer network emergency pumping station overflow that is likely to occasionally discharge mixed foul and surface water into Brandon Wood Brook. This will introduce a range of pollutants, particularly sanitary pollutants, nutrients, metals, oils, and sediments.

13.4.48. Consent DS/832 is likely to be a discharge from a non-mains domestic foul water treatment system. Discharges from this system to Birchley Wood Brook are likely to be volumetrically smaller than those from the pumping station overflow to Brandon Wood Brook, but more frequent. Pollutants will include sanitary pollutants, nutrients and particulates, although what treatment is provided is not known.

Water Dependent Ecological Areas

13.4.49. Within the study area there are several SSSIs:

- Combe Pool SSSI
- Herald Way March LNR and SSSI / Claybrookes Marsh LNR
- Ryton and Brandon Gravel Pits SSSI / Brandon Marsh SSSI

13.4.50. Combe Pool SSSI is located adjacent to the east side of the A46 in the area to the east of A46 / B4082 roundabout at the north end of the proposed scheme. Coombe Pool is designated SSSI and located approximately 300m north of the site boundary.

13.4.51. Combe Pool SSSI is designated as a site important for standing open water and canal. The whole site of 51 hectares (ha) was last surveyed on 4 May 2016. It was listed as *Unfavourable – Recovering*, with the notes that "*all in good condition, Lots of work to clear Rhododendron being done in northern section with good results*". It is one of the most important ornithological sites in Warwickshire for its herons (*Ardea cinerea*) and other breeding birds, and for wintering wildfowl. In the winter the pool also holds good numbers of tufted duck, pochard, gulls, and nationally significant numbers of shoveler. According to the HADDMS website (Ref. 13-37), road drainage from the A46 is directed to a ditch which flows northeast and outfalls to a watercourse within the SSSI. This ditch does not appear to be hydraulically linked with the water within Coombe Pool itself, and although it does fall within the SSSI designated area, does not appear to be related to the designated features of the SSSI.

13.4.52. Herald Way Marsh SSSI (including Claybrookes Marsh LNR) is located adjacent to the west of the A46, to the north of the railway crossing, immediately adjacent to the site boundary. Herald Way Marsh is designated as a site important for bogs – lowland habitat. The whole site of just over 10ha was last surveyed on 18 September 2009, and classified as favourable. The survey commented that "*Good range of surfaces present, recreation activity not causing damage. Water quality in northern marsh by inflow seems suspect and Environment Agency has been advised*". From HADDMS, road drainage from the A46 is directed to high priority outfalls located within the SSSI/LNR area.

13.4.53. Ryton and Brandon Gravel Pits SSSI/Brandon Marsh SSSI is located at its closest 850m south of the proposed scheme site boundary. The Brandon Marsh SSSI contains a range of wetland communities which are scarce in Warwickshire. They range from open water through to swamp and fen to marsh, as well as areas of grassland, scrub and woodland. The site was selected due to its assemblage of invertebrates, some of which are nationally rare. From the Ordnance Survey Mapping (Ref. 13-31) and the detailed river network layer in HADDMS (Ref. 13-37), it appears this SSSI is not hydraulically linked to the A46 catchment, with drainage from the proposed scheme passing through the river network to the west of the SSSI, and so it is not considered further.

Flood Risk

13.4.54. Full details on the flood risk associated with the study area and the proposed scheme are provided in the Flood Risk Assessment presented in Appendix 13-1. The following is a summary of this baseline.

13.4.55. As noted earlier, there are no Main Rivers within the proposed scheme site boundary, although the River Sowe crosses to the north of the site. Smite Brook is the nearest ordinary watercourse located approximately 750m to the north of the site boundary.

13.4.56. In accordance with the Flood Map for Planning (FMfP) provided by the Environment Agency, the majority of the proposed scheme site is located within Flood Zone 1. Land identified as being within Flood Zone 1 is classified as being at low risk (less than 0.1% Annual Exceedance Probability (AEP)) of flooding from rivers and the sea. A small area at the northern edge of the site boundary is at high (greater than 3.3% AEP) and medium risk of flooding (between 1% to 3.3% AEP). The proposed scheme plans indicate that this area which is at higher risk of flooding is a part of the site compound that will be used as a laydown yard temporarily during the construction phase. The proposed works will not involve changing existing ground levels within the flood zone.

13.4.57. As the Proposed Scheme is located in Flood Zone 1 (less than 0.1%AEP risk of fluvial flooding) the Environment Agency's guidance regarding allowances for climate change while undertaking flood risk assessments suggests that while assessing the impact of climate change on development of highways which are considered to be essential infrastructure, the central allowance indicating an increase of 20% on peak flows should be considered. Climate change has the potential to increase peak flows, and therefore flood extents, for the watercourses located in the vicinity of the Site. However, the majority of the Proposed Scheme is likely to remain at very low risk of fluvial flooding over its design life since it is located in Flood Zone 1.

13.4.58. A small area of the redline boundary at the northern edge of the site boundary is in flood zones 2 & 3. The proposed scheme plans indicate that this area which is at higher risk of flooding is a part of the site compound that will be used as a laydown yard temporarily during the construction phase. The proposed works will not involve changing existing ground levels within the flood zone. Therefore, even though climate change is likely to increase flood risk to this area, the consequence of flooding will remain low if the site stays as a greenfield area. Also, since the Site falls within the River Severn Catchment Flood Management Plan (CFMP), it is likely that the Environment Agency and the local council will work to deliver sustainable flood risk management for the long term to keep pace with climate change as per Policy 4 of the CFMP.

13.4.59. The Environment Agency Flood Map for Planning shows there is a risk of fluvial flooding associated with the Smite Brook and River Sowe. The risk of flooding from these sources does not extend into the site boundary. Thus, the site is at a low risk of flooding from fluvial sources.

13.4.60. The Risk of Flooding from Surface Water Map (Ref. 13-39) shows that majority of the site is at very low risk of flooding but there are two small areas shown to be at high risk of surface water flooding in the 3.33% AEP event. One such area is located towards the north of the redline boundary in the vicinity of a ditch located in Oak Farm nurseries. The other area at high risk of flooding is located to the south east of the Binley Road junction roundabout adjacent to the highway. The overall flood risk from surface water runoff from land is considered to be medium. In the future climate change is likely to cause an increase in rainfall intensity that will increase surface runoff rates and volumes, thus increasing the risk of surface water flooding.

13.4.61. Based on the data provided in the Strategic Flood Risk Assessment, there is no known risk of flooding from sewers to the proposed scheme site.

13.4.62. According to the Strategic Flood Risk Assessments, parts of the proposed scheme are shown to be in an area considered prone to groundwater flooding (≥75%).

Therefore, the proposed scheme site is considered to be at a high risk of groundwater flooding. In the future, due to climate change the predicted increase in the wetness of winters and the intensity of storm events could impact groundwater level fluctuations across the site, and possibly increase the level of the water table. As the likelihood of groundwater emergence under the climate change scenario is likely to increase, the potential for groundwater flooding to impact infrastructure will also increase. However, post-development the site will be largely covered by hardstanding ground, which reduces the infiltration and the likelihood of localised groundwater reaching the surface and causing flooding.

13.4.63. Based on Environment Agency mapping, the proposed scheme is not located within the maximum extent of flooding from reservoirs, and is therefore not considered to be at risk of flooding from reservoirs.

13.4.64. Based on Environment Agency mapping, the proposed scheme is not near to any other artificial sources of flood risk such as canals or wetland areas. As such, the proposed scheme is considered not to be at risk from any other artificial sources of flood risk.

13.5. Potential Impacts

13.5.1. The following section describes the potential effects on water resources and flood risk that may occur during both the construction and operation phases.

Construction Effects

13.5.2. During the construction phase temporary impacts on water quality could occur if construction does not follow good practice and mitigation measures are not implemented on site. The potential effects of the preferred route on surface water quality could include:

- Impacts on water quality due to deposition or spillage of soils, sediments, oils, fuels, or other construction chemicals, or through uncontrolled site run-off
- Potential increase in volume and rate of surface water runoff from new impervious areas or from storing construction materials in the floodplain, leading to an impact on flood risk
- Temporary effects on water levels and sediment dynamics within watercourses where new crossings are required due to construction works
- Increased risk of blockage of drains as a result of increased material (sands, gravels etc.) transported in runoff from site
- Water quality or flow effects to downstream water dependent ecological sites, including Combe Pool SSSI and Herald Way Marsh SSSI/Claybrookes Marsh LNR

13.5.3. Construction activities such as earthworks, excavations, site preparation and levelling and grading operations result in the disturbance of soils. Exposed soil is more vulnerable to erosion during rainfall events due to loosening and removal of vegetation to bind it, compaction and increased runoff rates. Surface runoff from such areas can contain excessive quantities of fine sediment, which may eventually be transported to watercourses where it can result in adverse impacts on water quality, flora and fauna. Construction works within, along the banks and across watercourses can also be a direct source of fine sediment mobilisation.

13.5.4. Contamination of surface waters, groundwater and soil could result from leakage and spills of fuels, oils, chemicals and concrete during construction affecting watercourses indirectly via site runoff or directly where works are close to and within a water body. Contamination may reduce water quality and impact aquatic fauna and flora.

13.5.5. Any construction works that impede on the floodplain have the potential to increase rate and volume of runoff, and increase risk of blockages in watercourses that could lead to flow being impeded, and a potential rise in flood risk.

Operational Effects

13.5.6. During operation of the new road the following impacts may occur:

- Impacts on the surface water quality from highway run-off (including the use of de-icants) or as a result of accidental spillages
- Increase in flood risk due to an increase in surface water runoff from the proposed scheme, changes in surface water flow pathways
- Impacts on hydraulic processes and sediment dynamics in watercourses and their floodplains
- Hydromorphological effects including changes to physical form, hydraulic processes and sediment dynamics underpinning habitats in watercourses and their floodplains

13.5.7. The proposed scheme could lead to alterations in the extent of highway runoff discharging into receiving watercourses due to changes to the existing drainage system. Additionally, the proposed scheme would increase the impermeable areas draining to certain road outfalls, which will affect the volume of runoff (as well as the quality). Surface water runoff from roads can contain pollutants such as hydrocarbons, heavy metals, inert particulates, litter and organic matter which can cause chronic pollution of the water environment if allowed to enter watercourses without the appropriate treatment or dilution. Additionally, there is a risk that a road accident will lead to a major spillage that could cause a serious pollution incident should it be allowed to reach a watercourse untreated. Also, changes in the routine of traffic and the characteristics of traffic flows may result in subtle changes to the concentration of contaminants in runoff and spillage risk.

13.5.8. Works to existing structures, such as culverts, may also result in the loss of areas of river bed and banks, and may interrupt flows and sediment transport process resulting in changes to channel hydromorphology upstream and downstream of the structure. These changes may also have adverse impacts on the riverine ecosystem.

13.5.9. It is important following completion of the proposed scheme that there is a requirement for regular inspection and maintenance of the drainage systems. This would be carried out in accordance with good practice guidance. Information regarding the maintenance regime will be provided in Operation and Maintenance manuals. Systems will be designed in accordance with current guidance to ensure that the potential for siltation and blockages is minimised under normal operation.

13.5.10. The maintenance regime for ponds, culverts, and road drainage networks will be identified to reduce the residual risk from failure or improper function of the drainage system due to blockages. This risk of flooding can also be alleviated during design by improving the existing drainage system where impermeable areas are increased.

13.6. Assessment Methodology

13.6.1. The methodology and guidance contained within Design Manual for Roads and Bridge (DMRB) *HD 45/09* (Ref. 13-29) has been used to undertake a qualitative assessment of the potential for impacts on water resources in the area. Potential impacts of the proposed scheme on the water environment have been assessed by:

- Considering the existing (baseline) status of the water environment within the study area with respect to flood risk, surface water and groundwater

- Identifying potential impacts of the proposed development on the water environment during the construction and operation phases
- Proposing suitable mitigation measures to be incorporated into the development design, construction and operation to avoid, minimise, reduce and offset any adverse impacts
- Reviewing any residual impacts and presenting additional mitigation measures to limit their impacts

13.6.2. A site wide Flood Risk Assessment has been prepared in accordance with NPPF requirements and the associated Planning Practice Guidance (PPG) and is presented in Appendix 13-1. The assessment related to flood risk within this chapter draws upon the studies and conclusions made within the Flood Risk Assessment.

13.6.3. Building on existing desk study and survey information, further data has been collected to prepare a robust baseline for the proposed scheme upon which the impact assessment can be undertaken. This included a review of national and local planning policy, any relevant published plans, documents, and best practice guidance, and a review of the following data sources:

- Existing scheme information, topographical data, site reports and consultations
- Online Ordnance Survey and aerial maps
- Online historic maps
- Various websites for data on water quality, water resources, hydrology, climate, geology, soils
- Any / current River Basin Management Plan, Catchment Abstraction Management Strategy, and Strategic Flood Risk Assessment covering the site

13.6.4. The Environment Agency was consulted for information on water quality, resources and biological data for water bodies in the Scheme area. Coventry City Council and Rugby Borough Council were consulted on the presence of any private water abstractions.

13.6.5. Following the initial desk study a site walkover survey was carried out of the proposed scheme site to review current land use, topography, morphology, and to determine the hydraulic and sediment dynamic properties of the rivers in this location (as this has relevance for the potential for sediment-bound pollutants in runoff to accumulate in the channel).

13.6.6. A quantitative assessment of surface water runoff and spillage risk from the proposed scheme designs to the watercourses to be outfalled to was undertaken using the Highways Agency's Water Risk Assessment Tool (HAWRAT) and spillage risk prediction method described in the DMRBs HD45/09 (Ref. 13-29). The assessment determined the need for treatment and spillage containment measures for future road runoff.

13.6.7. The significance of potential adverse effects during the construction and occupation phases of development was determined using the guidance and criteria set out in DMRB HD45/09. This was developed for road infrastructure projects, and provides a robust and well tested method by which to predict the significance of effects.

13.6.8. Under this approach, the importance of the receptor (Table 13-5) and the magnitude of impact (Table 13-6) are determined independently from each other and are then used to determine the overall significance of effects (see Table 13-7). Where

significant adverse effects are predicted, options for mitigation are considered and secured where possible.

13.6.9. Whilst other disciplines may consider *receptor sensitivity*, receptor importance is considered here. This is because when considering the water environment, the availability of dilution means that there can be a difference in the sensitivity and importance of a water body. For example, a small drainage ditch of low conservation value and biodiversity with limited other socio-economic attributes, is very sensitive to impacts, whereas an important regional scale watercourse, that may have conservation interest of international and national significance and support a wider range of important socio-economic uses, is less sensitive by virtue of its ability to assimilate discharges and physical effects. Irrespective of importance, all controlled waters in England are protected by law from being polluted. It should also be noted that in contrast to other disciplines the assessment of the water environment as described by DMRB HD45/09 does not include a category of Negligible for receptor importance or No Change for magnitude of impact.

13.6.10. Any effects identified through the Flood Risk Assessment, during either the construction or operation phases, were evaluated and a significance value attributed to each effect in accordance with the methodology outlined in this chapter.

Table 13-5: Criteria to Determine Receptor Importance

Value	Type of Receptor		
	Groundwater	**Surface Water**	**Flood Risk**
Very High	Principal aquifer providing a regionally important resource or supporting site protected under EC and UK habitat legislation Source Protection Zone 1	EC Designated Salmonid/Cyprinid fishery Water Framework Directive Class 'High' site protected/designated under EC or UK habitat legislation (SAC, SPA, SSSI, WPZ, Ramsar site, salmonid water)/Species protected by EC legislation	Floodplain or defence protecting more than 100 residential properties from flooding
High	Principal aquifer providing locally important resource or supporting river ecosystem Source Protection Zone 2	Water Framework Directive Class 'Good' Major Cyprinid Fishery Species protected under EC or UK habitat legislation	Floodplain or defence protecting between 1 and 100 residential properties or industrial premises from flooding
Medium	Aquifer providing water for agricultural or industrial use with limited connection to surface water Source Protection Zone 3	Water Framework Directive Class 'Moderate'	Floodplain or defence protecting 10 or fewer industrial properties from flooding
Low	Unproductive strata	Water Framework Directive Class 'Poor'	Floodplain with limited constraints and low probability of flooding of residential and industrial properties

Note 1: Professional judgement is applied when assigning an importance category to all water features. The Water Framework Directive status of a watercourse is not an overriding factor and in many instances it may be appropriate to upgrade a watercourse which is currently at poor or moderate status to a category of higher importance to reflect its overall value in terms of other attributes and Water Framework Directive targets for the watercourse. Likewise, a watercourse may be below Good Ecological Status, this does not mean that a poorer quality discharge can be emitted. All controlled waters are protected from pollution under the Environmental Permitting (England and Wales) Regulations 2016 and the Water Resources Act 1991 (as amended), and future Water Framework Directive targets also need to be considered.

Source: Adapted from HD45/09 (Highways Agency, 2009)

13.6.11. The magnitude of effect was determined based on the criteria in Table 13-6 taking into account the likelihood of the effect occurring. The likelihood of an effect occurring is based on a scale of certain, likely or unlikely. Likelihood will be considered in the case of water resources only, as likelihood is inherently included within the flood risk assessment.

Table 13-6: Criteria to Determine Magnitude of Effect

Impact	Description
Major Adverse	*Results in a loss of attribute and/or quality and integrity of the attribute:* **Surface water:** • Failure of both soluble and sediment-bound pollutants in HAWRAT (Method A, Annex I) and compliance failure with EQS values (Method B) • Calculated risk of pollution from a spillage >2% annually (Spillage Risk Assessment, Method D, Annex I) • Loss or extensive change to a fishery • Loss or extensive change to a designated Nature Conservation Site **Groundwater:** • Loss of, or extensive change to, an aquifer • Potential high risk of pollution to groundwater from routine runoff – risk score >250 (Groundwater Assessment, Method C, Annex I) • Calculated risk of pollution from spillages >2% annually (Spillage Risk Assessment, Method D, Annex I) • Loss of, or extensive change to, groundwater supported designated wetlands **Flood Risk:** • Increase in peak flood level (1% annual probability) >100 mm (Hydrological Assessment of Design Floods and Hydraulic Assessment, Methods E and F, Annex I)
Moderate Adverse	*Results in impact on integrity of attribute, or loss of part of attribute:* **Surface Water:** • Failure of both soluble and sediment-bound pollutants in HAWRAT (Method A, Annex I) but compliance with EQS values (Method B) Calculated risk of pollution from spillages >1% annually and <2% annually • Partial loss in productivity of a fishery **Groundwater:** • Partial loss or change to an aquifer • Potential medium risk of pollution to groundwater from routine runoff – risk score 150-250 • Calculated risk of pollution from spillages >1% annually and <2% annually • Partial loss of the integrity of groundwater supported designated wetlands **Flood Risk:** • Increase in peak flood level (1% annual probability) >50mm

Impact	Description
Minor Adverse	*Results in some measurable change in attribute's quality or vulnerability:* **Surface Water:** • Failure of either soluble or sediment-bound pollutants in HAWRAT • Calculated risk of pollution from spillages >0.5% annually and <1% annually **Groundwater:** • Potential low risk of pollution to groundwater from routine runoff – risk score <150 Calculated risk of pollution from spillages >0.5% annually and <1% annually Minor impacts on groundwater supported wetlands **Flood Risk:** • Increase in peak flood level (1% annual probability) >10mm
Negligible	*Results in impact on attribute, but of insufficient magnitude to affect the use or integrity:* *The Scheme is unlikely to affect the integrity of the water environment.* **Surface Water:** • No risk identified by HAWRAT (Pass both soluble and sediment-bound pollutants) • Risk of pollution from spillages <0.5% **Groundwater:** • No measurable impact upon an aquifer and risk of pollution from spillages <0.5% **Flood Risk:** • Negligible change in peak flood level (1% annual probability) <+/- 10mm
Minor Beneficial	*Results in some beneficial impact on attribute or a reduced risk of negative impact occurring:* **Surface Water:** • HAWRAT assessment of either soluble or sediment-bound pollutants becomes Pass from an existing site where the baseline was a Fail condition • Calculated reduction in existing spillage risk by 50% or more (when existing spillage risk is <1% annually) **Groundwater:** • Calculated reduction in existing spillage risk by 50% or more to an aquifer (when existing spillage risk <1% annually) **Flood Risk:** • Reduction in peak flood level (1% annual probability) >10mm
Moderate beneficial	*Results in moderate improvement of attribute quality:* **Surface Water:** • HAWRAT assessment of both soluble and sediment-bound pollutants becomes Pass from an existing site where the baseline was a Fail condition

Impact	Description
	• Calculated reduction in existing spillage by 50% or more (when existing spillage risk >1% annually) **Groundwater:** • Calculated reduction in existing spillage risk by 50% or more (when existing spillage risk is >1% annually) **Flood Risk:** • Reduction in peak flood level (1% annual probability) >50mm
Major beneficial	*Results in major improvement of attribute quality:* **Surface Water:** • Removal of existing polluting discharge, or removing the likelihood of polluting discharges occurring to a watercourse **Groundwater:** • Removal of existing polluting discharge to an aquifer or removing the likelihood of polluting discharges occurring, Recharge of an aquifer **Flood Risk:** • Reduction in peak flood level (1% annual probability) >100mm

Source: Adapted from HD45/09 (Highways Agency, 2009)

13.6.12. The significance of effects will be determined using the matrix presented in Table 13-7. Only those effects moderate or greater are considered significant.

Table 13-7 Matrix to Determine Significance of Effect

Importance	Magnitude			
	Major	**Moderate**	**Minor**	**Negligible**
Very High	Very large	Large / very large	Moderate / large	Neutral
High	Large / very large	Moderate / large	Slight / moderate	Neutral
Medium	Large	Moderate	Slight	Neutral
Low	Slight / moderate	Slight	Neutral	Neutral

Source: Adapted from HD45/09 (Highways Agency, 2009)

13.6.13. With reference to good industry practice (for example DMRB, CIRIA guides) recommendations are made for mitigation measures to manage and control works during construction to avoid, prevent and minimise the risk of water pollution.

Assessment Assumptions and Limitations

13.6.14. The assessment has been undertaken using available data at the time of writing in September 2019.

13.6.15. No water quality or flow monitoring has been undertaken. Determination of Q95 low flows has been calculated in a desk based exercise using catchment data and Wallingford Hydrosolutions Ltd LowFlows software.

13.6.16. No water quality sampling has been undertaken, and so best available Environment Agency data has been used in the HD45/09 HAWRAT assessment.

13.6.17. All road runoff is assumed to be discharged to surface watercourses as indicated by the drainage strategy, and so no assessments of discharges to ground have been undertaken.

13.6.18. Channel dimensions and gradients used in the assessment are based on estimates during the site visit, and have not been accurately measured.

13.6.19. No construction method statements are available at the time of writing, so assumptions have been made that all works would take place using best practice.

13.7. Design, Mitigation and Enhancement Measures

13.7.1. This section describes how potential environmental impacts have been, or will be avoided, prevented, reduced, or offset through design or management during the construction phase processes and operational designs. These measures are embedded within the design and are thus taken into account by the impact assessment in the initial prediction of effects.

13.7.2. The risk of pollution to watercourse and surface water and groundwater environment is greatest during the construction stages of the project. Pollution may arise directly from spillages of oil or other polluting substances, or indirectly from runoff from hard standing and other sealed surfaces or from construction machinery that may contain high levels of suspended solids. However, during construction potential impacts to the water environment would tend to be temporary and short term.

13.7.3. In order to avoid, minimise, and reduce adverse effects where possible, both direct and indirect, on the local surface water and groundwater receiving environment, an Environmental Management Plan (EMP) including water and drainage matters has been developed by the contractor appointed. The EMP would be reviewed, revised, and updated once the project progresses towards construction to ensure all potential impacts and effects are summarised and minimised as far as practicable in keeping with best practice at that point in time. The principles of mitigation and the measures set out below are the minimum standards that the contractor would implement.

13.7.4. The following documents provide useful guidance on best practice measures to minimise the risks of pollution as far as practicable. The UK Government Guidance for Pollution Preventions (GPP) (**Error! Reference source not found.**), which are still under development, cover a variety of scenarios. The ones released so far are:

- GPP 2: Above ground oil storage (2018);
- GPP 4: Treatment and disposal of wastewater where there is no connection to the public foul sewer;
- GPP 5: Works and maintenance in or near water for construction or maintenance works near, in, or over water (2018);
- GPP 8: Safe storage and disposal of used oils (2018);
- GPP 13: Vehicle washing and cleaning;
- GPP 19: Vehicles: Service and Repair;
- GPP 20: Dewatering underground ducts and chambers;
- GPP 21: Pollution Incident Response Plans (2018);
- GPP22: Dealing with spills; and

- GPP26: Safe storage – drums and intermediate bulk containers.

13.7.5. As of the 17 December 2015 all Pollution Prevention Guidance (PPG) Documents (Ref. 13-40) published by the UK environment agencies were withdrawn. Although they provide useful advice on the management of construction to avoid, minimise and reduce environmental impacts, they should not be relied upon to provide accurate details of the current legal and regulatory requirements and processes. They are referred to in this document alongside other current guidance and in the context of the Scheme and site specific mitigation measures. Construction phase operations would be carried out in accordance with guidance contained within the Environment Agency PPG, including:

- General Guide to the Prevention of Pollution: PPG1
- Above Ground Oil Storage tanks: PPG2
- Use and Design of Oil Separators in Surface Water Drainage Systems: PPG3
- Works in, Near or Liable to Affect Watercourse: PPG5
- Working at Construction and Demolition Sites: PPG6
- Storage and Disposal of Used Oil: PPG8
- High Pressure Water and Steam Cleaners: PPG13
- Control of Spillages and Fire Fighting Runoff: PPG18
- Pollution Incident Response Planning: PPG21
- Storage and Handling of Drums and Intermediate Bulk Containers: PPG26

13.7.6. Further mitigation measures would be those in accordance with current good practice for highway drainage design as set out in DMRB, and references therein and the following key Construction Industry Research and Information Association (CIRIA) documents:

- C741 (2015, 4th Edition) Environmental good practice on site guide (Ref. 13-41)
- C609 (2004) Sustainable Drainage Systems, hydraulic, structural and water quality advice (Ref. 13-42)
- C624 (2004) Development and flood risk – Guidance for the construction industry (Ref. 13-43)
- C522 (2001) Sustainable Urban Drainage Systems – Design manual for England and Wales (Ref. 13-44)
- C523 (2001) Sustainable Urban Drainage Systems – Best practice manual for England, Scotland, Wales and Northern Ireland (Ref. 13-45)
- C532 (2001) Control of water pollution from construction sites – Guidance for consultants and contractors (Ref. 13-46)

13.7.7. CIRIA document C741, 4th Edition Environmental good practice on site (Ref. 13-41) contains examples of best practice measures which can be used in specific situations. For example, there is a case study on use of non-potable water and reducing sediments within silty site runoff water. SuDS will be utilised wherever possible for drainage solutions. The following broad mitigation measures would be adopted on site:

- Site clearance and areas of bare earth will be kept to a minimum, and re-seeded or covered by a geotextile as soon as practically possible

- There will be no pumping or discharges (such as displaced ground or surface water) to controlled waters without a Water Activity Permit obtained from the Environment Agency (unless the water is confirmed with the Environment Agency as clean or an exception applies). The Principal Contractor shall comply with any conditions imposed by any permits
- Highways England or their Principal Contractor will obtain a bespoke Water Activity Permit from the Environment Agency before commencing any relevant works for any temporary works within 8m of the top of the bank of a Main River
- The Principal Contractor shall comply with any conditions imposed by any permits. Similarly, temporary and permanent consents from the Lead Local Flood Authorities (LLFA) for works affecting Ordinary Watercourses shall be obtained by the design team or the Principal Contractor as appropriate and in advance of any such works
- There will be no pumping into surface water drains or combined sewer without the permission of the statutory undertaker (Severn Trent Water)
- During the construction process any surface water land drains or existing road gullies present on the site would be identified and covered up to ensure construction site runoff or any accidental spillages cannot enter the drainage system without appropriate treatment
- Where water needs to be removed from excavations, it will be suitably treated (for example, settlement to remove suspended solids) and transported the minimum practical distance before discharge to a suitable water body or sewer under the appropriate consents or otherwise pumped to a tanker for off-site disposal at an appropriate licenced waste facility
- In order to prevent water pollution resulting from spillages of foul waste water generated by on site welfare facilities, these will be managed either by connection to the local mains or stored in a suitable system and regularly emptied for off-site disposal by a specialist contractor
- Spill kits will be available on the site, regularly checked and topped up, and appropriate training given to employees in their use
- Storage of fuel and chemicals will be in accordance with The Control of Pollution (Oil Storage) (England) Regulations 2001 and PPG26 and particular care will be taken with the delivery and use of concrete and cement as it is highly corrosive and alkaline. No washing out of delivery vehicles to take place on site without suitable provision for the washing out water and provision of a suitable location that is lined with a geotextile to prevent infiltration to ground. Such washing will not be allowed to flow into any drain and a wheel wash water will be implemented

13.7.8. Floodplain working will be kept to a minimum, with temporary land-take required for construction to be located out of the flood plain as far as reasonably practicable or allowances made for floodplain control measures. Where construction works do impede on the floodplain (for example, to the north of the site), floodplain compensation will be considered to ensure there is no net loss of floodplain storage, water flows are unobstructed, and that flood risk does not increase elsewhere.

13.7.9. SuDS are methods of controlling surface water in a more sustainable way than the traditional method of pipes to direct the water from the site as quickly as possible. Using SuDS is a way to minimise the risk and impact of flooding, however, their design and use depends on the development type. Ponds and swales are preferred sustainable solutions as this mimics natural drainage and can provide a number of

other benefits. However, where SuDS are not possible or there is a high risk proprietary treatment systems may be considered to provide some additional treatment of highway runoff.

13.7.10. Any replacement of culverts will be designed in such a way as to minimise the potential adverse hydromorphological, water quality, and biological impacts of the structure. For example, these will avoid changes in river alignment and length, any interruptions of flows, sediment transport or riverbank or bed continuum, allow for a naturalised bed avoiding scour effects, maximise light penetration, and maintain access for mammals (for example, otter).

13.7.11. Appropriate drainage treatment is generally decided as part of the detailed design using HD 33/16 DMRB Volume 4, Section 2, Part 3 (Ref. 13-37). Selection criteria include cost, performance, maintenance requirements, land availability and nature of the receiving waters. Systems include:

- Active systems (with operators) such as penstocks and notched weirs
- Passive systems such as swales, wetlands, ponds, silt traps and filter drains

13.7.12. Relevant guidelines for consultation when designing a drainage system with low pollution risk include:

- Environment Agency PPG5 Works in, near or over watercourses (Ref. 13-40)
- Environment Agency PPG21 Incident Response Planning (Ref. 13-40)
- Environment Agency PPG22 Dealing with Spills (Ref. 13-40)
- HD33/16 (DMRB Volume 4, Section 2, Part 3) Design of Highway Drainage Systems – guidance on conventional drainage systems to reduce pollution (Ref. 13-47)
- HA103/06 (DMRB Volume 4, Section 2, Part 1) Vegetative Treatment Systems for Highway Runoff - guidance on vegetated drainage systems (Ref. 13-26)
- HA118/06 (DMRB Volume 4, Section 2, Part 8) Design of Soakaways (Ref. 13-48)
- HA119/06 (DMRB Volume 4, Section 2, Part 9) Grassed Surface Water Channels for Highway Runoff (Ref. 13-49)

13.7.13. For drainage into the various watercourses, mitigation measures will be implemented to remove suspended solids, metals and hydrocarbons from road run-off.

13.7.14. Mitigation has the potential to enhance the current water environment where the current road drainage system does not include treatment or spillage containment, which will be considered by the proposed scheme. Use of the mitigation approaches described above would limit the impact of the proposed scheme on the water environment and help protect water quality.

13.7.15. The Drainage Strategy Report (Appendix 13-2) describes the proposed drainage designs for the proposed scheme. Flow attenuation and water quality treatment measures are included in the form of two ponds. Filter drains are also included for some drainage networks. The proposed attenuation pond designs were based on a discharge rate equal to the mean annual maximum flow rate (Qbar) and were designed to attenuate the 1 in 100 year return period storm event plus allowance for climate change (40%). The Drainage Strategy has been designed in accordance with HD33/16, ensuring no surcharge for a 1 in 1 year return period and no flooding in a 1 in 5 year return period. The network, excluding SuDS, has been designed including a 20% increase in rainfall to consider the effects of climate change.

13.7.16. A concrete *V* channel system is proposed to collect the surface water runoff within the central reserve. Concrete design channels are designed for a 1 in 5 year return period plus 20% allowance for climate change. Combined kerb drainage systems were chosen as the collection system along verges (at embankments) and were designed for a 1 in 5 year return period.

13.7.17. The proposed scheme was divided into two major catchments, south and north of the new proposed bridge over Binley junction. The south catchment of the proposed road includes the mainline (from south of the overfly bridge to approximately Oak Tree access road) and north bound merge and south bound diverge. The proposed layout also includes new proposed impermeable areas mainly in diverge and merge areas. Surface water run-off will be collected by surface water channels, kerb drains or filters drains and discharge to two existing outfalls (known as outfall A and outfall B), with an attenuation pond upstream of outfall B. Outfall A discharges to Brandon Wood Brook, and Outfall B to a small ditch within Binley Industrial Estate.

13.7.18. The north catchment comprises the area from north of the proposed bridge to the crossing with the B4428, northbound diverge and southbound merge. The proposed road falls mainly towards the north and the new layout includes new impermeable areas, mainly on the merge and diverges. Surface water run-off will be collected by surface water channels, kerb drains and conveyed by pipe systems and discharge to three existing outfalls (labelled C, D and E), with a pond upstream of outfall E. No additional mitigation has been incorporated for outfalls C and D in the drainage designs. All three outfalls are to small ditches that ultimately discharge to Birchley Wood Brook. Full details are provided in the drainage strategy in Appendix 13-2.

13.7.19. The number of new surface water outfalls has been minimised to include only existing outfalls and thereby avoid the construction of new and unnecessary structures along the river bank. Should improvement or repair works to the outfalls be undertaken, pre-fabricated concrete headwalls will be used where possible to avoid the need for pouring wet concrete close to the watercourse as this represents a spillage risk. Where outfalls have a pipe diameter less than or equal to 300mm they may be exempt from an Environmental Permit assuming the receiving watercourse is a Main River regulated by the Environment Agency.

13.7.20. Balancing ponds are to be used to control any increase in the rate of flow towards the impacted watercourses resulting from increased impermeable road areas. Without these balancing ponds increased flows may result in bank erosion, increased sediment loading and greater flooding potential to the impacted watercourses. Discharge rates from the ponds will be restricted using hydrobrakes or orifices at the pond outlets. The ponds are both to be located to the east of the A46, with pond A located towards the south of the proposed scheme (NGR SP 38663 77375), and pond B towards the north of the proposed scheme (NGR SP 38782 78447). Pond A will have a volume of 1000m^3 and pond B of 1600m^3.

13.8. Assessment of Effects

Value (Importance of Resources)

13.8.1. Based on the baseline data presented above, the key local water resources receptors within the study area are as follows (together with their importance):

- Smite Brook: High Importance as partly runs through Combe Pool SSSI, and is a Water Framework Directive watercourse at Moderate Ecological Status
- Birchley Wood Brook: High Importance as it flows adjacent to Combe Pool SSSI and is included in the designated SSSI area, and is a tributary of the Smite Brook Water Framework Directive reportable watercourse

- River Sowe: High Importance as a Water Framework Directive reportable watercourse at Moderate Ecological Status but with a target of Good, and which also provides habitat for protected fish species including European eel and bullhead
- Brandon Wood Brook: High Importance due to proximity to the ecologically sensitive Herald Way Marsh SSSI, and being a tributary of the River Avon Water Framework Directive reportable watercourse
- Drainage ditches: Medium importance on the basis that they generally discharge to watercourses that flow through SSSI sites (Coombe Pool and Herald Way Marsh). However, these waterbodies are unnatural, heavily modified and only seasonally wet, and so are of lesser importance than other watercourses in the study area
- Other small Ponds: Low importance on the basis that they are not designated and have minimal social or economic use
- Flood risk: The indicative floodplain map for the area shows that the site does not lie within the predicted floodplain of the River Sowe, although Flood Zone 2 extends close to the north eastern edge of the site. Due to the proximity of Flood Zone 2 at this location, plus medium risk of surface water flooding and high risk of groundwater flooding, flood risk is considered to be medium importance

13.9. Magnitude of Impacts and Significance of Effect

Construction

Surface Water Quality

13.9.1. Where construction works are undertaken in close proximity to Brandon Wood Brook, Birchley Brook, Smite Brook, their tributaries, ponds, or close to existing land drains connected to surface watercourses, there is the potential for adverse impacts on water quality due to deposition or spillage of soils, sediments, oils, fuels, or other construction chemicals.

13.9.2. Such materials may be deposited or spilt directly into the watercourse, enter the watercourse via uncontrolled surface runoff, or enter indirectly via the drains.

13.9.3. During construction there could also be water quality effects to downstream water dependent ecological sites including the Combe Pool SSSI (but not including Coombe Pool itself) and Herald Way Marsh SSSI/Claybrookes Marsh SSSI.

13.9.4. During construction, any discharges to surface water of unclean runoff would require a Water Activity Permit from the Environment Agency. The conditions attached to any such consent, and to limits on oils, suspended solids, and other pollutants, would be adhered to.

13.9.5. It is proposed to make use of existing outfalls, although they may need to be upgraded which will require some works close to and potentially within the receiving watercourse. There is the potential for conveyance of spills and fine sediment during any works to these outfalls to result in direct impacts to the receiving watercourses, namely Brandon Wood Brook, a small ditch within Binley Industrial Estate and small drainage ditches upstream of Birchley Wood Brook. There may also be indirect impacts to downstream receptors including Birchley Wood Brook, Smite Brook, and the River Sowe through hydrological connectivity to the upstream receptors.

13.9.6. The drainage designs include upsizing of an existing culvert at Outfall B. Surface water flooding has been observed at this location and the drainage strategy includes upsizing this culvert from 600mm to 750mm diameter in order to alleviate flooding.

The construction works for replacing this culvert has the potential to cause reduction in water quality through sediment disturbance from site clearance and works to the culvert, mobilisation of any existing ground contamination, and the risk of chemical spillages from plant, equipment, and materials.

13.9.7. Two areas have been proposed for the siting of the construction compound for the proposed Scheme. The first option is southeast of the A46-A428 junction close to the garden centre, north of Piles Coppice. This area has a drainage ditch along its northern extent, which appears to be culverted beneath the Binley Woods residential area to the east, and mapping suggests that this then most probably discharges to a tributary of the River Avon. The second option is towards the north of the proposed scheme, immediately north of the rugby club. This site has drainage ditches on its northern and eastern margins which flow north to Birchley Wood Brook. The temporary drainage system for the chosen compound area will include attenuation, however, there is potential for the surrounding drainage ditches close to the site to still receive polluted water, for example through accidental spillages, with implications for downstream waterbodies (for example, Smite Brook, River Sowe, Herald Way Marsh).

13.9.8. Adoption of the mitigation measures described in the Section 13.8 would minimise potential adverse surface water quality impacts during construction. Therefore, taking this into account alongside the risk presented by the nature of the works and its duration, it is considered that the construction works would have a negligible impact upon the water quality within the watercourses surrounding the proposed scheme site. This includes the high importance Brandon Wood Brook and Birchley Wood Brook (and its downstream receptors – Smite Brook, River Sowe), and medium importance drainage ditches. Applying Table 13-7, the potential effects on surface water quality are considered to be **neutral** and therefore not significant. The mitigation measures would also minimise any potential for adverse impacts to downstream water dependent ecologically sensitive sites (Combe Pool SSSI and Herald Way Marsh SSSI), giving a negligible impact to these receptors, which is a **neutral** effect and therefore not significant.

Flood Risk Impact to the Proposed Scheme

13.9.9. The Flood Risk Assessment (Appendix 13-1) considers the potential risks that the proposed scheme might be under from all sources of flooding. The risks are summarised in this section. These risks apply during both the construction and operational phases.

13.9.10. The River Sowe and its tributary Smite Brook are the nearest watercourses to this scheme's boundary. The River Sowe is about 0.62 miles (1km) and Smite Brook is approximately 750m away from the site boundary, and the risk of flooding from either does not extend into the proposed site. Thus, the site is at a low risk of flooding from fluvial sources.

13.9.11. The majority of the site is at very low risk of flooding but there are two small areas at high risk of surface water flooding in the 3.33% AEP event. One such area is located towards the north of the proposed scheme's boundary in the vicinity of a ditch located in Oak Farm nurseries. The other area at high risk of flooding is located to the south east of the Binley Road junction roundabout adjacent to the highway. The overall flood risk from surface water runoff from land is considered to be medium.

13.9.12. Parts of the proposed scheme are shown to be in an area considered prone to groundwater flooding (≥75%). Therefore, the proposed scheme site is considered to be at a high risk of groundwater flooding. Thus, during construction in order to

mitigate groundwater flooding risk, adequate drainage and dewatering facilities should be provided as outlined in the EMP.

13.9.13. There is no known risk of flooding from sewers, reservoirs or other artificial sources to the proposed scheme site.

13.9.14. Provided that appropriate drainage and dewatering measures are implemented as outlined in the EMP to account for possible groundwater flooding, then overall there is considered to be a Minor magnitude of impact to the proposed scheme from flooding in terms of the DMRB, which according to Table 13-7 gives a **Slight adverse** (not significant) effect from flooding.

Flood Risk Impact from the Proposed Scheme

13.9.15. The construction phase of the proposed scheme will involve works in areas close to and over minor watercourses. These are artificial ditches that drain to Brandon Wood Brook and Birchley Wood Brook. Any blockage of these watercourses would result in a cessation of flow, and a build-up of water upstream of the blockage. This could result in potential flooding upstream of the blockage and overland flows if the restricted water breaks out of the channel. The potential risk of flooding from blockages is considered to be a negligible impact given the very low flow conditions in these watercourses. As a result, the significance of the effect on these minor watercourses is **Neutral** (not significant).

13.9.16. Existing surface flow paths may be marginally disrupted during the construction activities due to excavation and provision of new impermeable areas and temporary hardstanding in compound areas. Without mitigation, this is considered to be a minor adverse magnitude in terms of surface water flooding, representing a **Slight adverse** (not significant) effect. However, appropriate mitigation measures will be implemented to manage surface water through a EMP.

13.9.17. Parts of the proposed scheme are shown to be in an area considered prone to groundwater flooding (≥75%). Appropriate mitigation measures within the EMP will ensure that there is a suitable temporary drainage system for the construction site that avoids any increase of the risk of groundwater flooding. As such, there is a negligible magnitude of impact to groundwater flooding, leading to a **Neutral** (not significant) effect.

Operation

Surface Water Quality: Routine Road Runoff

13.9.18. The drainage designs indicate that the proposed scheme will include changes to five existing outfalls, discharging to Brandon Wood Brook, drains to Birchley Wood Brook, and a ditch in the northern extent of Binley Industrial Estate. The designs include two attenuation ponds (with hydrobrakes at the outlets to restrict discharge rates) and the use of filter drains to ensure there is no increase in the rate of runoff from the road to the watercourse as well as to treat runoff prior to discharge to the receiving watercourse.

13.9.19. A DMRB HD45/09 (Ref. 13-29) compliant assessment of routine runoff and spillage risk has been undertaken using HAWRAT. This is a method for assessing the impact of routine runoff on receiving surface waters by considering the copper and zinc content of the runoff, together with the potential for chronic sediment impact on the receiving watercourse. Table 13-8 shows the data used in the HAWRAT assessments and their sources.

Table 13.8: Data Used within the HAWRAT Assessment for A46 Coventry Junction Improvements

Parameter	Value	Source
Annual average daily traffic (AADT)	>10,000 and <50,000 vehicles	AADT from modelled traffic data (2036 Do Something scenario).
Climatic Region	Warm-dry	HAWRAT embedded data
Rainfall Site	Birmingham (Standard Annual Average Rainfall 750 mm)	HAWRAT embedded data
Annual 95%ile river flow	Brandon Wood Brook 0.001 m^3/s Drainage Ditch 0.000 m^3/s (estimate of 0.001 m^3/s used for assessment) Birchley Wood Brook 0.002 m^3/s (upstream ditches estimated to be 0.001 m^3/s)	Calculated using Wallingford Hydrosolutions Ltd LowFlow software
Proposed impermeable road area drained	Outfall A = 1.733 ha Outfall B = 0.709 ha (plus 0.853 ha to upstream pond) Outfall C = 0.068 ha Outfall D = 0.804 ha Outfall E = 0.885 ha (plus discharge to pond from 1.944 ha)	AECOM Engineers Drainage Strategy (proposed impermeable area)
Proposed permeable area drained	Outfall A = 3.779 ha Outfall B = 12.984 ha (plus 0.222 to upstream pond) Outfall C = 0.042 ha Outfall D = 0.629 ha Outfall E = 1.911 ha (plus 0.52 ha to upstream pond)	AECOM Engineers Drainage Strategy (proposed permeable areas)
Existing impermeable area drained	Outfall A = 1.764 ha Outfall B = 0.562 ha Outfall C = 0.081 ha Outfall D = 0.750 ha Outfall E = 1.703 ha	AECOM Engineers Drainage Strategy
Existing permeable area drained	Outfall A = 4.137 ha Outfall B = 13.458 ha Outfall C = 0.038 ha Outfall D = 0.750 ha Outfall E = 0.502 ha	AECOM Engineers Drainage Strategy

Parameter	Value	Source
Base Flow Index	0.5	No specific data. Adopted default value as suggested by HAWRAT manual
Water Hardness	>200mg/l hardness total as Ca CO_3	Based on Environment Agency measurements from Brandon Wood Brook and nearby Binley Brook
River Width	Drainage ditches to Birchley Wood Brook = 2m Ditch in Binley Industrial Estate = 1m (estimated) Brandon Wood Brook = 1.5m	All outfalls to similar sized small drainage ditches/small watercourses.
Mitigation Treatment Efficiency for Ponds	Dissolved Copper Removal: 40% Dissolved Zinc Removal: 30% Sediment Removal: 60%	DMRB HD33/16 (Ref 13-47)
Mitigation Treatment Efficiency for Filter Drains	Dissolved Copper Removal: 0% Dissolved Zinc Removal: 45% Sediment Removal: 60%	DMRB HD33/16

13.9.20. The Step 1 assessment indicates that for each outfall, run-off at the point of discharge, prior to any dilution from receiving waters has concentrations over the toxicity thresholds for both soluble and sediment-bound pollutants ('Fail'). Due to this result, a Step 2 Tier 1 assessment has been undertaken in order to consider dilution in the watercourse. The results of the Step 2 Tier 1 assessment are presented in Table 13-9 both without and with mitigation as applicable. Where mitigation is applied, treatment efficiencies are derived from DMRB HD33/16 Geotechnics and Drainage (Ref 13-47) (values shown in Table 13-8).

13.9.21. Outfall C, D, and E discharge to the same watercourse within 0.62 miles (1km) of each other, meaning that they need to be assessed cumulatively for soluble pollutants in accordance with DMRB HD45/09 (Ref 13-29) guidance. The results of this cumulative assessment are also included in Table 13-9. They are not assessed for chronic sediment impact cumulatively as HD45/09 indicates that this is not necessary for outfalls a greater distance apart than 100m.

13.9.22. The results in Table 13-9 indicate that prior to the use of any mitigation measures all outfalls pass the assessment for soluble acute zinc impact, whereby there is sufficient dilution in the receiving watercourses to reduce zinc concentrations to acceptable levels.

13.9.23. Outfall A and E, and the cumulative assessment for outfalls C, D, and E, all fail the HAWRAT assessment for soluble acute copper impact. When mitigation is included for outfall A in the form of a filter drain as indicated in the drainage strategy there is still a failure for copper, with a further 3% removal being required to reduce the copper concentrations to acceptable levels. The proposed mitigation for outfall E on the other hand, which includes an attenuation pond, does decrease copper concentrations to levels required to pass the HAWRAT analysis for routine road runoff. Similarly, the cumulative assessment for outfalls C, D, and E passes for soluble acute copper impact once mitigation is included.

Table 13-9: HAWRAT Tier 1 Assessment Results for A46 Coventry Junction Improvement Scheme

Outfall / Mitigation	Receiving Watercourse	Step 2 Tier 1							
		Soluble Acute Impact Copper	Soluble Acute impact Zinc	Sediment Chronic Impact				Annual Average Cu	Annual Average Soluble Zn
				Accumulating?	Extensive	Deposition Index	Sediment settlement needed	EQS: 28 µg/l	EQS: 7.8 µg/l
Outfall A	Brandon Wood Brook	FAIL (requires 3% treatment)	PASS	Yes	Yes	236	58%	0.84	2.12
Outfall B	Ditch in Binley Industrial Estate	PASS	PASS	Yes	Yes	298	67%	0.61	1.51
Outfall C	Ditch NE of A428-A46 junction	PASS	PASS	Yes	No	7	0%	0.06	0.16
Outfall D	Ditch to Birchley Wood Brook	PASS	PASS	Yes	No	81	0%	0.30	0.78
Outfall E	Ditch to Birchley Wood Brook	FAIL (requires 4% treatment)	PASS	Yes	Yes	287	66%	0.79	2.01
With mitigation									
Outfall A – Filter Drain	Brandon Wood Brook	FAIL (requires 3% treatment)	PASS	Yes	No	94	0%	0.84	1.17
Outfall B – Vortex Grit Separator (e.g. Downstream Defender)	Ditch in Binley Industrial Estate	PASS	PASS	Yes	Yes	179	45%	0.61	1.29

Outfall B – Vortex Grit Separator and Attenuation Pond A	Ditch in Binley Industrial Estate	PASS	PASS	Yes	No	71	0%	0.37	0.901
Outfall E – Attenuation Pond B	Ditch to Birchley Wood Brook	PASS	PASS	Yes	Yes	115	14%	0.48	1.41
Outfall E – Attenuation Pond B + Filter Drain	Ditch to Birchley Wood Brook	PASS	PASS	Yes	No	46	0%	0.48	0.78
Cumulative assessment									
Outfall C+D+E	Ditches to Birchley Wood Brook	FAIL (requires 20% treatment	PASS	n/a			0.96 2.42		
Cumulative assessment With mitigation – Ditches for C; D & E; pond for E	Ditches to Birchley Wood Brook	PASS	PASS	n/a				0.49	1.02

13.9.24. Outfalls A, B and E all fail the HAWRAT assessment in terms of chronic sediment impact when no mitigation is considered. Once proposed treatment has been incorporated into the analysis (i.e. attenuation ponds for outfalls B and E, plus filter drains for outfalls A and E) all of the outfalls pass the assessment with the exception of outfall B. To ensure that outfall B passes the assessment a vortex grit separator (e.g. Downstream Defender) will be incorporated upstream of the pond. Space for this mitigation has been confirmed with the drainage designers. This combined with the pond gives sufficient treatment for sediment impact at outfall B. Assuming that the vortex grit separator is included then the drainage strategy provides adequate treatment for sediment deposition for all outfalls.

13.9.25. A HAWRAT analysis has also been undertaken of the existing drainage situation at the four outfalls for comparative purposes, and these are shown in Table 13-10.

Table 13-10: Existing HAWRAT Tier 1 Assessment Results without the Proposed Scheme

Option and Outfall	Step 2 Tier 1							
	Soluble Acute Impact Copper	Soluble Acute impact Zinc	Sediment Chronic Impact				Annual Average Cu	Annual Average Soluble Zn
			Accumulating?	Extensive	Deposition Index	Sediment settlement needed	EQS: 28 µg/l	EQS: 7.8 µg/l
Outfall A	FAIL (requires 3% treatment)	PASS	Yes	Yes	240	59%	0.85	2.12
Outfall B	PASS	PASS	Yes	No	107	7%	0.25	0.61
Outfall C	PASS	PASS	Yes	No	8	0%	0.07	0.18
Outfall D	PASS	PASS	Yes	No	76	0%	0.28	0.73
Outfall E	PASS	PASS	Yes	Yes	173	43%	0.56	1.45

13.9.26. Table 13-10 indicates that under existing drainage arrangements outfall A fails the dissolved metals assessment for copper and outfalls A and E fail the sediment-bound pollutants assessment. For outfall A into the Herald Way Marsh SSSI, in terms of sediment this existing failure has a marginally greater impact on the receiving watercourse than the proposed drainage strategy for the improvement works, requiring 59% of sediment to be settled in comparison to 58% post-improvement. In terms of copper, there is little difference between the existing and the proposed drainage, with both requiring 3% treatment. Therefore, the improvement works has a similar, and actually slightly reduced (in terms of sediment), impact on Brandon Wood Brook in the Herald Way Marsh SSSI.

13.9.27. Implementation of the proposed Drainage Strategy (including mitigation) is expected to significantly reduce the impact of Outfall E on the ditches draining to Birchley Wood Brook in comparison to the current situation which fails the sediment-bound pollutant test.

13.9.28. Outfall B and D both pass the HAWRAT assessment for metals and chronic sediment impact under current drainage arrangements (Table 13-10) and following implementation of the proposed Drainage Strategy (Table 13-9).

13.9.29. Based on the above assessment of the impact of routine road runoff on the various watercourses, a negligible impact is predicted for all watercourses except for Brandon Wood Brook. For Brandon Wood Brook, Minor adverse impacts are likely to occur through acute copper pollution, which gives a slight adverse effect for this high importance receptor (not significant), based on Table 13-7. Professional judgement has been applied to select a slight adverse effect over a moderate adverse effect on the basis that the proposed drainage system actually provides marginal improvement over existing baseline conditions due to the provision of filter drains which provide a degree of treatment. For the remaining watercourses the effect of routine road runoff is neutral (not significant). There is opportunity to achieve further mitigation and improvement to the Brandon Wood Brook into Herald Way Marsh SSSI as the proposed scheme advances. It is therefore proposed to undertake further investigation after receipt of the license to construct into water and sediment quality issues in the brook, and results used to inform an options appraisal including potential on-line treatments at the outfall, such as check dams and specific planting to prevent metals accumulating in the SSSI marshland downstream.

Surface Water Quality: Surface de-icing

13.9.30. De-icing salt is a potential pollution source from routine highway maintenance. No practical form of treatment can remove salt from the carriageway runoff after road salting. De-icing salt would potentially have an impact on the receiving aquatic ecosystem, which would result in a greater effect where the receiving watercourse is small, with limited dilution, such as is the case in this proposed scheme.

13.9.31. The Q95 flow for Birchley Wood Brook is estimated at 0.002m^3/s, with the headwaters of Brandon Wood Brook and drainage ditches that receive outfalls estimated to be lower than this. However, it is likely that the flows in winter when de-icing is required would often be greater than this. The fauna and flora present is also likely to be less sensitive to the impacts of de-icer salts in runoff during the winter when many plant species have died back and fauna dormant.

13.9.32. The effect from de-icing would be localised, occasional and generally of short duration when temperatures fall below 4°C. Therefore, the impact has been assessed

as negligible for both Scheme options. Using Table 13-7 this would result in a **neutral** effect, which is not significant.

Surface Water Quality: Accidental Spillages

13.9.33. DMRB HD45/09 (Ref. 13-29) provides a method for the assessment of pollution impacts from accidental spillages. This method gives an indication of the risk of an accidental spillage causing a pollution impact on receiving water bodies.

13.9.34. Watercourses should be protected so that the risk of a serious pollution incident has an annual probability of less than 1% (equivalent to a return period of 1 in 100 years), unless they are considered to be sensitive (for example, covered by a SSSI designation) in which case a more stringent annual probability of 1 in 200 years is applied.

13.9.35. For the proposed scheme, the probability that a spillage would cause a pollution incident has been calculated for the outfalls, using the data shown in Table 13-11. This includes road lengths draining to each outfall, and modelled traffic data. For outfalls B and D which receive some drainage from the A46-A428 junction roundabout, additional sections of road of 100m length have been included from each roundabout exit (i.e. four additional road sections approximated to 100m each), as a worst-case scenario.

Table 13-11: Data used within the HAWRAT spillage assessment for the Proposed Scheme

Parameter	Value	Source / Reasoning
AADT (2 way); HGV %	A46 north of roundabout: 40,585, 5% A46 south of roundabout: 38,660, 3% A46 through roundabout: 28,700, 6% A46 Entry Slip Northbound: 8,695 11% A46 Exit Slip Southbound: 4,946, 6% A46 Entry Slip Southbound 6,843, 1% A46 Exit Slip Northbound: 6,770, 2% A46 on roundabout: 9,434, 1%	Model outputs for the 2036 Do Something scenario.
Length of Road	Outfall A - 1185 m Outfall B - 525 m (extra 100m included in assessment as approximate length of each roundabout exit = worst case scenario) Outfall C 170 m (extra 100m included in assessment as approximate length of each	Road lengths from AECOM Engineers Drainage Designs

	roundabout exit = worst case scenario) Outfall D - 712 m (extra 100m included in assessment as approximate length of each roundabout exit = worst case scenario) Outfall E - 1175 m	
Road Type	A Road	Not motorway
Urban or Rural	Urban	Located at the eastern extent of Coventry and close to Binley Woods residential area
Spillage Risk Factor	Outfall A 0.31 (no junction) Outfall B 5.35 (roundabout) Outfall C 5.35 (roundabout) Outfall D 5.35 (roundabout) Outfall E 5.35 (no junction)	Based on road design and location
Emergency Response Time	<20 mins	Located at the edge of Coventry
Optimum Risk Reduction Factor	Pond = 0.5 Filter Drain = 0.6	HAWRAT Table 7.1 (Ref 13-29)

13.9.36. Results from the spillage risk assessment are shown in Table 13-12. The risk of a serious incident is less than 1% (1 in 100 years) for all outfalls even without inclusion of planned mitigation, and furthermore is less than 0.5% (1 in 200 years) for outfall A, B and D which have a SSSI shortly downstream, and so are assessed against the more stringent threshold. When all outfalls are combined for the Birchley Wood Brook catchment (outfall C, D and E) and Brandon Wood Brook catchment (outfall A and B), the outfalls again meet the thresholds required for passing the assessment. The risk of an accidental spillage resulting in a pollution incident is considered acceptable for all outfalls based on the proposed drainage details.

Table 13-12: Option B(w) Spillage Risk Results without mitigation

Outfall/ Aggregation	Annual Probability of Spillage (%)	Return Period	Sensitivity analysis for Return Period with 10% more traffic
A	0.01	1 in 14,290 years	1 in 12,991 years
B (including pond)	0.08	1 in 1,245 years	1 in 1,132 years
C	0.03	1 in 3,061 years	1 in 2,783 years

Outfall/ Aggregation	Annual Probability of Spillage (%)	Return Period	Sensitivity analysis for Return Period with 10% more traffic
D	0.04	1 in 2,831 years	1 in 2,573 years
E (including pond)	0.01	1 in 8,237 years	1 in 7,488
A + B+ C = Birchley West Brook combined	0.14	1 in 714 years	1 in 649 years
D+E = Brandon Wood Brook combined	0.05	1 in 1,842 years	1 in 1,674 years

13.9.37. Based on these results, it is considered that there would be negligible impacts on surface water quality from accidental spillages for all options. Applying Table 13-7 this results in a neutral effect (not significant).Traffic Forecasting Report (SGA R3)' (Ref. 15-3) has been used to inform the traffic data used for the spillage risk assessment. This uses the Coventry Area Strategic Model (CASM) to assess the impact of the Proposed Scheme in combination with forecast developments on the surrounding transport infrastructure. The traffic model is currently being updated and is due to be available in early 2020. Whilst the level of change to traffic flows is not yet known, it is not anticipated to be substantial, thus for the spillage risk assessment a sensitivity analysis has been carried out. This increased all the traffic flow AADT parameters by 10% and recalculated the spillage risk. As can be seen in Table 13-12 above, even with 10% more traffic, it is considered that there would be negligible impacts on surface water quality from accidental spillage for all options. Applying Table 13-7 this results in a neutral effect (not significant).

13.9.38. The same exercise was not carried out for HAWRAT assessment as the traffic band used within the assessment is >10,000 to < 50,000 AADT. As the maximum traffic used was 40,585, the addition of 10% traffic would not alter the assessment band used, so there was no need to revisit that HAWRAT assessment.

River Morphology

13.9.39. The drainage strategy and scheme design do not include any new crossings or new outfalls to any of the watercourses in the vicinity of the proposed Scheme. There may be minor modifications to existing outfalls to accommodate any increase in flows through the outfalls, but no new outfall construction is proposed.

13.9.40. There will be one culvert replacement at outfall B, where the existing 600mm culvert of the drainage ditch is to be upsized to 750mm diameter in order to alleviate flooding. Improved conveyance of flows and sediment will provide a degree of betterment for this watercourse, and a naturalised bed should be provided, if possible, to improve ecological continuity through the structure.

13.9.41. The most likely adverse morphological impact would result from alterations to flow regime from the new drainage arrangements for the A46, and potentially increased

deposition of sediment at each outfall due to the increased impermeable area of road being drained. This could increase sediment pressures on the drainage ditches and Brandon Wood Brook which already suffer from significant fine sediment deposition. However, the drainage designs include suitable mitigation measures to account for the predicted sediment impact. The HAWRAT Method A assessment described above indicates that provided that the proposed mitigation measures are implemented for each outfall, including a vortex grit separator (e.g. Downstream Defender) upstream of Pond A, that that there would be no impact in terms of chronic sediment impact. As such, there is likely to be a negligible impact in terms of morphology for all watercourses, thereby resulting in a **neutral** effect (not significant).

Surface Water Ponds: Water Quality and Morphology

13.9.42. There are two small ponds in the immediate vicinity of Binley junction, one to the southeast and one southwest of the roundabout. These are immediately outside of the scheme boundary and are not incorporated into the drainage strategy. As such, it is not considered that there will be any operational impact on these ponds. Therefore, the risk to water quality and morphology of the ponds is considered to be a negligible impact, therefore resulting in a **neutral** effect (not significant).

Impacts on Flood Risk from the Scheme during Operation

13.9.43. The proposed drainage strategy, as detailed in Appendix 13-2 and described above, includes restricting the runoff rate from the Scheme to the greenfield run-off rate, and the construction of two attenuation ponds to provide storage for excess storm water and treatment of runoff.

13.9.44. The highway drainage system has been designed in accordance with HD33/16, ensuring no surcharge for a 1 in 1 year return period and no flooding for a 1 in 5 year return period. The network, excluding SuDs, has been designed including a 20% increase in rainfall to consider the effects of climate change.

13.9.45. In addition, upsizing of the existing culvert at Outfall B is proposed to alleviate the known flooding issues in the area. Outfall B discharges into a culvert which consists of a 750mm pipe underneath the A46 and a 600mm pipe collecting overland flow from the east. Surface water flooding has been observed at this location and the drainage strategy includes upsizing this culvert from 600mm to 750mm diameter.

13.9.46. In addition, mitigation measures are being put in place to increase climate change resilience in the future. Peak runoff from the Proposed Scheme will be attenuated up to the 1% AEP (1 in 100 year) rainfall event plus a minimum of 40% climate change. Surface water runoff generated by higher return period storms (up to and including the 1% AEP + 40% allowance for climate change) will be retained within the site boundary, in accordance with the NPPF and EA guidance.

13.9.47. With full implementation of the proposed drainage strategy, there will be negligible impacts to the risk of fluvial and pluvial flooding from the proposed scheme, thereby giving a **neutral** effect (not significant).

13.9.48. There are no discharges to ground proposed by operation of the proposed scheme, and so there will be negligible impacts to the risk of groundwater flooding from the Scheme, thereby giving a **neutral** effect (not significant).

13.9.49. There is risk associated with failure of the drainage system through blockage and/or build-up of sediment, both of which may cause the capacity of the drainage system to be reduced. This residual risk of flooding will be alleviated by the new proposed drainage system and by ensuring regular maintenance is undertaken during the

lifespan of the scheme. As such, there will be negligible impacts of flood risk, leading to a **neutral** effect (not significant).

Residual Effects

13.9.50. The residual effects to water resources or flood risk from the proposed scheme with the appropriate mitigation in place is outlined in Table 13-13.

13.9.51. There is a temporary slight adverse effect on surface water flooding during construction due to the increased area of hardstanding.

13.9.52. There is a minor adverse impact to Brandon Wood Brook from routine runoff (specifically copper pollution), and although this is a marginal improvement over the existing situation, this gives a slight adverse effect which is considered insignificant.

13.9.53. All other possible impacts are considered neutral and not significant, provided that the suggested mitigation is adopted as necessary. This includes the inclusion of a vortex grit separator upstream of Pond A, which the drainage designers have confirmed would be possible within the available land.

13.9.54. Improved attenuation measures for the existing A46 outfalls that are to be used under the drainage strategy for the proposed scheme offer the opportunity to reduce pollution in the receiving watercourses in comparison to existing conditions.

Table 13-13: Summary of Residual Effects on Water Resources and Flood Risk

Impact	Value of Receptor	Magnitude of Impact	Residual Effect
Construction			
Surface water: quality	High (Medium for drainage ditches)	Negligible	Neutral (not significant)
Flood Risk Impact from the Scheme	Medium	Minor Adverse (surface water only)	Slight Adverse (not significant) – surface water only
Flood Risk Impact to the Scheme	Medium	Minor Adverse (due to groundwater)	Slight Adverse (not significant)
Operation			
Surface water quality: routine road runoff	High (Medium for drainage ditches)	Brandon Wood Brook: Minor Adverse All other watercourses: Negligible	Brandon Wood Brook: Slight Adverse (not significant) All other watercourses: Neutral (not significant)
Surface water quality: de-icing	High (Medium for drainage ditches)	Negligible	Neutral (not significant)
Surface water quality: accidental spillages	High (Medium for drainage ditches)	Negligible	Neutral (not significant)
River Morphology	High (Medium for drainage ditches)	Negligible	Neutral (not significant)

Impact	Value of Receptor	Magnitude of Impact	Residual Effect
Surface water ponds: water quality	Low	Negligible	Neutral (not significant)
Flood risk	Medium	Negligible	Neutral (not significant)

Water Framework Directive Assessment

13.9.55. In December 2000, the European Water Framework Directive (WFD) (2000/60/EEC) (Ref .13-1) came into force. Its objectives include to protect, enhance, and restore all bodies of surface and groundwater, with the aim of achieving good surface water status and good groundwater status by 2015.

13.9.56. In England, the Environment Agency is the competent authority for implementing the Water Framework Directive, although many objectives will be delivered in partnership with other relevant public bodies and private organisations (such as local planning authorities, water companies, Rivers Trusts, large private landowners and developers). As part of its regulatory role and statutory consultee on planning applications and environmental permitting (under the Environmental Permitting Regulations (England and Wales) 2010 (as amended), the Environment Agency must consider whether proposals for new developments have the potential to:

- Cause a deterioration of a waterbody from its current status or potential; and / or
- Prevent future attainment of good status or potential where not already achieved.

13.9.57. In determining whether or not a development is compliant or not compliant with the Water Framework Directive objectives for a water body, the Environment Agency must consider the conservation objectives of any Protected Areas (i.e. SSSIs) and adjacent Water Framework Directive water bodies, where relevant.

13.9.58. The assessment In Table 13-14 considers the likely impact on Water Framework Directive parameters and whether or not the proposed scheme may cause deterioration or prevent improvement in the status of the Water Framework Directive waterbodies.

13.9.59. The main potential impacts to the waterbodies are direct and indirect impacts on ecology, physical modifications to hydromorphology and habitats, changes to surface water runoff quantity and quality, and changes to surface water – groundwater connectivity and quantity and quality.

13.9.60. The assessment in Table 13-14 shows that there is not predicted to be any deterioration or prevention of improvement to the Water Framework Directive status of any of the waterbodies surrounding the proposed scheme, once good practice mitigation measures are implemented as outlined in the EMP during construction and that the attenuation measures are fully implemented at each road outfall in accordance with the DMRB HD45/09 (Ref. 13-29) assessment of routine road runoff.

Table 13-14: Water Framework Directive Assessment of Proposed Scheme impacts on surface and groundwater bodies

Waterbody and WFD status (if applicable)	Mitigation Measures / SSSI information	Impact to water quality	Impact to water flows	Impacts to hydromorphology	Impacts to ecology	Appraisal of no deterioration / failure to improve
Smite Brook – source to confluence with River Sowe (GB109054044630): Moderate Ecological Status; Good Chemical Status.	No mitigation measures included in Custom Waterbody Summary Report provided by the Environment Agency. However, the brook flows through Combe Pool SSSI area, which is designated due to Coombe Pool being one of the most important ornithological sites in Warwickshire for its herons, other breeding birds and for its wintering waterfowl. As such, water quality and habitat condition of the pool and brook must not be impacted. The SSSI status is Favourable – Recovering.	Potential to receive pollutants as hydrologically connected through Birchley Wood Brook to upstream drainage ditches that receive road outfalls. Provided that EMP procedures are followed during construction and appropriate attenuation measures adopted at the road outfalls then there no impact is predicted to this watercourse.	Potential for altered flows as the watercourse accepts surface water runoff from the area of the Scheme construction works. However, impacts predicted to be negligible provided that EMP procedures and the appropriate attenuation measures are adopted to account for increased impermeable area.	No hydromorphological impacts predicted given that no crossings or road outfalls are proposed for this watercourse, and mitigation provided for any increase in sediment deposition from the road upstream.	Provided that adverse impacts to water quality, the flow regime and hydromorphology are prevented through measures outlined in the EMP and through mitigation measures for road drainage, then no adverse impacts to aquatic ecology are predicted.	The Proposed Scheme would not cause deterioration or prevent improvement in the current status of the waterbody provided that good practice mitigation measures are implemented at the construction site and the appropriate drainage strategy implemented in accordance with DMRB HD45/09 at the upstream outfalls. The Unfavourable – recovering status of the SSSI would also not be impacted.
Sowe – Withy Brook to River Avon (GB109054044540): Moderate Ecological Status; Good Chemical Status.	No mitigation measures included in Custom Waterbody Summary Report provided by the Environment Agency.	Potential to receive pollutants as hydrologically connected through Birchley Wood Brook and Smite Brook to upstream drainage ditches that receive road outfalls. Provided that EMP procedures are followed during construction and appropriate attenuation measures adopted at the	Potential for altered flows as the watercourse accepts surface water runoff from the area of the Scheme construction works. However, impacts predicted to be negligible provided that EMP procedures and the appropriate attenuation measures are adopted to account for increased impermeable area.	No hydromorphological impacts predicted given that no crossings or road outfalls are proposed for this watercourse, and mitigation provided for any increase in sediment deposition from the road upstream.	Provided that adverse impacts to water quality, the flow regime and hydromorphology are prevented through measures outlined in the EMP and through mitigation measures for road drainage, then no adverse impacts to aquatic ecology are predicted.	The Proposed Scheme would not cause deterioration or prevent improvement in the current status of the waterbody provided that good practice mitigation measures are implemented at the construction site and the appropriate drainage strategy implemented in accordance with DMRB

Waterbody and WFD status (if applicable)	Mitigation Measures / SSSI information	Impact to water quality	Impact to water flows	Impacts to hydromorphology	Impacts to ecology	Appraisal of no deterioration / failure to improve
		road outfalls then there will be no impact predicted to this watercourse.				HD45/09 at the upstream outfalls.
Brandon Wood Brook (tributary of Avon)	The upper reaches flow through Herald Way Marsh SSSI/Claybrookes Marsh LNR. The SSSI is designated for its assemblages of invertebrates, a number of which are nationally rare. As such the water quality and habitat condition of the brook must not be impacted. The SSSI status is favourable, although suspect water quality has been reported.	Reduction in water quality possible due to deposition or spillages during construction and/or mobilisation of contaminants. This will be mitigated through procedures outlined in the EMP leading to negligible impact. Routine road runoff effects assessed as slight adverse, but is equivalent to existing drainage, and there are opportunities for improvement through further investigation that is to be undertaken. Accidental spillages from the road and de-icing would have negligible impacts.	Changes in flow regime could result from increased impermeable area in construction and operation, or from blockages or the receipt of additional discharges. This will be mitigated by following procedures outlined in the EMP and appropriate attenuation for increased impermeable area. This will give a negligible impact.	No new crossings or outfalls are proposed. Impacts from sediment deposition from the road are mitigated through filter drain treatment prior to the outfall. As such, there is likely to be a negligible impact in terms of morphology.	Provided that adverse impacts to water quality, the flow regime and hydromorphology are prevented through measures outlined in the EMP and through mitigation measures for road drainage, then no adverse impacts to aquatic ecology are predicted in comparison to impacts currently experienced.	The Proposed Scheme would not cause deterioration or prevent improvement in the current status of the waterbody (tributary of the Avon) or the Favourable status of the SSSI, provided that good practice mitigation measures are implemented during construction and the appropriate drainage strategy implemented for the road outfall in accordance with DMRB HD45/09.
Birchley Wood Brook (tributary of Smite Brook)	Flows through Combe Pool SSSI area, which is designated due to Coombe Pool being one of the most important ornithological sites in Warwickshire for its herons, other breeding birds and for its wintering waterfowl. As such, water	Potential to receive pollutants as hydrologically connected to upstream drainage ditches that receive road outfalls. Provided that EMP procedures are followed during construction and	Potential for altered flows as the watercourse accepts surface water runoff from the area of the Scheme construction works. However, impacts predicted to be negligible provided that EMP procedures and the	No hydromorphological impacts predicted given that no crossings or road outfalls are proposed for this watercourse, and mitigation provided for any increase in sediment deposition	Provided that adverse impacts to water quality, the flow regime and hydromorphology are prevented through measures outlined in the EMP and through mitigation measures for road drainage, then no	The Proposed Scheme would not cause deterioration or prevent improvement in the current status of the waterbody (tributary of Smite Brook) provided that good practice mitigation measures are implemented at the

Waterbody and WFD status (if applicable)	Mitigation Measures / SSSI information	Impact to water quality	Impact to water flows	Impacts to hydromorphology	Impacts to ecology	Appraisal of no deterioration / failure to improve
	quality and habitat condition of the pool and adjacent brook must not be impacted, although no connectivity between the brook and pool is known. The SSSI status is Favourable – Recovering.	appropriate attenuation measures adopted at the road outfalls then there will be no impact to this watercourse.	appropriate attenuation measures are adopted to account for increased impermeable area.	from the road upstream.	adverse impacts to aquatic ecology are predicted.	construction site and the appropriate drainage strategy implemented in accordance with DMRB HD45/09 at the upstream outfalls. The Unfavourable – recovering status of the SSSI would also not be impacted.
Drainage Ditches	n/a	Reduction in water quality possible due to deposition or spillages during construction and/or mobilisation of contaminants. This will be mitigated through procedures outlined in the EMP leading to negligible impact. Routine road runoff, accidental spillage and de-icing impacts assessed as negligible provided that appropriate attenuation measures are implemented.	Changes in flow regime could result from increased impermeable area in construction and operation, or from blockages or the receipt of additional discharges. This will be mitigated by following procedures outlined in the EMP and appropriate attenuation for increased impermeable area. This will give a negligible impact.	No new crossings or outfalls are proposed. An upsized culvert at outfall B should improve flow and sediment conveyance. Effects during the construction works will be mitigated through procedures in the EMP. The most likely morphological impact would be increased deposition of sediment at the road outfall due to the increased impermeable area of road being drained. However, the drainage designs include suitable mitigation measures to account for the predicted sediment impact. As such, there is likely to	Provided that adverse impacts to water quality, the flow regime and hydromorphology are prevented through measures outlined in the EMP and through mitigation measures for road drainage, then no adverse impacts to aquatic ecology are predicted.	The Proposed Scheme would not cause deterioration or prevent improvement in the current status of the waterbody (tributaries of Smite and Avon) provided that good practice mitigation measures are implemented during construction and the appropriate drainage strategy implemented for the road outfalls in accordance with DMRB HD45/09.

Waterbody and WFD status (if applicable)	Mitigation Measures / SSSI information	Impact to water quality	Impact to water flows	Impacts to hydromorphology	Impacts to ecology	Appraisal of no deterioration / failure to improve
				be a negligible impact in terms of morphology.		
Warwickshire Avon – Secondary Mudrocks WFD groundwater body (GB40902G990900): Good Status	No mitigation measures provided by the Environment Agency	Reduction in water quality possible due to deposition or spillages during construction and/or mobilisation of contaminants. This will be mitigated through procedures outlined in the EMP leading to negligible impact. No discharges to groundwater are planned during routine operation.	The excavation of cuttings or deep excavations has the potential to intercept groundwater, or perched groundwater levels. Methods for dealing with intercepted groundwater are to be included within the EMP. There is a cutting proposed adjacent to the Leofric Business Park. The excavation of this cutting could potentially impact the hydraulic gradient. Using the DMRB methodology, minor adverse impacts are predicted to flows, but these are insignificant effects under the DMRB assessment approach.	n/a	n/a	The Proposed Scheme would not cause deterioration or prevent improvement in water quality of the groundwater body provided that good practice mitigation measures are implemented during construction. There is potential for minor impacts to flow from construction of a cutting, but these are assessed as insignificant using the DMRB approach.

Summary

13.9.61. An assessment of the water environment has been performed in accordance with DMRB Volume 11, Section 3, Part 10 HD45/09 (Ref 13-29). The design of the A46 Coventry Junction Upgrades has aimed to prevent pollution to the water environment and where possible improve water quality and support objectives of the Water Framework Directive.

13.9.62. The proposed scheme is likely to increase surface water run-off to some waterbodies through an increase in impermeable areas which could cause negative impacts if not mitigated through the measures outlined in this chapter, including the use of filter drains and attenuation ponds (operation phase), as well as the implementation of the EMP (construction phase effects).

13.9.63. There is potential for pollution from run-off and spillage incidents to negatively impact the water quality of receiving watercourses if not mitigated for. However, all outfalls pass the HAWRAT Method A Tier 2 Assessment for road runoff with the exception of Brandon Wood Brook (outfall A), and all pass Method D (Spillage Risk) assessments, providing the mitigation measures proposed are implemented. This includes additional mitigation in the form of a vortex grit separator upstream of Pond A. The results indicate that once run-off reaches watercourses following the treatment process, the dilution within the watercourse will reduce pollutant concentrations to a level whereby adverse impacts on the environment are avoided. The exception to this at Brandon Wood Brook, which whilst failing the assessment for copper impact, does not show any deterioration in comparison to existing drainage impacts, and actually shows very marginal improvement in the quantitative assessment performance in terms of sediment impacts. Further investigation is suggested at this site to determine the extent of current baseline pollution and investigate opportunities for further future improvement at this outfall, especially given its location at the Herald Way Marsh SSSI.

13.9.64. The probability of a serious pollution accident was always below the suggested threshold of 1% annual probability (or 0.5% annual probability in the case of those outfalls discharging upstream of SSSIs).

13.9.65. The implementation of the suggested attenuation measures will marginally improve the water quality in the receiving watercourses over existing conditions resulting from current outfall arrangements. This will ensure no deterioration from pollution incidents in downstream water quality receptors including Birchley Wood Brook, Smite Brook, Combe Pool SSSI, Herald Way Marsh SSSI, the River Avon and River Sowe.

13.9.66. Morphological impacts are considered negligible for all watercourses as no new structures or outfalls are included in the drainage design, although one culvert is to be upsized at outfall B, which will provide a degree of betterment. Attenuation measures have been included to prevent chronic sediment impacts at the road outfalls and to avoid mobilisation of sediment and contaminants during replacement of the culvert. Presuming that measures outlined in the EMP are adopted during construction to prevent any blockages of the channel or mobilisation of contaminants, then impacts will be insignificant.

13.9.67. No deterioration of prevention of improvement is predicted for any of the Water Framework Directive waterbodies or their tributaries.

13.9.68. The Flood Risk Assessment demonstrates that it will be possible to manage flood risks to and from the Proposed Development in compliance with the NPPF and PPG,

and a strategy has been developed to control and discharge surface water in an acceptable, conventional and sustainable manner.

13.9.69. There are two small ponds in the immediate vicinity of the Binley junction, one to the southeast and one southwest of the roundabout. There are not thought to be any significant construction or operational impact on these ponds.

13.10. Monitoring

13.10.1. The Environmental Site Manager and Site Ecologist will visually inspect sediment concentrations in the waterbodies daily during site works. Any deviations will be noted in the log book, along with the action taken and general weather conditions at the time.

14. CLIMATE

14.1. Introduction

14.1.1. This chapter assesses the potential climate impacts of the construction and operation of the Proposed Scheme, following the methodology set out in the Design Manual for Roads and Bridges ("DMRB") Volume 11, Section 3, Part 1 (Air Quality) (Ref 14.1) and Highways England's Interim Advice Note (IAN) 114/08 – Highways Agency Carbon Calculation and Reporting Requirements (Ref 14.2). This chapter details the methodology followed for the assessment, summarises the regulatory and policy framework related to climate and describes the existing environment in the area surrounding the Scheme. Following this, the design, mitigation and residual effects of the Proposed Scheme are discussed, along with the limitations of the assessment.

14.1.2. To align with the requirements of the National Policy Statement for National Networks (NPSNN) (Ref 14.3) and the EIA Directive (Ref.14.4) this chapter addresses three separate aspects:

a) Greenhouse gas (GHG) impact assessment – the effects on the climate of GHG emissions arising from the Proposed Scheme, including how the Proposed Scheme would affect the ability of government to meet its carbon reduction plan targets;

b) Climate change resilience (CCR) assessment – the resilience of the Proposed Scheme to climate change, including how the Proposed Scheme design would be adapted to take account for the projected impacts of climate change; and

c) In-combination climate change impact (ICCI) assessment – the in-combination effects of a changing climate and the Proposed Scheme on the surrounding environment.

14.1.3. This chapter of the EAR has been undertaken by competent experts with relevant and appropriate experience:

- Associate Director, BA (Hons).

14.2. Legislative and Policy Framework

14.2.1. Table 14-1 provides a summary of national and local policy of relevance to the lifecycle GHG impact assessment and climate change resilience assessment.

Table 14-1: Planning Policy Context

Policy and Legislation	Summary of Requirements and Relevance
The Climate Change Act 2008 (2050 Target Amendment) Order 2019 (Ref. 14.5)	Sets a legally binding target for the UK to reduce its GHG emissions from 1990 levels by at least 80% by 2050. The target is supported by a series of five-year 'carbon budgets' and an independent committee monitors the UK's progress. The 2019 update is an amendment to the Climate Change Act 2008 to revise the current 2050 GHG target of an 80% reduction of GHG emissions compared to 1990 levels to a net zero carbon target

Policy and Legislation	Summary of Requirements and Relevance
National Networks National Policy Statement (NNNPS) (Ref. 14.6)	Sets out how climate change should be taken into account when developing infrastructure. Road projects require "…evidence of the carbon impact of the project and an assessment against the government's carbon budgets". Evidence of mitigation is also required, for design and construction, to demonstrate that the carbon footprint is not unnecessarily high.
EIA Directive 2014/52/EU (Ref. 14.4)	As of May 2017, an environmental impact assessment (where relevant) must include assessment of the impact of a proposed development on climate change (for example, the nature and magnitude of GHG emissions).
Defra (2011), Biodiversity 2020: A strategy for England's wildlife and ecosystem services (Ref. 14.7)	Establishes principles for considering biodiversity and the effects of climate change. The impact assessment will reflect these principles and identify how the proposed scheme's effects on the natural environment will be influenced by climate change, and how ecological networks will be maintained.
National Planning Policy Framework (NPPF) (2012, last updated 2019) (Ref. 14.8)	States that the purpose of planning is to contribute to the achievement of sustainable development, and that positive improvements should be sought in the quality of the built, natural and historic environment, as well as in people's quality of life. The NPPF is supported by National Planning Practice Guidance (NPPG).
The West Midlands Strategic Transport Plan (2017) (Ref. 14.9)	Published by the West Midlands Integrated Transport Authority, the 2026 delivery plan for transport sets out the Combined Authority's approach, objectives, indicators and development principles for an integrated transport across the West Midlands region, over a twenty-year period. Stated objectives include: reduction of transport-related environmental impacts, including GHG emissions; and, maintenance or development of transport infrastructure for greater reliability and resilience to climate change impacts. Principles are provided to guide future transport planning and development for consideration; several have relevance to climate change related topics. For instance: use of low carbon infrastructure; use of durable materials; re-use of excavated and waste materials; incorporation of Sustainable Drainage Systems (SuDS); reducing run-off rates; avoiding increased flood risks; and, 'future proofing' infrastructure for climate change impacts.
Coventry Local Development	Recognises challenges faced by the city in terms of climate change mitigation and adaptation, and sets out strategic objectives and enabling policies.

Policy and Legislation	Summary of Requirements and Relevance
Plan 2016 (Ref. 14.10)	Local Plan Objectives include: "Maintaining and enhancing an accessible transport network". Associated climate-related policies include: Policy EM1: Planning for Climate Change Adaptation; Policy EM4: Flood Risk Management; Policy EM5: SuDS; and, Policy DS3: Sustainable Development Policy.
Climate Change Strategy for Coventry (2012) (Ref. 14.11)	The overall vision is to ensure that, "by 2020, Coventry is a world-leading low carbon, resilient and sustainable city". The strategy sets out plans to tackle climate change in two ways: (i) reducing GHG emissions (mitigation); and, (ii) preparing for inevitable changes in the climate (adaptation). This includes reduction of transport-related GHG emissions, and improvement of infrastructure resilience.

14.3. Study Area

GHG Impact Assessment

14.3.1. The study area covers all direct GHG emissions arising from activities undertaken within the Proposed Scheme boundary during the construction and operation of the Proposed Scheme. It also includes indirect emissions embedded within construction materials, arising as a result of the energy used for their production, as well as emissions arising from the transportation of materials, waste and construction workers to and from the site.

14.3.2. The assessment of GHG impacts occurring during the Proposed Scheme construction stage focusses on construction activities. The spatial coverage of the assessment is therefore the area of construction works falling within the Proposed Scheme boundary.

14.3.3. The study area for the assessment of GHG emissions arising during the Proposed Scheme operation includes direct emissions arising from energy use within the Proposed Scheme boundary, indirect emissions embedded within materials required for maintenance of the road and associated assets, and emissions from road users which are presented for the whole traffic model study area (See Chapter 5: Air Quality for the full methodology).

Climate Change Resilience Assessment

14.3.4. The study area for the resilience assessment is the Proposed Scheme boundary i.e. it covers all assets and infrastructure which constitute the Proposed Scheme.

14.4. Baseline Conditions

GHG Impact Assessment

Current baseline

14.4.1. The baseline for the GHG impact assessment is a 'do-minimum' scenario, whereby the Proposed Scheme does not go ahead. Under this scenario GHG emissions associated with the future use and maintenance of the existing A46 are included. The detailed baseline was developed using traffic models based on the current A46 layout and its predicted use, accounting for any increase in traffic and associated

congestion, through to 2036 (the design year for the Proposed Scheme). This model has established a baseline against which the Proposed Scheme can be compared, to identify any variation in GHG emissions over time.

Construction year baseline (2020)

14.4.2. The construction year baseline for the GHG assessment incorporates GHG emissions from fuel use for construction activities, along with embodied carbon within materials used for construction.

Opening year baseline (2021)

14.4.3. The Proposed Scheme opening year baseline consists of GHG emissions from road users along with emissions arising from operational energy use e.g. for road lighting and road signals.

Future year baseline (2036)

14.4.4. The future year baseline consists of GHG emissions from road users along with emissions arising from operational energy use e.g. for road lighting and road signals.

Climate Change Resilience Assessment

14.4.5. Historic climate data obtained from the Met Office website (Ref. 14.12) recorded by the closest meteorological station to the Proposed Scheme (Coundon Weather Station) for the period 1981-2010 indicates the following:

- Average annual maximum daily temperature was 13.8°C
- Warmest month on average was July (mean maximum daily temperature of 21.6°C)
- Coldest months on average were January and December (mean daily minimum temperature of 7.0°C)
- Mean annual rainfall levels were 700.1mm
- Wettest month on average was October (70.1mm of rainfall on average for the month)
- Driest month on average was February (42.6mm of rainfall on average for the month)
- Windiest month on average was March
- Least windy months were August and September

14.4.6. The Met Office historic 10-year averages for the Midlands region identify gradual warming (although not uniformly so) between 1969 and 2018, with increased rainfall also. Information on mean maximum annual temperatures (°C) and mean annual rainfall (mm) is summarised in Table 14-2.

Table 14-2: Historic 10-year Averages for Temperature and Rainfall for the Midlands Region

Climate Period	Climate Variables	
	Mean maximum annual temperatures (°C)	Mean annual rainfall (mm)

1969-1978	12.817	728.04
1979-1988	12.606	797.32
1989-1998	13.512	744.48
1999-2008	13.970	843.01
2009-2018	13.846	783.20

14.4.7. The future baseline is expected to differ from the present-day baseline described above. UK Climate Projections 2018 (UKCP18) provides probabilistic climate change projections for pre-defined 20-year periods for annual, seasonal and monthly changes to mean climatic conditions over land areas. For the purpose of the assessment, UKCP18 probabilistic projections for pre-defined 20-year periods for the following average climate variables have been obtained and further analysed:

- mean annual temperature;
- mean summer temperature;
- mean winter temperature;
- maximum summer temperature;
- minimum winter temperature;
- mean annual precipitation;
- mean summer precipitation; and
- mean winter precipitation.

14.4.8. Projected temperature and precipitation variables are presented in Table 14-3 and Table 14-4, respectively. UKCP18 probabilistic projections have been analysed for the 25km grid square where the Proposed Scheme is located. These figures are expressed as temperature/ precipitation anomalies in relation to the 1981-2000 baseline.

14.4.9. UKCP18 uses a range of possible scenarios, classified as Representative Concentration Pathways (RCPs), to inform differing future emission trends. These RCPs *"… specify the concentrations of greenhouse gases that will result in total radiative forcing increasing by a target amount by 2100, relative to preindustrial levels."* RCP8.5 has been used for the purposes of this assessment as a worst-case scenario.

14.4.10. 14.4.10As the design life of the Proposed Development is at least 60 years, the CCR assessment has considered a scenario that reflects a high level of greenhouse gas emissions at the 10%, 50% and 90% probability levels11 up to 2079 to assess the impact of climate change over the lifetime of the Proposed Scheme.

[11] Within Table 14-3 and Table 14-4, the main figures (displayed above their corresponding ranges) represent the 50% probability level (as likely as not to occur), while the ranges (displayed in brackets within the tables) represent the 10% and 90% probability levels.

Table 14-3: Projected Changes in Temperature Variables (°C)

Climate Variable	Time Period		
	2020-2039	2040-2059	2060-2079
Mean annual air temperature anomaly at 1.5m (°C)	+1.0 (+0.3 to +1.7)	+1.8 (+0.9 to +2.8)	+2.8 (+1.3 to +4.4)
Mean summer air temperature anomaly at 1.5m (°C)	+1.3 (+0.4 to +2.2)	+2.4 (+0.9 to +3.8)	+3.5 (+1.2 to +6.1)
Mean winter air temperature anomaly at 1.5m (°C)	+0.9 (+0.0 to +1.9)	+1.6 (+0.4 to +2.9)	+2.4 (+0.7 to +4.2)
Maximum summer air temperature anomaly at 1.5m (°C)	+1.4 (+0.3 to +2.7)	+2.7 (+0.8 to +4.6)	+4.1 (+1.1to 7.1)
Minimum winter air temperature anomaly at 1.5m (°C)	+0.8 (-0.1 to +1.9)	+1.6 (+0.3 to +3.0)	+2.4 (+0.7 to +4.3)

Table 14-4: Projected Changes in Precipitation Variables (%)

Climate Variable	Time Period		
	2020-2039	2040-2059	2060-2079
Annual precipitation rate anomaly (%)	+1 (-4 to +6)	-1 (-8 to +5)	+0 (-5 to +6)
Summer precipitation rate anomaly (%)	-8 (-30 to +14)	-20 (-43 to +3)	-27 (-57 to +3)
Winter precipitation rate anomaly (%)	+7 (-4 to +19)	+9 (-6 to +25)	+18 (+0 to +38)

14.5. Potential Impacts

GHG Impact Assessment

14.5.1. The key anticipated GHG emission sources were identified as part of the scoping assessment and presented in the environmental scoping report.

14.5.2. The construction phase was scoped into the GHG impact assessment as the construction materials will potentially have high embodied carbon.

14.5.3. The pre-construction and decommissioning stages of the Proposed Scheme are anticipated to have a negligible impact on GHG emissions and have therefore been scoped out of this assessment. Road use was originally scoped out of the GHG assessment as the traffic modelling predicted a negligible impact on regional CO_2 emissions. However, the new MPI-57-052017 sets out a requirement to assess road user carbon in line with HA 207/07, therefore, operational carbon is assessed using the methodology present in Section 14.6: Assessment Methodology.

Climate Change Resilience Assessment

14.5.4. During the construction process, receptors may be vulnerable to a range of short term (2020s) climate risks. Potential impacts during the construction phase could include:

a) Inaccessible construction site due to severe weather event (flooding, snow and ice, storms) restricting working hours and delaying construction;

b) Health and safety risks to the workforce during severe weather events;

c) Unsuitable conditions (due to very hot weather or very wet weather, for example) for certain construction activities, such as laying pavement materials, or delivery of construction plant and increasing the need to repeat certain works; and

d) Damage to construction materials, plant and equipment, including damage to temporary buildings/facilities within the site boundary, such as offices, compounds, material storage areas and worksites, temporary access, and haul routes.

14.5.5. The Proposed Scheme has the potential to be impacted upon by a changing climate and, in particular more frequent severe weather events, in the medium to longer-term (2050s and 2080s). Potential impacts on the Proposed Scheme during the operational phase include:

a) Material and asset deterioration due to high temperatures;

b) Overheating of electrical equipment, such as information and communication systems;

c) Health and safety risks to road users;

d) Changes in travel patterns of network users;

e) Longer vegetation growing seasons resulting in increased periods of tree fall and increased maintenance and management requirements;

f) Damage to roads from periods of heavy rainfall;

g) Flood risk (surface, groundwater, fluvial and snow/ice melt) on the network and damage to drainage systems with the potential for increased runoff from adjacent land contributing to surface water flooding;

h) Increased slope instability as a result of prolonged/heavy precipitation leading to subsidence;

i) Storm damage to structures; and

j) Inaccessible network during severe weather events.

14.5.6. Non-significant but beneficial potential impacts are also expected such as: reduced pavement deterioration from less exposure to freezing, snow and ice; reduced need for snow clearing and reduced frequency of fog episodes, which reduce visibility and road access.

14.6. Assessment Methodology

GHG Impact Assessment

14.6.1. The GHG emissions arising from the construction and operation of the Proposed Scheme are within the scope of this assessment. It is very unlikely that the Proposed Scheme would be demolished after its design life as the road would have become an integral part of nationally important infrastructure. End of life assessment of the demolition phase is therefore scoped out of the assessment.

14.6.2. GHG emissions from construction have been calculated in line with guidance set out in Highways England's IAN 114/08 – Highways Agency Carbon Calculation and Reporting Requirements (Ref 14.2). This methodology provides guidance on estimating the contribution from construction activities, also referred to as 'construction carbon' and the maintenance/refurbishment activities. The IAN has been supplemented by use of Highways England's Carbon Reporting Tool (Ref 14.13).

14.6.3. The approach outlined in IAN 114/08 and the Highways England Carbon Reporting Tool is in line with the World Business Council for Sustainable Development (WBCSD)/World Resources Institute (WRI) Greenhouse Gas Protocol guidelines (Ref 14.14). Data collection for input to the Carbon Reporting Tool is based on the following set of standard data quality principles detailed in the Protocol which have been applied so that the results from the GHG assessment are as accurate and representative as possible:

a) Age – the GHG assessment is based on activity data and GHG emissions factors applicable to the study period;

b) Geography – activity data reflects the design of the Proposed Scheme. GHG emissions factors in the Carbon Tool are representative of the UK construction industry and UK transport sector;

c) Technology – the default solution was to apply data which is representative of the UK construction industry and transport sector.

d) Methodology – activity data was gathered directly from the Proposed Scheme's engineering and design teams to enable consistency and completeness of data collection; and

e) Competency – activity data was generated by the engineering and design teams in-line with applicable industry standards.

14.6.4. GHG emissions outputs from the Carbon Tool are reported as tonnes of carbon dioxide equivalent (tCO2e) and consider the seven Kyoto Protocol gases:

- Carbon dioxide (CO_2)
- Methane (CH_4)
- Nitrous oxide (N_2O)
- Sulphur hexafluoride (SF_6)

- Hydrofluorocarbons (HFCs)
- Perfluorocarbons (PFCs)
- Nitrogen trifluoride (NF3)[12]

14.6.5. GHG emissions have been assessed using a calculation-based methodology as per the following equation:

Activity data x GHG emissions factor = GHG emissions value.

14.6.6. Road user emissions have been calculated following the guidance provided in DMRB volume 11, section 3, part 1, HA 207/07 – regional assessment methodology (Ref 14.1). This methodology estimates the contribution from traffic on the road, also referred to as 'road user carbon'.

14.6.7. The uptake of lower carbon fuels, electric vehicles (EVs) and increased vehicle technology is not accounted for under the HA 207/07 approach, however commentary has been provided on the potential impact on GHG emissions from the use of the Proposed Scheme due to these technological advances.

14.6.8. The UK Government Strategy 'Road to Zero' (Ref 14.15) sets out a route map for the UK to move towards cleaner road transportation. The long-term aspirations set out in this strategy are that by 2030 between 50% and 70% of new car sales and 40% of van sales will be ultra-low emission vehicles and by 2040 all new petrol and diesel cars and vans will be zero carbon. This is supported by a range of initiatives to increase the supply of low carbon fuels and to grow the EV charging network.

14.6.9. In addition, future decarbonisation of the national electricity grid will have an impact upon the GHG emissions associated with the operation of the Proposed Scheme. According to the Department for Business, Energy and Industrial Strategy (BEIS) Updated Energy and Emissions Projections 2017 (Ref 14.16), up to 300 Tera Watt hours (TWh) could be generated by low carbon energy sources (renewables and nuclear) by 2035, with as little as 100 TWh generated using natural gas and from imports. Commentary has also been provided on the impact of grid decarbonisation.

14.6.10. All GHG emissions would contribute to global climate change and can therefore be considered to have some level of significance. The UK has legally binding GHG reduction targets and therefore the level of significance considers how the Proposed Scheme would contribute to the National GHG inventory and the UK achieving its reduction targets.

14.6.11. There is currently no guidance regarding significance levels for GHG emission impacts, although the guidance does indicate consideration of the UK National inventory and the effect that the development may have on the UK meeting its reduction targets.

14.6.12. Whilst the scope of the assessment covers the lifecycle stages of the project, the GHG assessment comprises two parts reflecting both the level of certainty of future activity and GHG emissions, and the extent that the predicted GHG emissions would be additional to the existing GHG inventory.

[12] Please note: Nitrogen trifluoride was added to the six other Greenhouse Gas Protocol gases listed above in 2013. However, some sources within the Highways England Carbon Reporting Tool were released prior to the Greenhouse Gas Protocol Accounting & Reporting Standard Amendment (such as Inventory of Carbon and Energy (ICE) 1.6a and 2.0 (2011)), and therefore do not include nitrogen trifluoride.

14.6.13. The first part of the GHG assessment considers the construction of the Proposed Scheme itself. The majority of these emissions would be additional to the existing National GHG inventory and have been compared to the relevant UK carbon budgets.

14.6.14. The second part of the GHG assessment comprises the operation and 'use' of the Proposed Scheme i.e. those emissions resulting from additional mechanical and electrical energy use such as lighting and the impact from a variation in vehicle journeys travelling on the road and surrounding area of assessment. Maintenance of the road and associated assets has also been considered within the operational GHG assessment. As at least part of the road user emissions associated with the operation of the Proposed Scheme would have been displaced from other parts of the road network (e.g. road users), they are not considered additional to the UK GHG inventory. Identifying and quantifying the balance of what is additional versus displaced with any level of certainty is challenging. The Proposed Scheme's calculated emissions have, therefore, been assessed against the UK's carbon budgets. The GHG assessment for the Proposed Scheme operation was therefore done on a scenario basis, with quantification of different scenarios to provide a range for the potential additional GHG emissions associated with the Proposed Scheme operation.

14.6.15. The first scenario considered is a 'do-minimum' scenario whereby the Proposed Scheme is not implemented. The second scenario considered is a 'do-something' scenario, whereby the Proposed Scheme goes ahead and the GHG emission reductions from embedded mitigation measures are taken into account.

14.6.16. In line with the NPSNN (Ref 14.6), the significance of effects has been assessed by comparing estimated GHG emissions arising from the Proposed Scheme with the relevant UK carbon budgets, and the associated reduction targets.

14.6.17. The scenarios used for the GHG assessment of the operation of the Proposed Scheme are summarised in Table 14-5.

Table 14-5: GHG Assessment Scenarios

Scenario		Description
'Do-minimum'	Without Proposed Scheme	'Business as usual' – baseline conditions
'Do-Something'	With Proposed Scheme and mitigation	Proposed Scheme implemented with embedded mitigation measures

14.6.18. A comparison of the GHG emissions for the 'do-minimum' and 'do-something' scenarios was undertaken at the Proposed Scheme opening year (2021) and future design year (2036) in line with HA 207/07 (Ref 14.1).

Climate Change Resilience Assessment

14.6.19. The climate change resilience assessment has considered the strategic aims and objectives encompassed within the Government's, Highways England's and local planning strategy and policy, which has the overarching aim of minimising the adverse impacts of climate change, whilst requiring new development to take climate change considerations into account within design. Ways in which resilience of the Proposed Scheme to climate change can be enhanced have been assessed and mitigation measures have been identified.

14.6.20. Consideration of climate change adaptation within EIAs is an area of emerging practice. There is not a prescribed format for undertaking such assessments, therefore the approach taken has followed new and emerging guidelines (Ref 14.17) and good practice from other similar studies.

14.6.21. An assessment of climate change resilience has been conducted for the Proposed Scheme which identifies potential climate change impacts and considers their potential consequence and likelihood of occurrence.

14.6.22. The assessment has included all infrastructure and assets associated with the Proposed Scheme. It has assessed resilience against both gradual climate change and the risks associated with an increased frequency of severe weather events as per the UKCP18 climate change projections (Ref 14.18).

14.6.23. The assessment of potential impacts and the Proposed Scheme's vulnerability takes into account the mitigation measures that have been designed into the Proposed Scheme. As there is a link between the climate change resilience assessment and the assessments reported within other chapters, cross-references are included where appropriate.

14.6.24. Following identification of the future climate projections, the project receptors which are vulnerable to climate change are identified as:

a) Construction phase receptors including the workforce, plant, and machinery.

b) The assets and their operation, maintenance and refurbishment (i.e. pavements, structures, earthworks and drainage, technology assets, etc.); and

c) End-users (members of public, commercial operators etc.).

14.6.25. For the operational phase of the Proposed Scheme, once potential impacts have been identified, the likelihood and consequence of each impact occurring to each receptor (where relevant) is assessed, for the selected future time frame for operation (2080s). Likelihood, consequence and significance definitions are outlined in the tables below. Project lifetime is considered to include construction and operational stages, and is taken to be 60 years. With respect to the construction phase, as this is planned to occur over a much shorter period compared to the operation of the road and within the next 10 years, future climate change is less relevant, and the assessment of potential impacts follows a more descriptive approach.

Table 14-6: Measure of Likelihood

Likelihood Category	Description (probability and frequency of occurrence)
Very high	The event* occurs multiple times during the lifetime of the project (60 years) e.g. approximately annually, typically 60 events.
High	The event occurs several times during the lifetime of the project (60 years) e.g. approximately once every five years, typically 12 events;
Medium	The event occurs limited times during the lifetime of the project (60 years) e.g. approximately once every 15 years, typically 4 events.

Likelihood Category	Description (probability and frequency of occurrence)
Low	The event occurs during the lifetime of the project (60 years) e.g. once in 60 years.
Very low	The event may occur once during the lifetime of the project (60 years).

* The event is defined as the climate event (such as heatwave) and the hazard (such as overheated electrical equipment) occurring in combination

Table 14-7: Measure of Consequence

Consequence of Impact	Description
Very Large Adverse	National level (or greater) disruption to strategic route(s) lasting more than 1 week.
Large Adverse	National level disruption to strategic route(s) lasting more than 1 day but less than 1 week OR Regional level disruption to strategic route(s) lasting more than 1 week.
Moderate Adverse	Regional level disruption to strategic route(s) lasting more than 1 day but less than 1 week.
Minor adverse	Regional level disruption to strategic route(s) lasting less than 1 day.
Negligible	Operational Phase: Disruption to an isolated section of a strategic route lasting less than 1 day.

14.6.26. Significance is derived through multiplying outcomes from the consequence and likelihood assessments, as shown in Table 14-8.

Table 14-8: Measure of Consequence

		Measure of Likelihood				
		Very Low	Low	Medium	High	Very High
Measure of Consequence	**Negligible**	NS	NS	NS	NS	NS
	Minor adverse	NS	NS	NS	S	S
	Moderate adverse	NS	NS	S	S	S
	Large adverse	NS	S	S	S	S
	Very Large adverse	NS	S	S	S	S

S= Significant
NS= Not significant

In-combination Climate Change Impact Assessment

14.6.27. An in-combination climate impact assessment has been undertaken to evaluate the combined impacts of future climate change and the Proposed Scheme on identified receptors in the surrounding environment.

14.6.28. Projected changes to average climatic conditions, as a result of climate change, and an increased frequency and severity of extreme weather events have the potential to impact the ability of the surrounding natural environment to adapt to climate change.

14.6.29. UKCP18 projections (Ref 14.18) for temperature and precipitation variables have been obtained and analysed to identify potential climate hazards that may impact receptors. Potential hazards identified include increased average temperatures, more frequent and heavier precipitation events and an increase in the frequency of severe storms.

14.6.30. The likelihood of climate hazards leading to an in-combination impact considers both the likelihood of an impact occurring (i.e. contaminant soil exposure due to ground movements) and the confidence levels associated with the change in climate hazard within the timescale (i.e. intense rainfall would increase contaminant soil migration).The likelihood is defined using the likelihood criteria outlined in Table 14-9, based on our assessment of the UKCP18 projections (Ref 14.18), confidence in the projections, and professional judgement.

Table 14-9: Likelihood Criteria for In-combination Effects

Likelihood of Impact Occurring	Confidence of Climate Hazard Occurring	
	Low	High
Low	Low	Medium
High	Medium	High

14.6.31. The consequence of in-combination impacts has been based on the change to the significance of the effect of the Proposed Scheme on the resource or receptor for each relevant environmental discipline, given existing mitigation measures as outlined in the relevant discipline assessment as shown in Table 14-10.

Table 14-10: Consequence Criteria for In-combination Effects

Consequence	Consequence Criteria
High	The climate change parameter in-combination with the effect of the Proposed Scheme causes the significance of the effect of the Proposed Scheme on the resource/ receptor, as defined by the topic, to increase from moderate to major.
Medium	The climate change parameter in-combination with the effect of the Proposed Scheme causes the significance of the effect of the Proposed Scheme on the resource/ receptor, as defined by the topic, to increase from low to moderate.

Consequence	Consequence Criteria
Low	The climate change parameter in-combination with the effect of the Proposed Scheme causes the significance of the effect of the Proposed Scheme on the resource/ receptor, as defined by the topic, to increase from negligible to low.
Very Low	The climate change parameter in combination with the effect of the Proposed Scheme does not impact the significance of the effect of the Proposed Scheme on the resource/ receptor, as defined by the topic.

14.6.32. The significance of effects has been determined through combining likelihood and consequence as shown in Table 14-11.

Table 14-11: Significance Criteria for In-combination Effects

Consequence	Likelihood		
	Low	**Medium**	**High**
Very Low	Negligible	Negligible	Minor
Low	Negligible	Minor	Moderate
Medium	Minor	Moderate	Major
High	Moderate	Major	Major

14.7. Assessment Assumptions and Limitations

GHG Impact Assessment

14.7.1. Volumes and types of construction materials were specified in the Proposed Scheme design; however, the exact source location is not known at this design stage. Therefore, a 50-mile (80km) round trip from source location to site has been assumed.

14.7.2. The exact volume and type of waste produced during construction, as well as the management method and destination will be affected by detailed design and therefore can only be estimated at the present stage. Therefore, an allowance of 5% for each imported construction material has been included within the construction carbon footprint to account for the expected waste production. It has also been assumed that 90% of all waste is to be diverted from landfill. A 50-mile (80km) round trip estimate for distance to waste processing facility has been assumed.

14.7.3. A 3-mile (5km) round trip for construction workers has also been assumed, using the nearest city of Coventry as a likely source location, and assuming a constant running time during working hours of the plant required for each activity period defined in the project programme.

14.7.4. The assessment is based on information in respect of energy use, types and quantities of materials used and waste generated, that was available during the design process. Where information was not available, assumptions based on professional judgement have been made. Where relevant, these assumptions are

consistent with those made by other topics for their assessments presented within this EAR.

14.7.5. GHG emissions from the end of life stage (decommissioning) of the Proposed Scheme have been scoped out of the assessment due to the anticipated operational length of the Proposed Scheme. The replacement of particular additional elements of the Proposed Scheme is included as part of the maintenance lifecycle stage of the GHG assessment.

14.7.6. All assumptions and limitations, including any exclusion, together with assumptions for choices and criteria leading to exclusion of input and output data are documented as part of the assessment.

In-combination Climate Change Impact Assessment

14.7.7. The assessment uses the lifespan of the Proposed Scheme (60 years) and the lifecycle stages to determine the relevant periods (short, medium and long-term) over which the climate projections are selected e.g. 2020-2039, 2040-2059, and 2060-2079.

14.7.8. Limitations associated with the approach taken for this climate change risk assessment relate to uncertainties inherent within UKCP18 (Ref 14.18).

14.7.9. Climate change, by its very nature, is associated with a range of assumptions and limitations. For example, there is uncertainty regarding how global climatic trends would be reflected at the regional scale. To overcome these issues, the assessment used forecast climate change data from the UKCP18 (Ref 14.18). These projections provide an update to the UKCP09 projections, to provide climate projections out to 2100, facilitating the assessment of risk exposure to future climate conditions.

14.7.10. Assessments made in relation to ‘consequence’ and ’likelihood’ have relied on professional judgement and evidence gathered through other environmental topic assessments.

Climate Change Resilience Assessment

14.7.11. Limitations associated with the approach taken for this climate change assessment relate to uncertainties inherent within the UKCP18 data (Ref 14.18).

14.7.12. By its very nature, climate change is associated with a range of assumptions and limitations. To overcome these issues, leading climate change data and science has been incorporated into the assessment and proven effective approaches undertaken for similar project types have been replicated. The UKCP18 projections are the most robust climate change projections for the UK.

14.7.13. The assessments made in relation to severity and likelihood have been based upon professional judgement.

14.8. Design, Mitigation and Enhancement Measures

GHG Impact Assessment

14.8.1. As stated in the *Fifth Assessment Report (AR5) - Synthesis Report* published by the Intergovernmental Panel on Climate Change (IPCC) (2014) (Ref. 14.19), mitigation (that is, reducing GHG emissions) and adaptation (that is, responding to climate change impacts) are complementary approaches to reducing risks of climate change impacts over different timescales.

14.8.2. Mitigation, in the short-term and medium-term, can substantially reduce climate change impacts in the latter decades of the 21st century. Benefits from adaptation can be realised now to address current risks and can be realised in the future to address emerging risks. Innovation and investments in environmentally sound infrastructure and technologies can both reduce GHG emissions and enhance resilience to climate change.

14.8.3. Mitigation measures for GHG emissions include:

- An Environmental Management Plan (EMP), to be prepared and implemented by the selected construction contractor following approval of the Proposed Scheme, which will include a range of good practice construction measures outlining an environmental management framework, operational control procedures (for example development of a Site Waste Management Plan (SWMP)), as well as a pollution control contingency plan.
- Investigate alternative materials with lower embodied GHG emissions such as locally sourced products and materials with a higher recycled content to include in detailed design specifications.
- Low carbon design specifications such as energy-efficient lighting and durable construction materials to reduce energy consumption and maintenance and decrease replacement cycles.
- Materials made available through excavation (for example, fill soil and gravels), and demolition (for example, aggregates), will be reused directly onsite where feasible to minimise emissions associated with the import of materials to site, and embodied carbon associated with additional materials.

Climate Change Resilience Assessment

14.8.4. A number of general mitigation and adaptation measures to address climate resilience risks will be incorporated, many of which have been identified by other parts of the report and through the Proposed Scheme design. The assessment identifies and takes into account existing resilience measures for each climate variable and associated impacts either already in place or in development for infrastructure and assets.

14.8.5. A series of mitigation measures designed into the Proposed Scheme are summarised in Table 14-12.

Table 14-12 Climate Change Resilience Mitigation Measures

Lifecycle stage	Mitigation measure	Delivery mechanism	Embedded/ Additional
Construction	The Proposed Scheme would be designed to improve its resilience to climate change through a range of design and material specification measures including where practicable: the use of construction materials with superior properties (such as increased tolerance to fluctuating temperatures), incorporation of current road design standards and future climate change allowances.	EMP	Embedded
Operation	A range of measures would be in place to improve the resilience of the Proposed Scheme to climate change during operation including maintenance plans for drainage systems to allow them to operate effectively and systems in place to assist road users through the installation of appropriate emergency systems being in place, e.g. variable messaging systems (VMS), cable ducts within lighting systems designed with 25% spare capacity to reduce the risk of overheating, and Sustainable Drainage Systems (SuDS) specified as part of the design.	EMP	Embedded

14.8.6. Assessment of the flood risk and drainage impacts has been undertaken within the Flood Risk Assessment and Drainage Strategy Report, which is included within Appendix 13-1 and 13-2 of this report. Mitigation measures being proposed include the construction of two attenuation areas to provide storage to excess storm water, and putting in place a new drainage system reducing impermeable areas, along with maintenance of drainage systems during the lifespan of the scheme.

14.9. Assessment of Effects

14.9.1. The government's national carbon reduction strategy (provided in the *Carbon Plan 2011*) provides a plan for the UK to meet its carbon reduction targets. While the government is legally bound to meet the commitments set out in this plan any increase in GHG emissions as a result of the Proposed Scheme will not necessarily result in the Proposed Scheme being refused, unless the increase causes a materially significant effect.

GHG Impact Assessment

14.9.2. The total GHG emissions from the construction phase of the project are estimated to be in the order of 29,580[13] tCO_2e. The primary GHG emissions sources and the breakdown of the calculated GHG emissions during construction are shown in Table 14-13.

Table 14-13: Summary of Construction Phase GHG Emissions

Project activity / Emissions source	Annual GHG emissions (tCO_2e)	% of total construction emissions
Embodied GHG emissions in construction materials	10,650	72%
Transport of materials	2,850	19.3%
Onsite construction activity	690	4.7%
Transport of workers	20	0.1%
Waste transport and disposal	580	3.9%
Total	14,790	-

14.9.3. Of the lifecycle stages scoped into the assessment as shown in Table 14-14, the embodied carbon associated with materials use is the biggest contributor to the carbon footprint of the Proposed Scheme. Materials such as steel and concrete can have high embodied carbon contents depending on the specifications used.

14.9.4. A comparison of operational road user GHG emissions between the 'do-minimum' and 'do-something' scenarios for the year of opening (2021) and the design year (2036) are presented in Table 14-14.

Table 14-14: Comparison of Road User Emissions – 'Do-minimum' v 'Do-something' Scenarios

Reporting category	Year of opening (tCO_2e)	Design year (tCO_2e)
Do-minimum	9,642,847	10,538,764
Do-something	9,643,836	10,548,598
Variation	989	9,834

[13] Figures rounded to the nearest 10 tCO2e.

14.9.5. The remaining primary GHG emissions sources associated with the operational phase are maintenance activities and energy use. Table 14-15 contains a breakdown and comparison of emissions from each of these activities.

Table 14-15: Summary of Operational GHG Emissions

Project activity / Emissions source	Annual GHG emissions (tCO_2e)	% of total operational emissions
Maintenance	11,110	88%
Energy use	1,520	12%
Total	12,630	-

14.9.6. In line with the requirement of the NPSNN, Table 14-16 provides an assessment of the Proposed Scheme's GHG emissions impact against the UK Government's five-year carbon budgets.

14.9.7. The UK Government has currently passed into law the carbon budgets up to 2032:

a) 3rd carbon budget (2018 to 2022) 2544 MtCO2e;

b) 4th carbon budget (2023 to 2027) 1950 MtCO2e;

c) 5th carbon budget (2028 to 2032) 1725 MtCO2e.

14.9.8. Whilst some tightening is likely to occur when the carbon budgets are reviewed and revised in 2020, to reflect the recent commitment to a net zero carbon economy by 2050, the Committee on Climate Change has indicated that the trajectory will be steeper over time; therefore it is the later carbon budgets rather than near term ones which will see a greater impact. We do not expect, therefore, that the near-term carbon budgets will be significantly different to those currently published.

14.9.9. The carbon assessment has considered emissions from the Scheme in two separate phases, emissions during construction and emissions during operation. Construction of the Scheme is a short-term activity that runs from 2020 to 2021. Emissions from construction therefore fall within the nearer term 3rd carbon budget. Emissions from the operation of the Scheme will fall into the 3rd, 4th, 5th and subsequent future budgets once set through to 2050. Table 14-16 presents the net tCO2e associated with operation during the 3rd, 4th and 5th carbon budget periods.

Table 14-16: Scheme net GHG emissions compared against the relevant carbon budgets

Project stage	Net tCO_2e	Relevant carbon budgets
Construction	29,580	3rd carbon budget period (2018 to 2022)
Operation	1,790	3rd carbon budget period (2018 to 2022)
	17,790	4th carbon budget period (2023 to 2027)
	32,530	5th carbon budget period (2028 to 2032)

14.9.10. Operational emissions calculated for the years within each carbon budget period include the vehicle use emissions for each specific year, plus the average annual GHG emissions associated with maintenance and operational energy use.

14.9.11. This assessment has established that during the period when carbon emissions from the Proposed Scheme will be at their highest level (short- and near-term construction activity and the first year of operation), the Proposed Scheme will only contribute to 0.001% of the UK's carbon budget for the relevant carbon budget period (the 3rd carbon budget period). During scheme operation, the Proposed Scheme's carbon emissions will equate to 0.001% of the UK's carbon budget for the 4th carbon budget period and 0.002% of the UK's carbon budget for the 5th carbon budget period. These figures are based on a precautionary assessment which does not take into account or rely upon the further decarbonisation of the UK electricity system or the ongoing move to lower carbon fuels for vehicles.

14.9.12. The method to calculate the UK carbon budgets varies to that used for the calculation of lifecycle emissions from a road scheme and therefore some caution must be taken when making a direct comparison. However, for the purposes of identifying to what extent the Proposed Scheme may impact the ability of the UK meeting its carbon budgets it is necessary to make this comparison to put the scheme into context.

14.9.13. The NPS states *"It is very unlikely that the impact of a road project will, in isolation, affect the ability of Government to meet its carbon reduction plan targets".* Indeed, as described above, emissions arising as a result of the Proposed Scheme represent less than 0.002% of total emissions in any five-year carbon budget during which they arise.

14.9.14. In this context it is concluded that the GHG impact of the Proposed Scheme would not have a material impact on the Government meeting its carbon reduction targets.

Climate Change Resilience Assessment

14.9.15. Climate resilience impacts on the Proposed Scheme during the construction phase, as outlined in Section 14.5: Potential Impacts, are not expected to be significant due to the duration and nature of the construction activities. Therefore, these impacts have not been assessed any further.

14.9.16. The Proposed Scheme may, however, be vulnerable to a range of potentially significant impacts during the operational phase. These have been assessed in accordance with the methodology set out in Section 14.6: Assessment Methodology.

14.9.17. The assessment has found that, based on the mitigation built into the design and assumed management practices, as well as the UKCP18 climate change projections, information from other environmental disciplines, and details on Proposed Scheme design, that none of the potential impacts identified would be significant (and are therefore classed as non-significant).

14.9.18. These non-significant climate resilience impacts, identified using the criteria set out in the assessment methodology, are presented in Table 14-15.

Table 14-15: Summary of non-significant effects - Operation

Receptor	Climate event	Impact (climate event and hazard occurring together)	Mitigation Built into the Design/ Assumed Management Practices	Measure of Likelihood[14]	Measure of Consequence	Impact Significance (Likelihood x Consequence)
End-users (members of public, commercial operators etc.) The assets and their operation, maintenance and refurbishment (i.e. pavements, structures, earthworks & drainage, technology assets, etc.).	Projected increase in mean summer and winter temperatures (+3.5°C and +2.4°C, respectively, by 2060-2079)	Heat damage, deformation, cracking and thermal expansion	Structures (bridges & retaining walls) will be designed for a design working life of 120 years, taking into account safety factors, load conditions and durability requirements.	Low	Moderate Adverse	Not Significant
		Overheating of electrical equipment	The impact of heat and changing temperatures is continually considered in lighting and electrical system design. Cable ducts will be designed with 25% spare capacity to ensure no overheating, and lighting and electrical design will consider the risks of overheating. The signalling equipment specified is also used in many Middle East countries, specifically Qatar and Saudi Arabia, and therefore considered to be appropriate and fit for the predicted increases in temperatures. The lighting type specified will allow for upgrade if required rather than replacing the whole unit.	Low	Moderate Adverse	Not Significant

[14] For components of the proposed scheme that have a shorter design life (for example, less than 20 years for the road surfaces and 15-20 years for the electrical signalling components), the likelihood and severity of the impacts are lower as they will undergo regular inspection, maintenance, and replacement, meaning they can be more reactive to changing weather and climate conditions.

Receptor	Climate event	Impact (climate event and hazard occurring together)	Mitigation Built into the Design/ Assumed Management Practices	Measure of Likelihood[14]	Measure of Consequence	Impact Significance (Likelihood x Consequence)
		Increased frequency of fog episodes	The junction will be fully lit to mitigate the potential impact of increased frequency of fog episodes.	Medium	Minor Adverse	Not Significant
		Increased snow and ice melting leading to flooding	Attenuation of discharge, as far as practicable, to equivalent Greenfield runoff rates as calculated in accordance with the Interim Code of Practice for SUDS, 2004d will be provided. Storage for additional flows up to the 1 in 100 year + 40% climate change return period will be provided in SUDS features.	Low	Minor Adverse	Not Significant
	Projected increase in winter precipitation (+18% by 2060-2079)	Damage to roads and drainage systems due to flooding Surface water flooding and standing waters Deterioration of structures due to soil moisture levels	To minimise the risk of flooding during construction, mitigation measures will include bund creation and use of straw bales and pebble filtration systems to encourage effective drainage of surface water. A 20% climate change allowance has been used for carriageway pipe designs in accordance with the Highways England Design Manual for Roads and Bridges (DMRB) (Volume 4, Section 2, Part 3). Drainage collection systems and vertical alignments were designed to minimise the risk of flooding of	Low	Minor Adverse	Not Significant

Receptor	Climate event	Impact (climate event and hazard occurring together)	Mitigation Built into the Design/ Assumed Management Practices	Measure of Likelihood[14]	Measure of Consequence	Impact Significance (Likelihood x Consequence)
			the carriageway at low points and intersections in accordance with DMRB. Attenuation of discharge, as far as practicable, to equivalent Greenfield runoff rates as calculated in accordance with the Interim Code o0f Practice for SUDS, 2004d will be provided. Storage ponds for additional flows up to the 1 in 100 year + 40% climate change return period will be provided in SUDS features. Compensation for floodplain loss may be required at some locations. Assessment of impact of any flood compensation land will be required, with level for level and volume for volume compensation being the normal practice. Culvert and drainage network sizing and strategy will be designed with an additional allowance for climate change. Sustainable Drainage Systems (SuDS) will be incorporated where practical/ appropriate.			

Receptor	Climate event	Impact (climate event and hazard occurring together)	Mitigation Built into the Design/ Assumed Management Practices	Measure of Likelihood[14]	Measure of Consequence	Impact Significance (Likelihood x Consequence)
		Slope instability and landslides	There are a limited number of slopes within the Proposed Scheme as the site is generally flat, so instability is very unlikely. Earthworks and steepening of slopes will be required at some locations which will be limited to a maximum defined gradient where possible. Where this is not possible, retaining solutions will be required including reinforced earth retaining walls, which will help to mitigate the risk of slope instability and landslides. The severity of impacts from increased winter precipitation is low for aspects of the Proposed Scheme that are regularly monitored, for example, slope stability, and aspects that are regularly maintained or replaced, for example road surfaces (expected to be every 15 years) and drainage systems.	Very low	Moderate Adverse	Not Significant
	Projected decrease in mean summer precipitation	Drying out of road and pavement structures	This will be considered when specifying materials in detailed design. The severity of the impact will be low for pavement and road surfaces which will undergo regular repair and replacement as part of maintenance activities.	Medium	Negligible	Not Significant

Receptor	Climate event	Impact (climate event and hazard occurring together)	Mitigation Built into the Design/ Assumed Management Practices	Measure of Likelihood[14]	Measure of Consequence	Impact Significance (Likelihood x Consequence)
	(-27% by 2060-2079)	'Summer Ice' – Occurs after a prolonged period of no rain when dirt and oil residue build up on the road. When the first rain event occurs, this material becomes incredibly slippery and dangerous (similar to ice on the road)	Regular maintenance of drainage systems	Medium	Minor Adverse	Not Significant
	Projected increase in frequency and magnitude of storms and wind	Increased debris on the network	Site clearance, stopping sight distances, visibility splay assessments, and landscape design will be undertaken to mitigate any debris from vegetation on the network.	Medium	Minor Adverse	Not Significant
		Increased wind gusts damaging utilities and affecting tall structures	Structures (bridges and retaining walls) will be designed for a design working life of 120 years, taking into account safety factors, load conditions and durability requirements. Regular inspection of the condition of these	Very low	Minor Adverse	Not Significant

Receptor	Climate event	Impact (climate event and hazard occurring together)	Mitigation Built into the Design/ Assumed Management Practices	Measure of Likelihood[14]	Measure of Consequence	Impact Significance (Likelihood x Consequence)
			over this lifetime will enable maintenance or upgrades due to unexpected climate impacts to be considered as part of future planned maintenance. Height of signs has been reduced where possible to minimise the risk of instability. As these signs are replaced and maintained over the lifetime of the Proposed Scheme then options for further mitigation or strengthening will be reviewed based on future predictions of wind and storms.			

		Health and safety risks to road users, and disrupted and/ or inaccessible network	Suitable network redundancies and diversion routes will be identified. Emergency response and contingency plans will be put in place. Standard operating procedures will be developed for use in the event of necessary road closure and/ or traffic diversion.	Low	Moderate Adverse	Not Significant

In-combination Climate Change Impact Assessment

14.9.19. Following liaison with the various other environmental disciplines, considering the UKCP18 climate change projections and mitigation built into the design, it is anticipated that none of the potential impacts identified would be significant (and are therefore classed as non-significant).

14.9.20. The non-significant in-combination climate change impacts, identified using criteria the set out in the assessment methodology, are presented in Table 14-16.

Table 14-16: Summary of Potential In-combination Climate Change Impacts

Receptor	Potential in-combination impact	Likelihood	Consequence	Significance	Additional Recommended Mitigation Measures
People & their property	Decreased summer rainfall and higher temperatures leading to dust during construction causing soiling and affecting people's health	Medium	Very low	Negligible	-

14.10. Monitoring

14.10.1. As no significant effects have been identified for the Climate assessment, no monitoring of significant effects is proposed.

14.10.2. The EMP sets out monitoring to be undertaken during the construction stage to ensure that the mitigation measures embedded in the Proposed Scheme design are appropriately implemented. Highways England is committed to reducing carbon emissions and working closely with suppliers to reduce emissions from network related activity. As a requirement of the EMP energy consumption and materials use will be recorded and reported on an ongoing basis during the construction phase of the scheme using Highways England Carbon Reporting Tool. It is not considered practical to monitor GHG emissions from road users during the operational phase of the scheme.

15. ASSESSMENT OF CUMULATIVE EFFECTS

15.1. Introduction

15.1.1. This chapter considers the potential for cumulative effects. By definition, these are effects that result from incremental changes caused by other past, present or reasonably foreseeable actions together with the Proposed Scheme.

15.2. Cumulative Assessment Methodology

15.2.1. The *Design Manual for Roads and Bridges (DMRB) Volume 11, Section 2, Part 5* (Ref. 15-1) identifies two types of cumulative impact, which have been considered in this chapter:

- Type 1 effects (inter-relationship effects): Cumulative impacts that arise from the accumulation of different impacts from the Proposed Scheme, for example noise, airborne dust, or traffic on a single receptor. Individually these may not be significant, but the accumulation of different effects may give rise to an overall significant effect
- Type 2 effects (combined effects): Cumulative impacts from different schemes (in-combination with the Proposed Scheme being assessed), which may, on an individual basis be insignificant but, cumulatively, have a likely significant effect. For example, impacts caused by the Proposed Scheme may be exacerbated by the activities from other committed major schemes nearby or non-significant individual impacts at different sites collectively may give rise to an overall significant effect in the region

15.2.2. This cumulative assessment focuses on the key impacts associated with the Proposed Scheme; residual effects that have been deemed neutral significance have therefore been scoped out of this cumulative assessment. In other words, a residual effect of neutral significance is not considered likely to generate a significant cumulative effect when combined with other scheme impacts or impacts from a separate project.

Scope of Assessment

15.2.3. Good practice guidance provided in The Planning Inspectorate (PINS) *Advice Note Seventeen: Cumulative Effects Assessments* (Ref. 15-2) (relevant to Nationally Significant Infrastructure Projects) has been adhered to, despite the Proposed Scheme not being deemed a Nationally Significant Infrastructure Project. For each topic within the environmental assessment report a zone of influence has been determined in order to identify cumulative schemes.

15.2.4. In order to create a short list of cumulative schemes, threshold criteria have been applied. Development schemes considered within the cumulative assessment comprise:

- Committed road schemes within the East Midlands region which may have an impact on traffic flows around the Proposed Scheme
- Major developments with planning permission (or with a resolution to grant consent) and those under construction which are located within an approximate 1 mile radius of the Proposed Scheme

15.2.5. It should be noted that some of the schemes are under construction and as a result, these schemes may be considered as built and operational within the baseline traffic flows. Where applicable, this has been stated within this environmental assessment report.

15.2.6. A list of road and development schemes has been compiled by undertaking a search of the local authorities' planning portal for planning applications, the Highways England improvements and major road works portal, a review of allocated and proposed sites within local plans, and through consultation with the applicable local authorities.

15.2.7. Table 15-1 sets out the key schemes with the potential to cause cumulative effects. These are illustrated in Chapter 18: Figure 15-1.

Table 15-1: Cumulative Schemes

Scheme Name	Description	Opening year
Road schemes in the East Midlands Region with the potential to affect Binley junction and surrounds		
M6 junction 2 to junction 4: smart motorway	Improving the busy 13.6 mile (22km) stretch of M6 motorway between junction 2 at Coventry and junction 4 near Coleshill by upgrading it to an *all lane running* smart motorway	March 2020
A5 Dodwells to Longshoot Widening	Widening of the current section of single carriageway between Dodwells roundabout and the Longshoot Junction to a dual carriageway	Estimated to be 2020
M42 junction 6 improvements	Increasing the capacity of the M42 at junction 6	Estimated to be 2019 or 2020
A46 Link Road Scheme	Capacity upgrades to the A46 between Stoneleigh and Kenilworth	Planning application approved 17/07/18 Open to traffic 2019
Development schemes within approximately 1 mile of the Proposed Scheme		
Whitley South (OUT/2016/0405)	A commercial led development south-west of the Proposed Scheme on the A45, comprising demolition of existing structures and the erection of new buildings to accommodate offices, research and development facilities, and light industrial uses (Use Class B1), hotel accommodation (Use Class C1), car showroom accommodation, small scale retail and catering establishments (Use Classes A1, A3, A4 and/or A5), new countryside park, ground modelling work including the construction of landscaped bunds, construction of new roads/footpaths/cycle routes, remodelling of junctions on the	Planning application approved 10/07/17 Surrounding roadworks underway

	existing highway network, associated parking, servicing and landscaping.	
Oakdale Nurseries Rugby Road (R11/0786)	Redevelopment of this former garden centre east of Binley Woods, including the erection of a new building with open sales area and service yard, car parking, landscaping and associated works.	Not specified in the application

15.2.8. Traffic Forecasting Report (SGAR3)' (Ref. 15-3) has been used to inform the traffic data used for the air quality and noise and vibration chapters. This uses the Coventry Area Strategic Model (CASM) to assess the impact of the proposed scheme in combination with forecast developments on the surrounding transport infrastructure. The traffic model is currently being updated to reflect regular reviews and updates, which include updates for recent developments. It is planned for the output of this model to be included in a revised air quality and noise assessment in early 2020 to confirm the findings in this environmental assessment report remain valid.

Methodology

15.2.9. The cumulative effects assessment takes into account how the environmental effects of the Proposed Scheme will combine and interact with the effects of nearby road and development schemes.

15.2.10. A cumulative scheme assessment has been determined for each topic area due to the varying zone of influence for different technical topics. Developments from the list of cumulative schemes within this study area have been identified and potential cumulative impacts determined and scoped-in. The severity of potential cumulative effects has been determined through consideration of the following:

- the duration of the effect
- the geographical extent of the effect
- the type of effect
- the frequency of the effect
- the value and resilience of the receptor affected
- the likely success of mitigation

15.2.11. This assessment has considered whether the impacts of the Proposed Scheme in combination with other schemes will lead to changes to the baseline conditions and result in significant effects during both the construction and operational effects.

15.2.12. The assessment presented herein aims to identify the potential for cumulative impacts to occur during construction and operation of the Proposed Scheme, and where possible, identify the possibility of significant effects. In determining the possible significance of such cumulative effects, the location and timing of potential developments and their associated impacts and effects have been taken into account. When addressing the temporal nature of changes, consideration has been given to whether cumulative impacts and effects would be temporary or permanent and if temporary, their likely duration.

15.2.13. The significance of potential cumulative effects has been determined in accordance with *Table 2.6 of DMRB Volume 11, Section 2, Part 5* as reproduced in Table 15-2.

Table 15-2: Descriptors for Significance of Cumulative Effects

Significance	Effect
Severe	Effects that the decision-maker must take into account as the receptor or resource is irretrievably compromised.
Major	Effects that may become key decision-making issue.
Moderate	Effects that are unlikely to become issues on whether the project design should be selected, but where future work may be needed to improve on current performance.
Minor	Effects that are locally significant.
Not Significant	Effects that are beyond the current forecasting ability or are within the ability of the resource to absorb such change.

15.2.14. Where potentially significant cumulative effects are identified, additional mitigation proposals may need to be recommended, as applicable. Some such mitigation measures may be beyond the control of Highways England for the Proposed Scheme, but could provide useful guidance to relevant planning authorities when considering other development planning applications

Assumptions and Limitations

15.2.15. The cumulative assessment will be undertaken using the information available at the time of writing. As the assessment takes into account proposals as early as the screening or scoping stage, limited information may be available on some schemes; therefore, some assessments may provide more of a qualitative assessment based on the information available. Rejected planning applications, not subject to appeal have not been considered within the assessment. The different assessments may have different requirements for the consideration of cumulative effects.

15.3. Type 1 effects (inter-relationship effects):

15.3.1. As detailed in Section 15.1.1, there is a need to consider the potential for the Proposed Scheme to generate cumulative effects due to the accumulation of different impacts caused by the Proposed Scheme upon identified sensitive receptors (Type 1 inter-relationship effects).

15.3.2. The sections below provide a qualitative assessment of potential impact interactions. The interactions identified herein focus on the potential for the Proposed Scheme to generate significant cumulative Type 1 effects rather than reporting all potential interactions.

15.3.3. The severity of potential cumulative effects depends largely upon the distance of the applicable receptor to the Proposed Scheme, and the duration over which such effects would be experienced, for example whether short-term effects during the construction phase or long-term effects during the operational phase.

Construction Phase

15.3.4. During construction, the locations at most risk from inter-relationship effects would be those in closest proximity to construction activities (that is, within 200m of the Proposed Scheme boundary). Receptors in these locations are likely to experience the combined

impacts of dust, noise, vibration, and visual intrusion, as well as being more vulnerable to other nuisance factors such as traffic interruptions and disturbance.

Noise, Vibration, and Lighting

15.3.5. Noise and vibration resulting from construction activities combined with lighting required for night time working has the potential to impact on local biodiversity, in particular bats.

15.3.6. One tree adjacent to the A428 Rugby Road (TN24) was assessed in Chapter 8: Biodiversity as having a moderate potential to support roosting bats. An assessment of Binley Common Farm Wood potential Local Wildlife Site (pLWS), Piles Coppice Local Wildlife Site (LWS), and Combe Pool Site of Special Scientific Interest (SSSI) and Country Park also confirmed that trees within these woods (within 50m of the Proposed Scheme) have generally moderate potential to support roosting bats. Although there will be no direct impact to these trees such as tree removal, the combined indirect impact from noise, vibration, and lighting has the potential to disturb bats and their roosts.

15.3.7. The Environmental Management Plan (EMP) has been developed in parallel to this report to minimise construction impacts. Construction works close to potential roost sites will be minimised as far as possible with appropriate buffers in place; particularly to the south of Binley Common Farm Wood where the temporary construction compound will potentially be located. Lighting will be at the minimum brightness necessary for adequate security and safety at the compound to avoid light spill to woodland edges and field boundaries. Night-time working will also be minimised and temporary lighting will avoid direct illumination of potential bat roost features and woodland edges.

15.3.8. The cumulative effect of noise, vibration, and lighting is therefore considered to be not significant.

Waste, Air Quality and Runoff

15.3.9. Construction will typically require the use of the following resources: bulky earthworks (soil and rock), concrete, bituminous material, sub-base materials, steel and wood. Construction is also anticipated to generate waste materials which may include: surplus soil and rocks from earthworks, wood and vegetation from site clearance, road plantings (some of which may contain coal tars), surplus and recycled concrete and other materials such as metals, plastics, and wood. All of these materials will be stored on-site whilst awaiting use or removal. In addition, as a result of construction activities including demolition works, drilling, or transportation of goods, key pollutants such as PM_{10} and dust have the potential to settle around the construction site and cause soiling and deposition effects on surfaces.

15.3.10. There is potential for runoff from the site to contain pollutants from waste materials, and air quality deposition which, in turn, may pollute surrounding watercourses and a number of field drains including Combe Pool SSSI, the River Sowe, Smite Brook, Herald Way Marsh SSSI and Claybrookes Marsh Nature Reserve. As detailed in Chapter 8: Biodiversity - the Combe Pool SSSI supports a suitable fish spawning habitat and macroinvertebrate community. In addition, the River Sowe and Smite Brook provide suitable habitats and records of notable fish populations and macroinvertebrate assemblages.

15.3.11. There is potential for temporary indirect effects on Combe Pool SSSI and Herald Way Marsh SSSI and Herald Way Marsh (Claybrook Marsh) Local Nature Reserve (LNR) from pollution run-off during construction activities. This may also affect Combe Abbey

Pool (part SSSI) Ecosite and Claybrookes Marsh Local Wildlife Site (LWS) and Herald Way Marsh (part SSSI) Ecosite. These sites may be susceptible to temporary disturbance from dust from construction activities given their proximity to the main general working area where most of the construction activities will occur. The current buffer between the A46 and Binley Common Farm Wood pLWS will be temporarily reduced slightly during construction as a result of the proposed compound location being sited immediately to the south of the wood. There are direct outfalls from the A46 into these SSSIs. Polluted runoff resulting from construction activities has the potential to impact aquatic species within the surrounding waterbodies without adequate mitigation.

15.3.12. Air quality and dust control measures will be in place during construction and implemented through the EMP to ensure negative impacts on Binley Common Farm Wood pLWS and other designated sites located adjacent to the Proposed Scheme are minimised. The construction compounds are temporary; the land used will be reinstated and returned back to the land owner when construction is completed. Adequate buffer zones will be established to ensure any potential impacts are minimised during construction. In addition, standard control measures to prevent water resource pollution, and measures to control dust from construction activities will be included in the EMP.

15.3.13. Good industry practice measures will be implemented, as detailed in the EMP, which has been developed in parallel to this environmental assessment report, to control dust, noise, and vibration impacts. Any effect is considered temporary as many of the impacts would occur only during the construction period and any remaining effects would decrease following cessation of construction activities.

15.3.14. Due to the temporary nature of the construction phase and the mitigation measures implemented through the EMP, it is anticipated that the inter-relationships of the Proposed Scheme impacts will be not significant.

Operational Phase

Air Quality, Noise and Vibration and Landscape

15.3.15. A number of residential receptors in close proximity to the Proposed Scheme such as those situated along Rugby Road and the residential estate located north-west of the Proposed Scheme may experience a worsening of air quality as well as an increase in noise during the operation of the Proposed Scheme as a result of additional traffic using the road. These residential properties would also experience a slight adverse to large adverse visual impact due to the construction of a new elevated structure. The Proposed Scheme does not propose to remove any significant areas of vegetation; however, a new elevated section of road has the potential to increase awareness of the A46 corridor locally, leading to an increased sense of urbanisation. Although this change is not considered significant when assessed as a stand-alone impact, the increased awareness of the road alongside the deterioration in air quality and noise impacts in combination may potentially lead to a cumulative impact without adequate mitigation.

15.3.16. Operational mitigation measures include the replacement and additional planting of trees and shrubs and their integration with the existing landscape. In addition, appropriate design and siting of new lighting and signage has been achieved with the Proposed Scheme design in order to minimise visual intrusion and light spill into the surrounding area. A noise barrier has also been included in the design to minimise the noise generated by the Proposed Scheme. Due to the implementation of these

mitigation measures to minimise the intrusion, it is anticipated that the inter-relationships of the Proposed Scheme impacts will be not significant.

15.4. Type 2 effects (combined effects)

15.4.1. The cumulative road schemes listed in Table 15-1 are relatively remote from the Proposed Scheme, meaning there is limited potential for combined construction effects on the receptors described in this environmental assessment report. This has therefore been scoped out. The potential for combined effects during operation are assessed below.

Air Quality and Noise

15.4.2. The transportation schemes listed in Table 15-1 have been incorporated in the traffic modelling predictions along with estimated changes in trip generation based on development data provided by local authorities. They are therefore included in the Do-Minimum and Do-Something scenarios.

15.4.3. Chapter 5: Air Quality and Chapter 11: Noise and Vibration did not identify any significant effects for the future conditions in the Do-Minimum and Do-Something scenarios. It is therefore anticipated that the combined impacts of the scheme impacts are not significant.

Landscape

15.4.4. In terms of landscape, the Whitley South development falls outside of zone of theoretical visibility corridor, which is detailed in Appendix 7-1.

15.4.5. The Oakdale Nurseries redevelopment is fairly remote from the Proposed Scheme and situated on brownfield land where the existing buildings on-site remain derelict. The redevelopment of this site is likely to give rise to a positive impact on the landscape due to the redevelopment of derelict buildings and the construction of a new nature conservation area on-site.

15.4.6. It is therefore anticipated that the combined impacts of the cumulative schemes on landscape are not significant.

Biodiversity

15.4.7. There are seven statutory designated sites within 1.24 miles (2km) of the Proposed Scheme: Combe Pool SSSI, Herald Way Marsh SSSI, Herald Way Marsh (Claybrook Marsh) LNR, Brandon Marsh SSSI, Ryton and Brandon Gravel Pits SSSI, Stoke Floods LNR and Willeham Wood LNR. In addition, there are approximately 60 non-statutory designated sites within 1.24 miles (2km) of the Proposed Scheme boundary comprising Local Wildlife Sites (LWSs), potential LWSs (pLWSs), and Ecosites.

15.4.8. The Brandon Little Wood LWS is located directly adjacent to the western boundary of the Oakdale Nurseries site, where impacts could combine with that of the Proposed Scheme. However, it is considered that given the distance between this development and the Proposed Schemes, the predicted negligible impact from the Proposed Scheme on this receptor, and the implementation of the EMP, the combined impact of the scheme impacts will be not significant. The proposed Oakdale Nurseries development will also include the development of a 7.1ha nature conservation area which is anticipated to increase the long-term biodiversity of the site and local area.

15.4.9. The Whitley South development has also committed to incorporate ecological features and create new habitat, which in combination with a variety of other ecological compensation, mitigation and avoidance measures minimises any adverse ecological

effects. Due to this, no significant adverse cumulative effects on biodiversity are anticipated and the effect is considered not significant.

Materials

15.4.10. All the various development schemes as detailed in Table 15-1 require construction materials and would generate waste in need of appropriate management and disposal.

15.4.11. However, given the nature and scale of these developments, they are not collectively anticipated to result in significant cumulative effects with regard to materials sourcing, and it is not anticipated that any of the developments will require material resources that are considered to be rare or scarce.

15.4.12. None of the developments in Table 15-1 are anticipated to result in the generation of large volumes of waste in need of disposal given that they do not entail large scale earthworks. Those developments that interact with potentially contaminated material would manage associated contamination risks.

15.4.13. Therefore, there are no anticipated cumulative effects in relation to waste and the cumulative effect is considered not significant.

People and Communities

15.4.14. The Proposed Scheme and cumulative schemes are all generally expected to lead to positive effects on people and communities during operation. The cumulative effect is therefore considered not significant.

Water and Drainage

15.4.15. The proposed Whitley South development will result in increased areas of hardstanding as a result of additional developments and road areas. This could result in a minor increase in surface water runoff generated and could increase flood risk if not appropriately mitigated. For this reason, a drainage strategy has been developed for both the Proposed Scheme and the Whitley South development which will sustainably manage drainage and mitigate flood risk accordingly. In addition, both the Proposed Scheme and the Oakdale Nurseries redevelopment are within areas which have existing hardstanding either from the existing A46 carriageway or the existing Oakdale Nurseries.

15.4.16. Despite the potential increase in surface water runoff from the Whitley South scheme, due to its approximate distance 1 mile south-west of the Proposed Scheme this is unlikely to increase flood risk associated with Flood Zones 2 and 3 to the north-east of the Proposed Scheme from Smite Brook and Combe Pool SSSI. Therefore, there are unlikely to be any operational cumulative water resource and drainage impacts as a result of any other local developments in combination with the Proposed Scheme. The effect on water and drainage is therefore considered to be not significant.

Climate

15.4.17. The cumulative schemes presented in Table 15-1 have already been incorporated into the traffic model or deemed too negligible to make a perceptible difference. Although the cumulative schemes will inevitably have a demand for natural resources which have in-built carbon, none are considered nationally significant or of a similar scale to change the conclusions given in this environmental assessment report on the impacts on climate. The effect on climate from the Proposed Scheme with these other developments is therefore considered not significant.

15.5. Summary

15.5.1. The Proposed Scheme has the potential to generate some Type 1 inter-relationship and Type 2 in-combination effects during the construction and operation of the Proposed Scheme, however with mitigation and implementation of the EMP such effects are considered to be not significant.

16. SUMMARY

16.1.1. This chapter provides a summary of the residual effects and their significance as a result of the proposed scheme. Additional mitigation measures to manage potential residual effects are also summarised. Industry standard mitigation measures have not been repeated in this table; however, they are presented in each of the technical chapters in this report and the Environmental Management Plan (EMP), which has been prepared for the proposed scheme and will be updated during detailed design.

16.1.2. Table 16-1 provides a summary of the construction phase effects and mitigation. Table 16-2 provides a summary of the operational phase effects and mitigation.

16.1.3. Following the assessment of the potential environmental impacts, it is not anticipated that the proposed scheme will result in any significant effect.

Table 16-1: Residual Effects during Construction

Topic	Residual Effect		Significance	Additional Mitigation Measures	Delivery Mechanism
Air Quality	Dust emissions from construction works and non-road vehicle emissions		Neutral	Industry standard measures are expected to be sufficient. Additional mitigation is not required.	Implementation of the EMP.
	Construction vehicle emissions		Neutral		Implementation of the EMP.
Cultural Heritage	Groundworks, site clearance and road construction have the potential to result in the loss, damage, settlement or compaction of previously unknown archaeological assets and deposits.	Archaeological Asset ID MCT15374, MCT15363, MCT16484, MCT15632, and MWA2848	Neutral	Industry standard measures are expected to be sufficient. Additional mitigation is not required.	Implementation of the EMP and preparation of a Written Scheme of Investigation (WSI)
		Archaeological Asset ID MCT205 MWA8279	Slight Adverse		
		Archaeological Asset ID MCT16604	Slight Adverse		
		The Cocked Hat Restaurant and Hotel, Coombe Abbey Registered Park and Garden and Coombe Abbey Conservation Area	Slight Adverse		

Table 16-1: Residual Effects during Construction

Topic	Residual Effect	Significance	Additional Mitigation Measures	Delivery Mechanism
Landscape	Reduced visual amenity during construction of and from the Cocked Hat Restaurant and Hotel, Premier Inn Hotel, Broad Street Rugby Club, Greens Home & Garden Centre, Public Right of Way R145, and A428 Rugby Road	Moderate Adverse	Industry standard measures are expected to be sufficient. Additional mitigation is not required.	Implementation of the EMP.
	Reduced visual amenity during construction of/from the Binley Woods, Kings Park Drive, Centenary Way long distance footpath /Coombe and the Play area off Twickenham Road	Slight Adverse		
	Reduced visual amenity during construction of/from the A428 Brandon Road and Binley Wood Recreation Ground	Neutral		
Biodiversity	Pollution runoff and dust from construction activities on designated sites and habitats	Neutral	Industry standard measures have been outlined in the technical chapter. Pollution prevention control measures will be in place and implemented through the EMP.	Implementation of the EMP.
	Habitat Loss	Neutral	All habitat will be replaced in line with mitigation and enhancement measures proposed	

Table 16-1: Residual Effects during Construction

Topic	Residual Effect		Significance	Additional Mitigation Measures	Delivery Mechanism
	Species – Disturbance, Mortality and Injury		Neutral	Works are primarily localised within the existing highway boundary. Industry standard measures have been outlined in the technical chapter to ensure reduced conflict with species and their protection in line with relevant guidance. These will be implemented through the EMP.	
Geology and soils	Made Ground and soil derived leachate	Exposure to contaminants, dust and vapours.	Slight Adverse	Industry standard measures have been outlined in the technical chapter. A watching brief during all intrusive works will be undertaken by a suitably qualified and experienced person (SQEP) to identify any visual and olfactory evidence for contamination. An appropriate Materials Management Plan (MMP) under the CL:AIRE Development Industry Definition of Waste Code of Practice will be prepared alongside any earthworks and excavation strategy. The Materials Management Plan details the procedures and measures that would be taken to classify, track, store, dispose of and possibly re-use all demolition and excavated materials that would be encountered during the development works along with the	The implementation of the EMP and the MMP
		Reduction in groundwater/ surface water quality due to uncontrolled release of pollutants.	Slight Adverse		
		Migration of contaminated water through preferential pathways (such as piling) to groundwater in underlying aquifers.	Slight Adverse		
		Spread of potentially contaminated material or contamination arising via	Slight Adverse		

Table 16-1: Residual Effects during Construction

Topic	Residual Effect		Significance	Additional Mitigation Measures	Delivery Mechanism
		construction of the Scheme.		classification, tracking, storage, and use of imported materials.	
	Groundwater	Exposure to contaminants in surface water or groundwater.	Slight Adverse	Industry standard measures are expected to be sufficient. Additional mitigation is not required.	Implementation of the EMP.
		Migration to surface watercourses.	Slight Adverse		
		Lateral migration of contaminants through Aquifer.	Slight Adverse		
	Agricultural Use	Temporary loss of soil resources.	Slight Adverse	Industry standard measures are expected to be sufficient. Additional mitigation is not required.	Implementation of a Soil Resource Plan will be prepared following receipt of a licence and during detailed design.
	Offsite Sources: Made Ground (e.g. associated	Effects on Controlled Waters (surface waters). Lateral migration of contaminated groundwater with	Slight Adverse	A piling risk assessment will be undertaken in accordance with Environment Agency guidance. In the event that ground contamination is discovered during the works, work will stop	Implementation of the EMP

Table 16-1: Residual Effects during Construction

Topic	Residual Effect		Significance	Additional Mitigation Measures	Delivery Mechanism
	with commercial and industrial land use, infilled areas (landfills, former colliery workings, ponds), and existing road construction .	discharge to surface water. Discharge of contaminants entrained in surface water runoff followed by overland flow and discharge.		immediately and the requirements of the earthworks, reclamation strategy, and the health and safety plan will be complied with and the appropriate steps taken. Suitable measures will be taken to prevent disturbance and mobilisation of contaminants, until the observed contamination is reviewed and where appropriate has been treated on-site or removed for off-site disposal or treatment.	
		Effects on Controlled Waters (groundwater); Leaching of contaminants to underlying aquifers.	Slight Adverse		
Materials, Assets and Waste	Material requirement		Neutral	Material resource requirement for the proposed scheme constitutes a negligible fraction of the overall UK demand for construction materials. Therefore, industry standard measures are expected to be sufficient in the management of these resources for the proposed scheme. Additional mitigation is not required.	Implementation of the EMP

Table 16-1: Residual Effects during Construction

Topic	Residual Effect	Significance	Additional Mitigation Measures	Delivery Mechanism
	Excavated materials	Neutral	Excavated materials would be used within the Proposed Scheme. It is the intention that as much of the reusable cut material would be reused on site as possible. This material would be used in accordance with a Materials Management Plan, prepared under the CL:AiRE Definition of Waste: Code of Practice (Ref.10-23) and would not be classified as waste. Additional mitigation is not required.	
	Waste generation	Neutral	Waste generated during construction of the proposed scheme will be largely recycled or re-used elsewhere rather than disposed to landfill. Industry standard measures are expected to be sufficient in the management of waste for the proposed scheme. Additional mitigation is not required.	
Noise and vibration	Day time construction noise at residential property at Broadstreet Rugby Club, Cocked Hat Hotel and Restaurant and Premier Inn Hotel	Significant adverse	Installation of temporary noise screens or equivalent mitigation in order to reduce noise levels by 10dB. Additional measures such as using quieter plant than that assumed in the assessment or block booking those hotel rooms which are likely to experience significant adverse effect for the period of the slip road construction.	Implementation of the EMP

Table 16-1: Residual Effects during Construction

Topic	Residual Effect	Significance	Additional Mitigation Measures	Delivery Mechanism
	Day time construction noise at all remaining residential properties and non-residential noise sensitive properties within study area	Not significant	Industry standard measures are expected to be sufficient. Additional mitigation is not required.	
	Night time construction noise at all receptors within study area	Not significant	Industry standard measures are expected to be sufficient. Additional mitigation is not required.	
	Construction traffic noise	Not significant	Not applicable	
	Building damage as a result of vibration during the construction period at all receptors within study area	Not significant	Industry standard measures are expected to be sufficient. Additional mitigation is not required.	
	Annoyance as a result of vibration during the construction period at Premier Inn and Cocked Hat	Significant adverse	Additional measures will be applied to avoid this significant adverse effect; this will comprise the use of non-vibratory rollers to compact earthworks and surfacing layers. Should this not be feasible, the contractor will block book the affected receptors to effectively remove these receptors so no visitors or customers experience the predicted level of effect.	

Table 16-1: Residual Effects during Construction

Topic	Residual Effect		Significance	Additional Mitigation Measures	Delivery Mechanism
	Annoyance as a result of vibration during the construction period at all other receptors within study area		Not significant	Industry standard measures are expected to be sufficient. Additional mitigation is not required.	
People and communities	Impacts on motorised travellers	Changed views from the road	Large Adverse	Temporary effect not requiring additional mitigation	-
		Increased driver stress	Slight Adverse	N/A	-
	Impacts on non-motorised users	Temporary disturbance of Binley Roundabout Crossing	Slight Adverse	During construction, a temporary crossing south of the Binley junction, adjacent to the existing crossing point will be provided for the entire construction phase.	-
		Temporary disturbance of Piles Coppice Public Right of Way	Slight Adverse	During the construction phase, a temporary diversion route will be set-up around the construction compound, to the east, allowing non-motorised users to continue to access Piles Coppice from the north.	-
		Temporary disturbance of A428 Footpath	Slight Adverse	An alternative footpath is located on the north side of the road.	-
	Private Assets: Temporary loss of agricultural land		Slight Adverse	N/A	-
	Community Land: Temporary slight encroachment on to land owned by Broadstreet Rugby Club		Slight Adverse	N/A	-

Table 16-1: Residual Effects during Construction

Topic	Residual Effect	Significance	Additional Mitigation Measures	Delivery Mechanism
	Commercial Properties: Loss of land ownership at Greens Home and Garden Centre	Slight Adverse	N/A	-
Road Drainage and the Water Environment	Impacts on Surface Water Quality	Neutral	Industry standard measures plus additional mitigation will be adopted to minimise potential adverse impacts on surface water quality. The additional mitigation will include drainage strategy involving flow attenuation and water quality treatment measures using two ponds with hydrobrakes at the outlets to restrict discharge rates), inclusion of filter drains in some drainage networks, a concrete *V* channel system is proposed to collect the surface water runoff within the central reserve with a combined kerb drainage system chosen as the collection system along verges.	Implementation of the EMP
	Flood Risk Impact to the Proposed Scheme	Slight Adverse	Industry standard measures plus additional mitigation in the form of appropriate drainage and dewatering measures as outlined in the EMP will be adopted to minimise flood risk impact.	

Table 16-1: Residual Effects during Construction

Topic	Residual Effect	Significance	Additional Mitigation Measures	Delivery Mechanism
	Flood Risk Impact from the proposed scheme	Neutral	Not applicable	
Climate	GHG Impact	Slight Adverse	Industry standard measures are expected to be sufficient. Additional mitigation is not required.	Implementation of the EMP

Table 16-2: Residual Effects during Operation

Topic	Residual Effect	Significance	Mitigation Measure	Delivery Mechanism
Air quality	Local operational air quality impacts – Changes in annual average concentrations of NO2 and PM10	Neutral	Industry standard measures are expected to be sufficient. Additional mitigation is not required.	-
Cultural Heritage	Impact on Archaeological and Heritage Assets	Neutral	Industry standard measures are expected to be sufficient. Additional mitigation is not required.	-
	The Cocked Hat Restaurant and Hotel, Coombe Abbey Registered Park and Garden and Coombe Abbey Conservation Area			
Landscape	Reduced visual amenity during operation at specific receptors including the Cocked Hat Restaurant and Hotel, Premier Inn Hotel, Greens Home & Garden Centre, A428 Rugby Road, and Binley Woods	Slight adverse	Industry standard measures are expected to be sufficient. Additional mitigation is not required.	-
	Reduced visual amenity during operation at specific receptors including the Broad Street Rugby Club, Public Right of Way R145, A428 Brandon Road, Kings Park Drive, Play area off Twickenham Road, Binley Wood Recreation Ground and Centenary Way long distance footpath / Coombe	Neutral		

Topic	Residual Effect		Significance	Mitigation Measure	Delivery Mechanism
Biodiversity	Pollution impact from surface water run-off on designated sites and habitats		Neutral	Industry standard measures are expected to be sufficient. Additional mitigation is not required.	-
	Changes in air quality and emissions from operational traffic on designated sites and habitats		Neutral	Industry standard measures are expected to be sufficient. Additional mitigation is not required.	
	Species – Disturbance, Mortality and Injury		Neutral	Industry standard measures are expected to be sufficient. Additional mitigation is not required.	
Geology and soils	Made Ground, soil derived leachate and ground gas	Exposure to contaminants, dust and vapours.	Slight Adverse	Industry standard measures are expected to be sufficient. Additional mitigation is not required.	-
		Effects on Future Site Users. Workers and future users of the Scheme.	Neutral		
		Reduction in groundwater or surface water quality due to uncontrolled release of pollutants.	Slight Adverse		
		Spread of potentially contaminated material or contamination arising via construction of the road.	Slight Adverse		

Topic	Residual Effect		Significance	Mitigation Measure	Delivery Mechanism
	Ground water	Effect on Off-site Receptors: exposure to contaminants in surface water or groundwater.	Slight Adverse	Industry standard measures plus embedded design mitigation are expected to be sufficient. Additional mitigation is not required.	-
		Effects on Future Site Users. Workers and future users of the Scheme.	Neutral		
		Effects on controlled waters (surface water); Migration to surface watercourses.	Slight Adverse		
		Effects on controlled waters (groundwater); lateral migration of contaminants through Aquifer.	Slight Adverse		-
	Agricultural Use	No further loss of Agricultural Land anticipated during the operational phase	Slight Adverse	The potential for contaminants to impact upon landscaping vegetation along the route will be mitigated through design, and the implementation of a clean suitable growing medium for the flora in accordance with the 'British Standard Specification for Topsoil and Requirements for Use' (BS 3882:2015, 2015). Any chemicals used, such as fertilizers or herbicides will be used in accordance with	-

Topic	Residual Effect		Significance	Mitigation Measure	Delivery Mechanism
				appropriate environmental controls manufacturer's instructions for handling those chemicals and oils (including COSHH (Control of Substances Hazardous to Health) assessments will be implemented and operatives or users will be trained in the application and use of dosing chemicals.	
	Offsite Sources: Made Ground (for example, associated with commercial and industrial land use, infilled areas (landfills, former colliery workings, ponds), and existing road construction).	Effect on Maintenance Workers: exposure to contaminated soils Effects on Future Site Users. Workers and future users of the Scheme.		Industry standard measures plus embedded design mitigation are expected to be sufficient. Additional mitigation is not required.	
		Effect on Agricultural Soils: loss of soil resources.			
		Effects on Controlled Waters (surface waters). Lateral migration of contaminated groundwater with discharge to surface water. Discharge of contaminants entrained	Slight Adverse		-

Topic	Residual Effect		Significance	Mitigation Measure	Delivery Mechanism
		in surface water runoff followed by overland flow and discharge.			
		Effects on Controlled Waters (surface water); Leaching of contaminants to underlying aquifers.	Slight Adverse		
		Effects on Controlled Waters (ground water); Leaching of contaminants to underlying aquifers.	Slight Adverse		-
Noise and vibration	Daytime and night-time noise and vibration impacts during operation at all residential and non-residential receptors		Not significant	Industry standard measures are expected to be sufficient. Additional mitigation is not required (note, the noise barrier has been incorporated as part of the embedded mitigation and forms part of the proposed scheme).	-
People and communities	Motorised Travellers: Views from the road due to the new elevated section of the proposed scheme		Slight Adverse	Industry standard measures are expected to be sufficient. Additional mitigation is not required.	-
	Motorised Travellers: Driver Stress		Moderate beneficial		

Topic	Residual Effect	Significance	Mitigation Measure	Delivery Mechanism
	Non-motorised travellers: Binley roundabout crossing	Slight beneficial		
	Non-motorised travellers: Piles Coppice Public Right of Way Private Assets: Temporary loss of agricultural land	Neutral		
	Commercial Properties: removal of 6 car parking spaces from Greens Home & Garden Centre Community land: loss of land owned by Broadstreet Rugby Club	Slight Adverse		
Road drainage and the water environment	Surface Water Quality: Routine road runoff on Brandon Wood Brook	Slight Adverse	There is potential for additional mitigation and improvement to the Brandon Wood Brook into Herald Way Marsh SSSI as the scheme advances. It is proposed to undertake further investigation after receipt of the license to construct into water and sediment quality issues in the brook, and results used to inform an options appraisal including potential on-line treatments at the outfall, such as check dams and specific planting to prevent metals accumulating in the SSSI marshland downstream.	-

Topic	Residual Effect		Significance	Mitigation Measure	Delivery Mechanism
	Surface Water Quality: Routine road runoff on various watercourses		Neutral	Industry standard measures and embedded design mitigation are expected to be sufficient. Additional mitigation is not required.	
	Surface Water Quality: Surface De-icing		Neutral	Industry standard measures are expected to be sufficient. Additional mitigation is not required.	
	Surface Water Quality: Accidental Spillage		Neutral	Industry standard measures are expected to be sufficient. Additional mitigation is not required.	
	Morphology for all watercourses		Neutral	Industry standard measures and embedded design mitigation including the provision of a vortex grit separator upstream of Pond A, are expected to be sufficient.	
	Surface Water Ponds: Water Quality		Neutral	Industry standard measures are expected to be sufficient. Additional mitigation is not required.	
	Flood Risk		Neutral	Industry standard measures and embedded design mitigation including the drainage strategy are expected to be sufficient. Additional mitigation is not required.	
Climate	Projected increase in mean summer and winter	Heat damage, deformation, cracking and thermal expansion Overheating of electrical equipment	Neutral	The impact of heat and changing temperatures is continually considered in lighting and electrical system design. Cable ducts will be designed with 25% spare capacity to ensure no overheating, and	

Topic	Residual Effect		Significance	Mitigation Measure	Delivery Mechanism
	temperatures (+3.5°C and +2.4°C respectively) (by 2060-2079 time period)	Increased frequency of fog episodes Increasing snow and ice melt leading to flooding		lighting and electrical design will consider the risks of overheating. The signalling equipment specified is also used in many Middle East countries, specifically Qatar and Saudi Arabia, and therefore considered to be appropriate and fit for the predicted increases in temperatures. The lighting type specified will allow for upgrade if required rather than replacing the whole unit. Structures (bridges & retaining walls) will be designed for a design working life of 120 years, taking into account safety factors, load conditions and durability requirements. The junction will be fully lit to mitigate the potential impact of increased frequency of fog episodes. For components of the proposed scheme that have a shorter design life (for example, less than 20 years for the road surfaces and 15-20 years for the electrical signalling components), the likelihood and severity of the impacts are lower as they will undergo regular inspection, maintenance, and replacement, meaning they can be more reactive to changing weather and climate conditions Attenuation of discharge, as far as practicable, to equivalent Greenfield runoff rates as calculated in accordance with the	

Topic	Residual Effect		Significance	Mitigation Measure	Delivery Mechanism
				Interim Code of Practice for SUDS, 2004d will be provided.	
	Projected increase in winter precipitation (+18%) (by 2060 – 2079 time period)	Damage to roads and drainage systems due to flooding Surface water flooding and standing waters Deterioration of structures due to soil moisture levels Slope instability and landslides	Neutral	A 20% climate change allowance has been used for carriageway pipe designs in accordance with the Highways England Design Manual for Roads and Bridges (DMRB) (Volume 4, Section 2, Part 3). Drainage collection systems and vertical alignments were designed to minimise the risk of flooding of the carriageway at low points and intersections in accordance with DMRB. Attenuation of discharge, as far as practicable, to equivalent Greenfield runoff rates as calculated in accordance with the Interim Code of Practice for SUDS, 2004d will be provided. Storage ponds for additional flows up to the 1 in 100 year + 40% climate change return period will be provided in SUDS features. Compensation for floodplain loss may be required at some locations. Assessment of impact of any flood compensation land will be required, with level for level and volume for volume compensation being the normal practice. Culvert and drainage network sizing and strategy will be designed will an additional allowance for climate change.	

Topic	Residual Effect		Significance	Mitigation Measure	Delivery Mechanism
				There are a limited number of slopes within the proposed scheme as the site is generally flat, so instability is very unlikely. Earthworks and steepening of slopes will be required at some locations which will be limited to a maximum defined gradient where possible. Where this is not possible, retaining solutions will be required including reinforced earth retaining walls, which will help to mitigate the risk of slope instability and landslides. The severity of impacts from increased winter precipitation is low for aspects of the proposed scheme that are regularly monitored, for example, slope stability, and regularly maintained or replaced, for example road surfaces (expected to be every 15 years) and drainage systems.	
	Projected decrease in mean summer precipitation (-27% y 2060-2079)	Drying out of road and pavement structures	Neutral	This will be considered when specifying materials in detailed design. The severity of the impact will be low for pavement and road surfaces which will undergo regular repair and replacement as part of maintenance activities.	
		Summer Ice' – Occurs after a prolonged period of no rain when dirt and oil residue build up on the road.	Neutral	Regular maintenance of drainage systems	

Topic	Residual Effect		Significance	Mitigation Measure	Delivery Mechanism
	Projected increase in frequency and magnitude of storms and wind (by 2050)	Increased debris on the network Damage to utilities Increased wind gusts affecting tall structures	Neutral	Site clearance, stopping sight distances, visibility splay assessments, and landscape design will be undertaken to mitigate any debris from vegetation on the network. Structures (bridges and retaining walls) will be designed for a design working life of 120 years, taking into account safety factors, load conditions and durability requirements. Regular inspection of the condition of these over this lifetime will enable maintenance or upgrades due to unexpected climate impacts to be considered as part of future planned maintenance. Height of signs has been reduced where possible to minimise the risk of instability. As these signs are replaced and maintained over the lifetime of the proposed scheme then options for further mitigation or strengthening will be reviewed based on future predictions of wind and storms.	
		Health and safety risks to road users, and disrupted and/ or inaccessible network	Neutral	Suitable network redundancies and diversion routes will be identified. Emergency response and contingency plans will be put in place. Standard operating procedures will be developed for use in the event of necessary road closure and/ or traffic diversion.	

Topic	Residual Effect	Significance	Mitigation Measure	Delivery Mechanism
	GHG Impact	Slight adverse	Industry standard measures are expected to be sufficient. Additional mitigation is not required.	Implementation of the EMP

17. REFERENCES AND GLOSSARY

Introduction

Ref 1-1 European Commission, (2014); Directive 2014/52/EU of the European Parliament and of the Council of 16 April 2014 amending Directive 2011/92/EU on the assessment of the effects of certain public and private projects on the environment

Ref 1-2 Her Majesty's Stationary Office (HMSO), (2019); The Highways Act 1980 (as amended 2019)

Ref 1-3 Department for Communities and Local Government (DCLG), (2019); National Planning Policy Framework

Ref 1-4 Department for Transport, (2015); Highways England: Licence

Ref 1-5 Highways Agency, (2015); Interim Advice Note 125/15: Environmental Assessment Update

Ref 1-6 Highways Agency, (2009); Design Manual for Road and Bridges, Volume 11: Environmental Assessment

The Project

Ref 2-1 Highways England, (2014); Highways England South Midlands Route Strategy Evidence Report

Ref 2-2 Coventry City Council, (2016); Coventry City Council Local Plan 2016

Ref 2-3 Highways England, (2014); Strategic Business Plan: 2015-2020

Ref 2-4 Her Majesty's Stationary Office (HMSO), (2015); The Infrastructure Act 2017

Ref 2-5 Department for Transport, (2015); Highways England: Licence

Ref 2-6 Highways England, (2015); Highways England Delivery Plan: 2015-2020

Ref 2-7 Highways England, (2017); South Midlands Route Strategy

Ref 2-8 Her Majesty's Stationary Office (HMSO), (1974); Control of Pollution Act (as amended 1989)

Assessment of Alternatives

Ref 3-1 Highways Agency (2008); Design Manual for Roads and Bridges (DMRB) Volume 11, Section 2, Part 5

Ref 3-2 Highways England (2014); The Route Strategic Options Report – A46 Coventry to M6 J2 Study

Environmental Assessment Methodology

Ref 4-1 Highways Agency, (2007); Design Manual for Roads and Bridges (DMRB) Volume 11, Section 3, Part 1

Ref 4-2 Highways England, (2014); Interim Advice Note 135/10 Landscape and Visual Effects Assessment

Ref 4-3 Landscape Institute, (2013); Guidelines for Landscape and Visual Impact Assessment

Ref 4-4 Highways England, (2011); Interim Advice Note 153/11 Guidance on the Environmental Assessment of Material Resources

Ref 4-5 Highways Agency, (2011); DMRB Volume 11, Section 3, Part 7 Noise and Vibration

Ref 4-6 Department for Transport, (2001); DMRB Volume 11, Section 3, Part 6 Land Use – Amendment No 1

Ref 4-7 Department for Transport, (1993); DMRB Volume 11, Section 3, Part 8 Pedestrians, Cyclists, Equestrians and Community Effects

Ref 4-8 Highways Agency, (2009); DMRB, Volume 11, Section 3, Part 10 Road Drainage and the Water Environment

Ref 4-9 British Standards Institute, (BSI) (2013); BS EN 15804: 2012+A1:2013: Sustainability of construction works. Environmental product declarations. Core rules for the product category of construction products.

Ref 4-10 BSI, (2016); PAS 2080:2016

Ref 4-11 Highways Agency, (2008); DMRB, Volume 11, Section 3, Part 4 Scoping of Environmental Impact Assessments

Ref 4-12 Highways Agency, (2008); DMRB, Volume 11, Section 3, Part 6 Reporting of Environmental Impact Assessments

Ref 4-13 Highways Agency, (2015); Interim Advice Note 125/15 Environmental Assessment Update

Ref 4-14 Highways Agency, (2008); DMRB, Volume 11, Section 2, Part 5 Assessment and Management of Environmental Effects

Air Quality

Ref 5-1 Her Majesty's Stationary Office (HMSO), (2007); Design Manual for Roads and Bridges, Volume 11, Section 3, Part 1 (DMRB 11.3.1), HA 207/07 Air Quality

Ref 5-2 Council of European Communities, (2008); Ambient Air Quality and Cleaner Air for Europe Directive, 2008/50/EC

Ref 5-3 Her Majesty's Stationary Office (HMSO), (2010); The Air Quality Standards Regulations, SI 1001, The Stationery Office

Ref 5-4 Defra, (2007); The Air Quality Strategy for England, Scotland, Wales and Northern Ireland

Ref 5-5 Her Majesty's Stationary Office (HMSO), (1995); The Environment Act

Ref 5-6 Her Majesty's Stationary Office (HMSO), (2000 and 2002); The Air Quality (England) Regulations 2000, Statutory Instrument No 928, and The Air Quality (England) (Amendment) Regulations 2002, Statutory Instrument No 3043, The Stationery Office

Ref 5-7 Defra and DfT, (2017); UK Plan for Tackling Roadside Nitrogen Dioxide Concentrations, OGL

Ref 5-8 Defra and DfT, (2017); Clean Air Zone Framework, OGL.

Ref 5-9 Highways England, (2017); Our Strategy to Improve Air Quality

Ref 5-10 Department for Communities and Local Government (DCLG), (2014); National Planning Practice Guidance, the National Archives

Ref 5-11 Department for Communities and Local Government (DCLG), (2012 and amended 2019); National Planning Policy Framework, the National Archives

Ref 5-12 Council of European Communities, (1992); Council Directive 92/43/EEC of 21 May 1992 on the conservation of natural habitats and of wild fauna and flora

Ref 5-13 Her Majesty's Stationary Office (HMSO), (2014); National Policy Statement for National Networks

Ref 5-14 Coventry City council (2019), Coventry Local Air Quality Action Plan Outline Business Case

Ref 5-15 Highways Agency, (2015); Interim Advice Note 185/15 Updated traffic, air quality and noise advice on the assessment of link speeds and generation if traffic data into speed bands for users of DMRB 11.3.1, HA

Ref 5-16 IAQM, (2014); Guidance on the assessment of dust from demolition and construction (v1.1), IAQM

Ref 5-17 Highways Agency, (2013); Interim Advice Note 170/12 v3 Updated air quality advice on the assessment of future NOx and NO_2 projections for users of DMRB 11.3.1, HA

Ref 5-18 Highways Agency, (2013); Interim Advice Note 174/13 Updated advice for evaluating significant local air quality effects for users of DMRB 11.3.1, HA

Ref 5-19 Highways Agency, (2013); Interim Advice Note 175/13 Updated advice on risk assessment related to compliance with the EU Directive on ambient air quality and on the production of scheme air quality action plans for users of DMRB 11.3.1

Ref 5-20 Defra, (2016); Local Air Quality Management, Technical Guidance 2016 (LAQM.TG(16)), OGL

Ref 5-21 DfT, (2015); TAG Unit A3 Environmental Impact Appraisal, Section 3 Air Quality Impacts

Ref 5-22 Defra (2017); Air Quality Directive 2015 Baseline Projections, accessed January 2018

Cultural Heritage

Ref 6-1 Department for Transport (DfT), (2007); Design Manual for Roads and Bridges: Volume 11, Section 3, Part 2, Cultural Heritage

Ref 6-2 Her Majesty's Stationary Office (HMSO), (1979); Ancient Monuments and Archaeological Areas Act 1979 (as amended), http://www.legislation.gov.uk/ukpga/1979/46

Ref 6-3 HMSO, (1990); Planning (Listed Building and Conservation Areas) Act 1990

Ref 6-4 Department for Communities and Local Government (DCLG), (2019); National Planning Policy Framework (NPPF)

Ref 6-5 Department for Communities and Local Government (DCLG), (2019); National Planning Policy Framework (NPPF), Conserving and enhancing the historic environment, https://www.gov.uk/government/publications/national-planning-policy-framework--2

Ref 6-6 Coventry City Council, (2017); Coventry City Council Local Plan 2011 - 2031

Ref 6-7 Rugby Borough Council, (2019); Rugby Borough Council Local Plan 2011 - 2031.

Ref 6-8 Rugby Borough Council, (2010); Coombe Abbey Conservation Area Appraisal

Ref 6-9 Department for Transport (DfT), (2001); Design Manual for Roads and Bridges: Volume 10, Section 6, Part 1: Environmental Design. Part 1HA 75/01 Trunk Roads

and Archaeological Mitigation. Department for Transport/ Highways Agency/ Stationery Office (London) http://www.standardsforhighways.co.uk/ha/standards/ghost/dmrb/vol10/section6/ha7501.pdf

Ref 6-10 Historic England, (2017); Historic Environment Good Practice Advice in Planning Note 3 (2nd edition), The Setting of Heritage Assets, https://content.historicengland.org.uk/images-books/publications/gpa3-setting-of-heritage-assets/heag180-gpa3-setting-heritage-assets.pdf/]

Ref 6-11 Chartered Institute of Archaeologists, (2014); Code of Conduct and Standard and Guidance for Historic Environment, Desk-Based Assessment

Ref 6-12 DfT, (2014); National Policy Statement for National Networks

Ref 6-13 Geotechnics, (2017); A46 Coventry Junctions Factual Report, Geotechnics unpublished report.

Ref 6-14 AECOM, (2017); A46 Coventry Junctions Improvement Geotechnical Interpretive Report (HE551486-ACM-VGT-XX-RP-GE-00001)

Ref 6-15 Coventry City Council, (2013); Coventry Historic Landscape Characterisation

Landscape

Ref 7-1 Council of Europe, (2000); European Landscape Convention

Ref 7-2 Warwickshire County Council, (1996); Warwickshire Structure Plan (1996-2011)

Ref 7-3 Coventry City Council, (2011); The New Coventry Local Development Plan (2011-2031)

Ref 7-4 Coventry City Council, (2016); Coventry Local Plan

Ref 7-5 Department for Transport, (1993); Design Manual for Roads and Bridges (DMRB) Volume 11 Section 3 Part 5 (Annex III)

Ref 7-6 Highways Agency, (2010); Interim Advice Note (IAN) 135/10 Landscape and Visual Effects Assessment

Ref 7-7 Warwick County Council (2006) Landscape Assessment of the borough of Rugby, Sensitivity and Condition survey: https://apps.warwickshire.gov.uk/api/documents/WCCC-688-147

Ref 7-8 Mouchel PCF Stage 1 Environmental Study Report

Ref 7-9 Landscape Institute, (2013); Guidelines for Landscape and Visual Impact Assessment 3 (GLVIA3)

Biodiversity

Ref. 8-1 Her Majesty's Stationary Office (HMSO), (1981); The Wildlife and Countryside Act 1981 (as amended), http://www.legislation.gov.uk/ukpga/1981/69

Ref. 8-2 Her Majesty's Stationary Office (HMSO), (2000); The Countryside and Rights of Way Act 2000, http://www.legislation.gov.uk/ukpga/2000/37/contents

Ref. 8-3 Her Majesty's Stationary Office (HMSO), (2017); The Conservation of Habitats and Species Regulations 2017, http://www.legislation.gov.uk/uksi/2017/1012/contents/made

Ref. 8-4 Her Majesty's Stationary Office (HMSO), (2006); The Natural Environment and Rural Communities Act 2006, http://www.legislation.gov.uk/ukpga/2006/16/contents

Ref. 8-5 JNCC and Defra (on behalf of the Four Countries' Biodiversity Group), (2012); UK Post-2010 Biodiversity Framework, http://jncc.defra.gov.uk/page-6189

Ref. 8-6 Her Majesty's Stationary Office (HMSO), (1992); The Protection of Badgers Act 1992, http://www.legislation.gov.uk/ukpga/1992/51/contents

Ref. 8-7 Her Majesty's Stationary Office (HMSO), (1997); The Hedgerows Regulations 1997, http://www.legislation.gov.uk/uksi/1997/1160/contents/made

Ref. 8-8 Her Majesty's Stationary Office (HMSO), (2003); The Water Environment (Water Framework Directive) (England and Wales) Regulations 2003, http://www.legislation.gov.uk/uksi/2003/3242/contents/made

Ref. 8-9 Department for Communities and Local Government (DCLG), (2019); The National Planning Policy Framework (NPPF), https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/6077/2116950.pdf

Ref. 8-10 Department for Communities and Local Government (DCLG), (2019); The National Planning Practice Guidance (NPPG), https://www.gov.uk/government/collections/planning-practice-guidance

Ref. 8-11 Department for Communities and Local Government (DCLG), (2014); The National Policy Statement for National Networks (NPSNN), https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/387222/npsnn-print.pdf

Ref. 8-12 Coventry City Council, (2016); Coventry Local Plan. https://www.coventry.gov.uk/info/111/planning_policy/2310/local_plan accessed 14.10.19

Ref. 8-13 Rugby Borough Council, (2016); Rugby Borough Council Local Plan 2011-2031, Publication Draft

Ref. 8-14 Warwickshire Wildlife Trust, (2017); Local Biodiversity Action Partnership. The Species and Habitat Action Plans 2012 to 2017, http://www.warwickshirewildlifetrust.org.uk/LBAP%20Action%20Plans

Ref. 8-15 Warwickshire Museum and Natural Environment, (2013); Warwickshire, Coventry and Solihul Green Infrastructure Strategy, https://www.warwickshire.gov.uk/greeninfrastructure accessed 14.10.19

Ref. 8-16 Highways England, (2015); Our plan to protect and increase biodiversity

Ref.8-17 Highways Agency, (2012); Biodiversity Action Plan, http://webarchive.nationalarchives.gov.uk/20101110134540tf_/http://www.highways.gov.uk/aboutus/723.aspx accessed 14.10.19

Ref.8-18 Department for Transport (DfT), (2015); Road Investment Strategy for the 2015/16 – 2019/20 Road Period, https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/408514/ris-for-2015-16-road-period-web-version.pdf accessed 10.10.19

Ref.8-19 Highways England, (2015); Highways England Delivery Plan (2015 – 2020), https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/424467/DSP2036-184_Highways_England_Delivery_Plan_FINAL_low_res_280415.pdf

Ref. 8-20 Chartered Institute of Ecology and Environmental Management (CIEEM), (2019); Guidelines of Ecological Impact Assessment in the UK and Ireland (Second Edition 2019)

Ref. 8-21 The Wildlife Trusts, (2017); Tormentil Potentilla erecta, http://www.wildlifetrusts.org/species/tormentil

Ref. 8-22 Natural England, (2013); National Character Area (NCA) Profile: 97 Arden (NE337), http://publications.naturalengland.org.uk/publication/1819400?category=587130

Ref. 8-23 Natural England, (2013); National Character Area (NCA) Profile: 96 Dunsmore and Feldon (NE469), http://publications.naturalengland.org.uk/publication/4878893332824064?category=587130

Ref. 8-24 Oldham RS, Keeble J, Swan MJS and Jeffcote M, (2000); Evaluating the suitability for the great crested newt (*Triturus cristatus),* Herpetology Journal, Vol. 10, pp. 143-155.

Ref. 8-25 Biggs J, Ewald N, Valentini A, Gaboriaud C, Griffiths RA, Foster J, Wilkinson J, Arnett A, Williams P and Dunn F, (2014); Analytical and methodological development for improved surveillance of the Great Crested Newt. Appendix 5. Technical advice note for field and laboratory sampling of great crested newt (Triturus cristatus) environmental DNA

Ref. 8-26 Collins, J (ed.), (2016); Bat surveys for professional ecologists: good practice guidance 3rd edition, Bat Conservation Trust, London

Ref. 8-27 Shawyer, CR (2011); Barn Owl *Tyto Alba* Survey Methodology and Techniques for use in Ecological Assessment: Developing Best Practice in Survey and Reporting. IEEM, Winchester

Ref. 8-28 Harris S, Creswell P and Jefferies DJ, (1989); Surveying badgers, Mammal Society, London

Ref. 8-29 WDCG (2016) Dormouse survey. Warwickshire Dormouse Conservation Group.

Ref. 8-30 Strachan R, Moorhouse Y and Gelling M, (2011); The Water Vole Conservation Handbook (Third Edition)

Ref. 8-31 Dean M, Strachan R, Gow D and Andrews R, (2016); The Water Vole Mitigation Handbook (The Mammal Society Mitigation Guidance Series), Mathews F and Chanin M (eds)

Ref. 8-32 Royal Society for the Protection of Birds (RSPB), The National Rivers Authority (NRA) and The Royal Society for Nature Conservation (RSNC), (1994); The New Rivers & Wildlife Handbook

Ref. 8-33 Environment Agency, (2010); Fifth Otter Survey of England 2009-2010, Technical Report

Ref. 8-34 Chanin, P, (2003); Ecology of European Otter, Conserving Natura 2000 Rivers Ecology Series No.10 English Nature

Ref. 8-35 Highways Agency, (2010); Interim Advice Note 130/10 Ecology and Nature Conservation: Criteria for Impact Assessment

Ref. 8-36 Berthinussen A and Altringham JD, (2012); The effects of a major road on bat activity and diversity, Journal of Applied Ecology, 49, 82-89

Ref. 8-37 Air Pollution Information System, (2017a); Coombe Pool SSSI, http://www.apis.ac.uk/srcl/select-a-feature?site=1001242&SiteType=SSSI&submit=Next

Ref. 8-38 Air Pollution Information System, (2017b); Herald Way Marsh SSSI, http://www.apis.ac.uk/srcl/select-a-feature?site=1005052&SiteType=SSSI&submit=Next

Ref. 8-39 Air Pollution Information System, (2017c); Nitrogen Deposition: Fen, Marsh and Swamp, http://www.apis.ac.uk/node/975

Ref. 8-40 Institute of Lighting (2018) Guidance Note 08/18. Bats and artificial lighting in the UK. Bats and the Built Environment series.

Geology and Soils

Ref 9-1 Highways Agency, (1993); Design Manual of Roads and Bridges Volume 11, Section 3, Part 11 Geology and Soils

Ref 9-2 Highways Agency, (2001); Design Manual of Roads and Bridges Volume 11, Section 3, Part 6 – Land Use – Amendment No 1

Ref 9-3 Defra, (2012); Environmental Protection Act 1990: Part 2A Contaminated Land Statutory Guidance

Ref 9-4 Her Majesty's Stationary Office (HMSO), (2006); Contaminated Land (England) Regulations SI 2006/1380

Ref 9-5 Her Majesty's Stationary Office (HMSO), (2000); Contaminated Land (England) Regulations SI 2000 (SI 2000/227)

Ref 9-6 Her Majesty's Stationary Office (HMSO), (2006); Contaminated Land (England) Regulations SI 2001 (SI 2001/663)

Ref 9-7 Department for Communities and Local Government (DCLG), (2019); National Planning Policy Framework

Ref 9-8 Her Majesty's Stationary Office (HMSO), (2010); The Town and Country Planning (Development Management Procedure) (England) Order 2010

Ref 9-9 Highways England, (2017); A46 Coventry Junctions Upgrade Preliminary Sources Study Report

Ref 9-10 AECOM, (2017); A46 Coventry Junctions Improvement Geotechnical Interpretive Report (HE551486-ACM-VGT-XX-RP-GE-00001)

Ref 9-11 The British Geological Survey (BGS), (2018); GeoIndex web service

Ref 9-12 The Environment Agency, (2018); The Environment Agency's "What's In Your Backyard" (WIYBY) web service

Ref 9-13 MAGIC Partnership & Natural England, (2018); MAGIC Maps web service

Ref 9-14 Cranfield University, (2018); Soilscapes, LandIS online viewer www.landis.org.uk

Ref 9-15 Mouchel, (2016); A46 Coventry Junctions Environmental Study Report

Ref 9-16 Mouchel, (2016); A46 Coventry Junction Upgrade Interim PCF - Environmental Scoping Report

Ref 9-17 Mouchel, (2017); Roads Investment Programme, West Midlands Area 9, Preliminary Sources Study Report A46 Coventry Junctions Upgrade (Ref: HE551486-MOU-HGT-A46_A428-RA-CE-0040)

Ref 9-18 BRE, (2015); BRE Report BR211, Radon: Protective measures for new buildings

Ref 9-19 Environment Agency, (2004); Model Procedures for the Management of Land Contamination – CLR11

Ref 9-20 British Standards Institution (2011); BS10175: 2011 Investigation of Potentially Contaminated Sites – Code of Practice

Ref 9-21 Environment Agency (2017); Derivation and use of soil screening values for assessing ecological risks, (2008b) Guidance on the Use of Soil Screening Values in Ecological Risk Assessment or (2015) BS3882 Specification for Topsoil and Requirements for Use

Ref 9-22 International Organization of for Standardization, (2017); ISO 19204:2017 Soil quality -- Procedure for site-specific ecological risk assessment of soil contamination

Ref 9-23 (BSI), (2007); BS 3882:2015 British Standard Specification for Topsoil and Requirements for Use

Ref 9-24 Department for Environment, Food and Rural Affairs (Defra), (2009); Construction Code of Practice for the sustainable use of soils on construction sites

Ref 9-25 Construction Industry Research and Information Association (CIRIA), (2010); CIRIA C692 3rd Edition Environmental Good Practice on Site

Ref 9-26 The UK Government Data.gov.uk (accessed September 2019); Data sets from the Environmental Agency, (including Flood Maps for planning portal .https://flood-map-for-planning.service.gov.uk).

Materials, Assets and Waste

Ref 10-1 Highways Agency, (2008); Design Manual for Roads and Bridges (DMRB) Volume 11, Section 2, Part 5

Ref 10-2 Highways England, (2015); Interim Advice Note 153/11 Guidance on the Environmental Assessment of Material Resources

Ref 10-3 Directive 2008/98/EC of the European Parliament and of the Council of 19 November 2008 on Waste and repealing certain Directives (Waste Framework Directive)

Ref 10-4 Her Majesty's Stationary Office (HMSO), (2011); The Waste (England and Wales) Regulations 2011

Ref 10-5 Her Majesty's Stationary Office (HMSO), (2010); The Environmental Permitting (England and Wales) Regulations 2010

Ref 10-6 Her Majesty's Stationary Office (HMSO), (1990); Environmental Protection Act 1990

Ref 10-7 Her Majesty's Stationary Office (HMSO), (2005); The Hazardous Waste Regulations 2005 (as amended 2016)

Ref 10-8 Department for Environment, Food and Rural Affairs, (2018); 25 Year Environmental Plan

Ref 10-9 Department for Environment, Food and Rural Affairs, (2018); Resources and Waste Strategy

Ref 10-10 Department for Communities and Local Government (DCLG), (2012); National Planning Policy Framework

Ref 10-11 Department for Communities and Local Government (DCLG), (2014); Planning Practice Guidance: Minerals

Ref 10-12 Defra, (2013); Waste Management Plan for England 2013

Ref 10-13 Department for Communities and Local Government (DCLG), (2014); National Planning Policy for Waste

Ref 10-14 Ministry of Housing, Communities and Local Government, (2009); The National and Regional Guidelines for Aggregates Provision in England 2005 to 2020

Ref 10-15 Warwickshire County Council, (2016); Warwickshire Minerals Plan Publication Consultation December 2016

Ref 10-16 Warwickshire County Council, (2013); Warwickshire Waste Core Strategy 2013 – 2028

Ref 10-17 Coventry City Council, (2016); Local Plan Publication Draft

Ref 10-18 Environment Agency, (2017); Waste Management for England 2017

Ref 10-19 British Geological Survey (2019); British Geological Survey's Geoindex Onshore

Ref 10-20 WRAP (undated); Designing Out Waste Tool for Civil Engineering

Ref 10-21 WRAP (undated) Achieving good practice Waste Minimisation and Management. Guidance for construction clients, design teams and contractors

Ref 10-22 Mineral Products Association (2018); Profile of the UK Mineral Products Industry Workbook: 2018 edition. Mineral Products Association

Ref 10-23 CL:AIRE. Definition of Waste: Code of Practice

Noise and Vibration

Ref 11-1: DEPARTMENT FOR TRANSPORT, National Networks National Policy Statement, 2014

Ref 11-2: DEPARTMENT FOR COMMUNITIES AND LOCAL GOVERNMENT, National Planning Policy Framework, 2012

Ref 11-3: DEFRA, Noise Policy Statement for England, 2010

Ref 11-4: DEPARTMENT FOR COMMUNITIES AND LOCAL GOVERNMENT, National Planning Policy Practice Guidance - Noise, 2014

Ref 11-5: HIGHWAYS ENGLAND, Design Manual For Roads And Bridges Vol. 11, Section 3, PART 7, HD 213/11 REVISION 1, Noise and Vibration, Highways England, 2011

Ref 11-6: DEPARTMENT OF TRANSPORT AND THE WELSH OFFICE, Calculation of Road Traffic Noise, 1988.

Ref 11-7: MOUCHEL, A46 Coventry Junction Upgrade Interim PCF – Environmental Scoping Report (HE551486-MOU-EGN-A46_A428-RP-LE-0098), 2017

Ref 11-8: BRITISH STANDARDS INSTITUTION, BS 5228:2009 + A1:2014 Code of Practice for noise and vibration control on construction and open sites, 2014.

Ref 11-9: BRITISH STANDARDS INSTITUTION, BS 7385-2: 1993 Evaluation and measurement for vibration in buildings – Part 2: Guide to damage levels from ground borne vibration, 1993.

Ref 11-10: INTERNATIONAL STANDARDS ORGANISATION, ISO 4866:2010 Mechanical vibration and shock. Vibration of fixed structures. Guidelines for the measurement of vibrations and evaluation of their effects on structures, 2010.

Ref 11-11: HM GOVERNMENT, Noise Insulation Regulations 1975 (as amended 1988)

Ref 11-12: WORLD HEALTH ORGANISATION Guidelines for Community Noise, 1999

Ref 11-13: WORLD HEALTH ORGANISATION Night Noise Guidelines for Europe, 2009

Ref 11-14: HIGHWAYS ENGLAND, Interim Advice Note 185/15, Updated traffic, air quality and noise advice on the assessment of link speeds and generation of vehicle data into 'speed-bands' for users of DMRB Volume 11, Section 3, Part 1 'Air Quality and Volume 11, Section 3. Part 7 Noise, 2015

People and Communities

Ref 12-1 Office of National Statistics, (2016); ONS Population Estimates

Ref 12-2 Office of National Statistics, (2012); Census 2011

Ref 12-3 Public Health England, (2017); Health Profile, Public Health England

Ref 12-4 Highways Agency, (1993); Design Manual for Roads and Bridges (DMRB), Volume 11 Section 3 Part 9 Vehicle Travellers

Ref 12-5 Highways Agency, (2007); Design Manual for Roads and Bridges (DMRB), Volume 11 Section 2, Part 5 Assessment and Management of Environmental Effects

Ref 12-6 Dahlgren and Whitehead, (1991); Social Model of Health

Ref 12-7 Warwickshire County Council, (2011); Warwickshire Local Transport Plan

Ref 12-8 Her Majesty's Stationary Office (HMSO), (2000); Countryside and Rights of Way Act

Ref 12-9 Coventry City Council, (2007); Rights of way improvement plan 2007-2017

Ref 12-10 Coventry City Council, (2016); Coventry City Council Local Plan

Ref 12-11 Rugby Borough Council, (2011); Local Development Framework, Final Version Core Strategy

Ref 12-12 Office of National Statistics, (2011); 2011 Census Data

Ref 12-13 Office of National Statistics, (2016); West Midlands Health Data

Ref 12-14 Highways Agency, (2008), Design Manual for Roads and Bridges (DMRB), Volume 11 Section 2, Part 5 Assessment and Management of Environmental Effects

Ref 12-15 World Health Organisation, (1946); Constitution of the World Health Organisation: Principles

Ref 12-16 Healthy Urban Development Unit (HUDU) (2017), Planning for Health Rapid HIA Tool, Third Edition.

Water and Drainage

Ref 13-1 The European Union (2000) Water Framework Directive, Directive 2000/60/EC

Ref 13-2 The European Union (2008) Priority Substances Directive, Directive 2008/105/EC

Ref 13-3 The European Union Directive (2006) Groundwater Daughter Directive, Directive 2006/118/EC

Ref 13-4 The European Union Directive (2007) The EU Floods Directive, Directive 2007/60/EC

Ref 13-5 The European Union (2004) The Environmental Liability Directive, Directive 2004/35/EC

Ref 13-6 The European Union (2006) Freshwater Fish Directive, Directive 2006/44/EC

Ref 13-7 The Water Environment (Water Framework Directive) (England Wales) Regulations (2017) London, The Stationary Office

Ref 13-8 The Water Environment (Water Framework Directive) (England Wales) Regulations (2003) London, The Stationary Office

Ref 13-9 The Groundwater (England and Wales) Regulations (2009) London, The Stationary Office

Ref 13-10 The Floods and Water Management Act (2010) London, The Stationary Office;

Ref 13-11 The Environmental Damage (Prevention and Remediation) Regulations (2015) London, The Stationary Office

Ref 13-12 Water Act (2014) London, The Stationary Office

Ref 13-13 The Land Drainage Act (1991) London, The Stationary Office

Ref 13-14 The Water Resources Act (1991) London, The Stationary Office

Ref 13-15 The Salmon and Freshwater Fisheries Act (1975) London, The Stationary Office

Ref 13-16 The Environmental Permitting (England and Wales) Regulations (2016) London, The Stationary Office

Ref 13-17 The Eels (England and Wales) Regulation (2009) London, The Stationary Office

Ref 13-18 The Control of Pollution (Oil Storage) (England) Regulations (2001) London, The Stationary Office

Ref 13-19 Department for Communities and Local Government (2012) National Planning Policy Framework, London, The Stationary Office

Ref 13-20 Department for Communities and Local Government (2012) National Planning Practice Guidance, London, The Stationary Office

Ref 13-21 Department for Communities and Local Government (2015) Flood Risk and Coastal Change NPPG, London, The Stationary Office

Ref 13-22 Department for Communities and Local Government (2014) National Policy Statement for National Networks NPPG, London, The Stationary Office

Ref 13-23 DEFRA (2011) Future Water, the Government's water strategy for England, London, The Stationary Office

Ref 13-24 DEFRA (2011) Non-statutory technical standards for SuDS

Ref 13-25 CIRIA (2015) The SuDS Manual (C753)

Ref 13-26 Highways Agency (2006), Design Manual for Roads and Bridges HD103/06, Vegetated Drainage Systems for Highway Runoff

Ref 13-27 Highways Agency, Design Manual for Roads and Bridges HD 33/06 Surface and Subsurface Drainage Systems for Highways

Ref 13-28 Coventry City Council (2018) Local Plan

Ref 13-29 DMRB, (2009); Volume 11, Section 3, Part 10, HD45/09 Road Drainage and the Water Environment

Ref 13-30 MET Office, available at http://www.metoffice.gov.uk/ accessed December 2017

Ref 13-31 Ordnance Survey, Ordnance survey mapping, 2017, available and accessed December 2017

Ref 13-32 Environment Agency; Catchment Data Explorer, available at http://environment.data.gov.uk/catchment-planning/ accessed December 2017)

Ref 13-33 Environment Agency; What's in my Backyard, available at http://apps.environment-agency.gov.uk/wiyby/ ; accessed December 2017

Ref 13-34 UK Government, River and Sea Levels website, https://flood-warning-information.service.gov.uk/river-and-sea-levels, accessed December 2017

Ref 13-35 National River Flow Archive, www.nrfa.co.uk accessed December 2017

Ref 13-36 British Geological Survey, Geology of Britain Viewer, available at http://www.bgs.ac.uk/discoveringGeology/geologyOfBritain/viewer.html , accessed December 2017

Ref 13-37 Highways England, Highways Agency Drainage Data Management System (HADDMS), www.HADDMS.co.uk

Ref 13-38 Environment Agency, Long term flood risk assessment for locations in England, available at https://flood-warning-information.service.gov.uk/long-term-flood-risk, accessed December 2017

Ref 13-39 Environment Agency, Updated Flood Map for Surface Water, available at https://flood-warning-information.service.gov.uk/long-term-flood-risk, accessed December 2017

Ref 13-40 Environment Agency, Pollution Prevention Guidelines

Ref 13-41 C741 (2015, 4th Edition) Environmental good practice on site guide

Ref 13-42 C609 (2004) Sustainable Drainage Systems, hydraulic, structural and water quality advice

Ref 13-43 C624 (2004) Development and flood risk – Guidance for the construction industry

Ref 13-44 C522 (2001) Sustainable Urban Drainage Systems – Design manual for England and Wales

Ref 13-45 C523 (2001) Sustainable Urban Drainage Systems – Best practice manual for England, Scotland, Wales and Northern Ireland

Ref 13-46 C532 (2001) Control of water pollution from construction sites – Guidance for consultants and contractors

Ref 13-47 DMRB, (2009); Volume 4, Section 2, Part 3, HD33/16 Design of Highways Drainage Systems – guidance on conventional drainage systems to reduce pollution

Ref 13-48 DMRB, (2006); Volume 4, Section 2, Part 8, HA118/06 Design of Soakaways

Ref 13-49 DMRB, (2006); Volume 4, Section 2, Part 8, HA119/06 Grassed Surface Water Channels for Highway Runoff

Climate

Ref 14-1 Highways England (2007) Design Manual for Roads and Bridges Volume 11, Section 3, Part 1 (Air Quality)

Ref 14-2 Highways England's Interim Advice Note (IAN) 114/08 – Highways Agency Carbon Calculation and Reporting Requirements

Ref 14-3 Department for Transport (2014) National Policy Statement for National Networks

Ref 14-4 Directive 2014/52/EU of the European Parliament and of the Council of 16 April 2014 amending Directive 2011/92/EU

Ref 14-5 H.M. Government (2008) Climate Change Act 2008

Ref 14-6 Department for Transport (2014) National Networks National Policy Statement (NNNPS)

Ref 14-7 Defra (2011) Biodiversity 2020: A strategy for England's wildlife and ecosystem services

Ref 14-8 H.M. Government (2012) National Planning Policy Framework (NPPF) (as updated 2019)

Ref 14-9 West Midland Combined Authority (2017) The West Midlands Strategic Transport Plan

Ref 14-10 Coventry City Council (2016) Coventry Local Plan

Ref 14-11 Coventry City Council (2012) Climate Change Strategy for Coventry

Ref 14-12 The Met Office historic climate data. Link: www.metoffice.gov.uk/public/weather/climate/gcqfp5e8q (Accessed 02/09/2019)

Ref 14-13 Highways England, Carbon Reporting Tool, v1.03 https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/553866/Task_ 446_Carbon_Tool_v1.03.xlsm

Ref 14-14 World Business Council for Sustainable Development (WBCSD)/World Resources Institute (WRI) (2004) The GHG Protocol: A corporate reporting and accounting standard (revised edition)

Ref 14-15 H.M. Government (2018) Road to Zero Strategy

Ref 14-16 Department for Business, Energy and Industrial Strategy (BEIS) (2017) Updated Energy and Emissions Projections

Ref 14-17 IEMA (2015) IEMA Environmental Impact Assessment Guide to: Climate Change Resilience and Adaptation

Ref 14-18 UK Met Office (2018) UK Climate Projections 2018 (UKCP18)

Ref 14-19 The Intergovernmental Panel on Climate Change (IPCC) (2014) Fifth Assessment Report (AR5) - Synthesis Report

Assessment of Cumulative Effects

Ref 15-1 Highways Agency (2008); DMRB, Volume 11, Section 2, Part 5 Assessment and Management of Environmental Effects

Ref 15-2 The Planning Inspectorate (2019); Advice Note Seventeen, Cumulative Effects Assessment, Version 2

Ref 15-3 Highways Agency, (2013); The project control framework Handbook, http://assets.highways.gov.uk/our-road-network/managing-our-roads/project-control-

framework/The%20project%20control%20framework%20handbook%20v2%20April%202013.pdf Accessed 26/09/17

GLOSSARY

AADT	Annual Average Daily Traffic
AAWT	Annual Average Weekly Traffic
ADMS	Atmospheric Dispersion Modelling System
ALC	Agricultural Land Classification
APWR	Anti-Pollution Works Regulations
AQMA	Air Quality Management Area
AQAP	Air Quality Management Plan
AOD	Above Ordnance Datum
AONB	Area of Outstanding Natural Beauty
BAP	Biodiversity Action Plan
BAS	Biodiversity Action Site
BEIS	Department for Business, Energy and Industrial Strategy
bgl	below ground level
BGS	British Geological Survey
BH	Borehole
BNL	Basic Noise Level
BOD	Below Ordnance Datum
BTEX	Benzene, Toluene, Ethylbenzene and Xylene
CASM	Coventry Areas Strategic Model
CAZ	Clean Air Zone
CCR	Climate Change Resilience
CH_4	Methane
CIEEM	Chartered Institute of Ecology and Environmental Management
CIFA	Chartered Institute for Archaeologists
CIRIA	Construction Industry Research & Information Association
CL:AIRE	Contaminated Land: Applications In Real Environments
CO	Carbon Monoxide
CO_2	Carbon Dioxide
COMAH	Control of Major Accidents Hazards
COSHH	Control of Substances Hazardous to Health
CRTN	Calculation of Road Traffic Noise
CSM	Conceptual Site Model
Defra	Department for Environment, Food and Rural Affairs
DfT	Department for Transport

DM	Do Minimum
DMRB	Design Manual for Roads and Bridges
DS	Design Sulphate
DS	Do Something
DTM	Digital Terrain Model
EAR	Environmental Assessment Report
eDNA	Method for testing for the presence of great crested newts in pond water samples
EDR	Environmental Damage Regulations
EIA	Environmental Impact Assessment
EIAR	Environmental Impact Assessment Report
EMP	Environmental Management Plan
EPA	Environmental Protection Act
EQS	Environmental Quality Standards
EU	European Union
EVs	Electric Vehicles
FRA	Flood Risk Assessment
GCN	Great crested newt
GHG	Greenhouse Gas
GLVIA	Guidelines for Landscape and Visual Assessment
GQRA	Generic Quantitative Risk Assessment
HAWRAT	Highways Agency Water Risk Assessment Tool
HDV	Heavy Duty Vehicle
HECZ	Historic Environment Character Zone
HER	Historic Environment Record
HFCs	Hydroflurocarbons
HGVs	Heavy Goods Vehicles
HLA	Historic Landscape Area
HLC	Historic Landscape Characterisation
HPA	Health Protection Agency
HUDU	Healthy Urban Development Unit
IAQM	Institute of Air Quality Management
IAN	Interim Advice Note
ICCI	In-combination Climate Change Impact
IPCC	Intergovernmental Panel on Climate Change
LAQM	Local Air Quality Management

LAQM.TG	Local Air Quality Management Technical Guidance
LCA	Local Character Area
LCRM	Land Contamination Risk Management
LCT	Landscape Character Type
LGS	Local Geological Site
LiDAR	Light Detection and Ranging
LLFA	Lead Local Flood Authority
LNR	Local Nature Reserve
LPA	Local Planning Authority
LTT	Long Term Trend
LVIA	Landscape and Visual Impact Assessment
LWS	Local Wildlife Site
MMP	Materials Management Plan
MT	Motorised Travellers
NCA	National Character Area
NERC	Natural Environment and Rural Communities
$NF3^3$	Nitrogen Trifluoride
NGR	National Grid Reference
NHLE	National Heritage List for England
NIHHS	Notifications of Installations Handling Hazardous Substances
NOx	Nitrogen Oxides
NO_2	Nitrogen Dioxide
N_20	Nitrous Oxide
NPPF	National Planning Policy Framework
NPPG	National Practice Policy Guidance
NPSNN	National Policy Statement for National Networks
NSIP	Nationally Significant Infrastructure Project
NMU	Non-Motorised User
NVZ	Nitrate Vulnerable Zone
OS	Ordinance Survey
PAH	Polyaromatic Hydrocarbons
PCBs	Polychlorinated biphenyls
PCF	Project Control Framework
PFCs	Perfluorocarbons
PHVs	Private Hire Vehicles
PINS	The Planning Inspectorate

pLWS	Potential Local Wildlife Site
PM_{10}	Particulate matter 10 micrometers or less in diameter
PPE	Personal Protective Equipment
PPG	Planning Practice Guidance
PRoW	Public Right of Way
RCP	Representative Connection Pathway
RIGS	Regionally Important Geological Site
RIS	Road Investment Strategy
S41	Section 41 of the NERC Act 2006
SAC	Special Area of Conservation
SF_6	Sulphur Hexafluoride
SPA	Special Protection Area
SPG	Supplementary Planning Guidance
SPZ	Source Protection Zone
SQEP	Suitably Qualified and Experienced Person
SRN	Strategic Road Network
SSSI	Site of Special Scientific Interest
SuDs	Sustainable Drainage Systems
SVOCs	Semi Volatile Organic Compounds
SWMP	Site Waste Management Plan
TAG	Transport Analysis Guidance
TAR	Traffic Assessment Report
TCPA	Town and Country Planning Act
TPH	Total Petroleum Hydrocarbons
TPO	Tree Protection Area
TWh	Terra Watt hour
uFMsFW	Updated Flood Map for Surface Water
UKCP09	UK Climate Projections 2009
UKCP18	UK Climate Projections 2018
ULSD	Ultra-Low-Sulphur Diesel
VMS	Variable Messaging System
VOCs	Volatile Organic Compounds
WBCSD	World Business Council for Sustainable Development
webTAG	Web-based Transport Analysis Guidance
WAC	Waste Acceptance Criteria
WFD	Water Framework Directive

WHO	World Health Organisation
WIYBY	What's in Your Backyard
WRA	Water Resources Act
WRI	World Resources Institute
WS	Window Sample
WSI	Written Scheme of Investigation
ZTV	Zone of Theoretical Visibility

18. FIGURES AND APPENDICES

18.1 FIGURES

1. INTRODUCTION

1.1 Site Location Plan

2. THE PROJECT

2.1 Environmental Constraints

2.2 a-c Profile of the Proposed Scheme

2.3 Temporary and Permanent Land

2.4 a-b Permanent Drainage Ponds

5. AIR QUALITY

5.1 Air Quality Overview Plan

5.2 Affected Road Network and Monitoring Locations Links

5.3 Receptor Locations

5.4 200m Study Area

6. CULTURAL HERITAGE

6.1 Archaeological Assets

6.2 Built Heritage Assets

6.3 Historic Landscape

7. LANDSCAPE

7.1 Locations of LCAs and View Points for Visual Assessment

7.2 a-d Zone of Theoretical Visibility

7.3 Representative Viewpoints Taken from Previous Assessment

7.4 Preliminary Landscape Mitigation Plan

8. BIODIVERSITY

8.1 European Sites within 30km of Proposed Scheme

8.2 Statutory Sites with 2km of Proposed Scheme

8.3 Non-Statutory Sites within 2km of Proposed Scheme

8.4 Protected and notable species records

8.5a Phase I Habitat Survey North

8.5b Ponds within 500m of Proposed Scheme

8.6 Ponds within 500m of Proposed Scheme

9. GEOLOGY AND SOILS

9.1 Factual Report Map

9.2 CSM Red Line

11. NOISE AND VIBRATION

11.1 The Location of the Noise Barrier

11.2 Noise Changes for Do Minimum 2021 to Do Minimum 2036 – Noise Difference Plot

11.3 Noise contour plot short term

11.4 Noise contour plot long term

13. ROAD DRAINAGE AND THE WATER ENVIRONMENT

13.1 Information on water supplies

15. ASSESSMENT OF CUMULATIVE EFFECTS

15.1 Cumulative schemes

18.2 APPENDICES

5. AIR QUALITY

5.1 Local Planning Policy

5.2 Baseline Air Quality within the Study Area

5.3 Additional Local Air Quality Methodology

5.4 Air Quality Modelling Results for all Receptors

5.5 Air Quality Assessment of Nationally Designated Sites for Ecology

6. CULTURAL HERITAGE

6.1 Heritage Assets

7. LANDSCAPE

7.1 Viewpoint Assessment

8. BIODIVERSITY

8.1 Summary of Ecological Study Areas

8.2 Baseline Reports

8.2 (a) Assessment of Implications of European Sites (AIES) Report

8.2 (b) Preliminary Ecological Appraisal and Bat Preliminary Roost and Habitat Assessment Report

8.2 (c) Extended Phase 1 Habitat Survey

8.2 (d) Great Crested Newt 2018 survey

8.2 (e) Great Crested Newt Habitat Suitability Index (HSI) Pond 4

8.2 (f) Great Crested Newt Habitat Suitability Index (HSI) 2016

8.2 (g) Bat Activity Survey Report 2018

8.2 (h) Bat Activity Survey Report 2017

8.2 (i) Ornithological Walkover 2019 Technical Note

8.2 (j) Badger Survey Report 2019

8.2 (k) Badger Survey Report 2017

8.2 (l) Riparian Mammal Survey Report 2019

8.2 (m) Aquatic Ecology Walkover and Macroinvertebrate Survey 2017

8.2 (n) Aquatic Ecology Walkover and Macroinvertebrate Survey 2018

8.3 Habitat description and Target Notes 2019

8.4 Ecological Impact Assessment Methodology

9. GEOLOGY AND SOILS

9.1 Enviro and Geo Insight Reports

9.2 Soil and Leachate Chemistry Output

9.3 Human Health Risk Assessment Methodology and Controlled Waters Risk Assessment Methodology

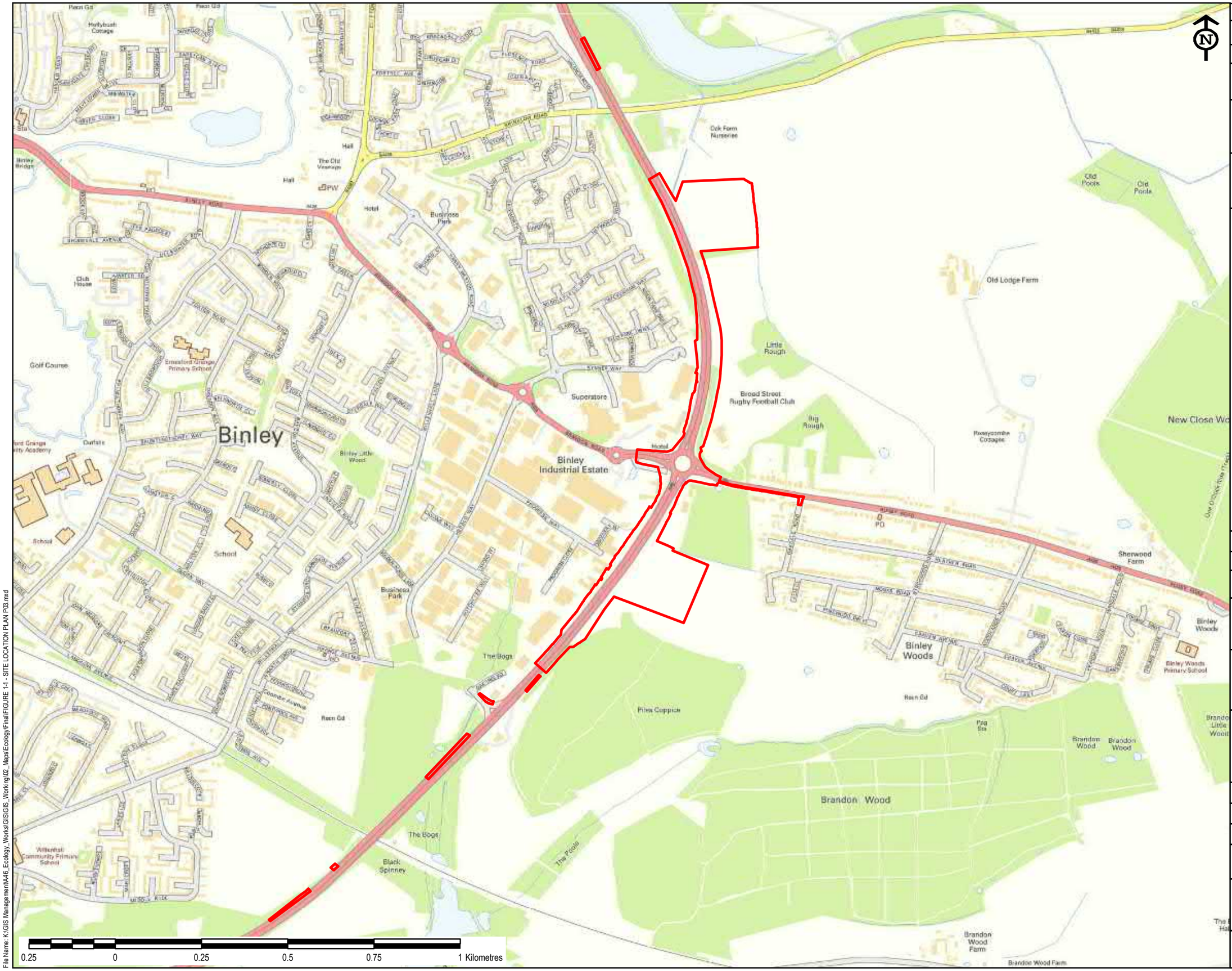
1.3 ROAD DRAINAGE AND THE ENVIRONMENT

13.1 Flood Risk Assessment

13.2 Drainage Strategy

FIGURES

Figure 1.1 Site Location Plan



SAFETY, HEALTH AND ENVIRONMENTAL INFORMATION BOX

IT IS ASSUMED THAT ALL WORKS ON THIS DRAWING WILL BE CARRIED OUT BY A COMPETENT CONTRACTOR WORKING, WHERE APPROPRIATE, TO AN APPROPRIATE METHOD STATEMENT.

THIS DRAWING IS TO BE USED ONLY FOR THE PURPOSE OF ISSUE THAT IT WAS ISSUED FOR AND IS SUBJECT TO AMENDMENT.

EXCEPTIONAL RISKS RELATING TO THE WORKS ASSOCIATED WITH THIS DRAWING ARE IDENTIFIED BELOW.

CONSTRUCTION

MAINTENANCE / OPERATION / DECOMMISSIONING / DEMOLITION

KEY:

Site Boundary (Highways Boundary)

NOTES

1. THIS DRAWING IS TO BE READ IN CONJUNCTION WITH ALL OTHER RELEVANT DOCUMENTATION.
2. DO NOT SCALE FROM THIS DRAWING, USE ONLY PRINTED DIMENSIONS.
3. ALL DIMENSIONS IN MILLIMETRES , ALL CHAINAGES, LEVELS AND COORDINATES ARE IN METRES UNLESS DEFINED OTHERWISE.
4. THIS DRAWING IS TO BE READ IN CONJUNCTION WITH THE PROJECT HEALTH & SAFETY FILE FOR ANY IDENTIFIED POTENTIAL RISKS.
5. CONTAINS OS DATA © CROWN COPYRIGHT AND DATABASE RIGHT 2017

Revision Details	By	Check	Date	Suffix
Update to Red Line	GB	NT	22.03.18	P03

Purpose of issue

FOR INFORMATION

Client
Highways England
Major Projects
The Cube
199 Wharfside Street
Birmingham
B1 1RN

Working on behalf of highways england

Project Title

A46 COVENTRY JUNCTION UPGRADE

Drawing Title

FIGURE 1-1
SITE LOCATION PLAN

Designed	Drawn	Checked	Approved	Date
NT	GB	AR	NT	22/03/2018

Internal Project No.	Suitability
60547444	S0
Scale @ A3	Zone
1:10,000	BINLEY JUNCTION

THIS DOCUMENT HAS BEEN PREPARED PURSUANT TO AND SUBJECT TO THE TERMS OF AECOM'S APPOINTMENT BY ITS CLIENT. AECOM ACCEPTS NO LIABILITY FOR ANY USE OF THIS DOCUMENT OTHER THAN BY ITS ORIGINAL CLIENT OR FOLLOWING AECOM'S EXPRESS AGREEMENT TO SUCH USE, AND ONLY FOR THE PURPOSES FOR WHICH IT WAS PREPARED AND PROVIDED.

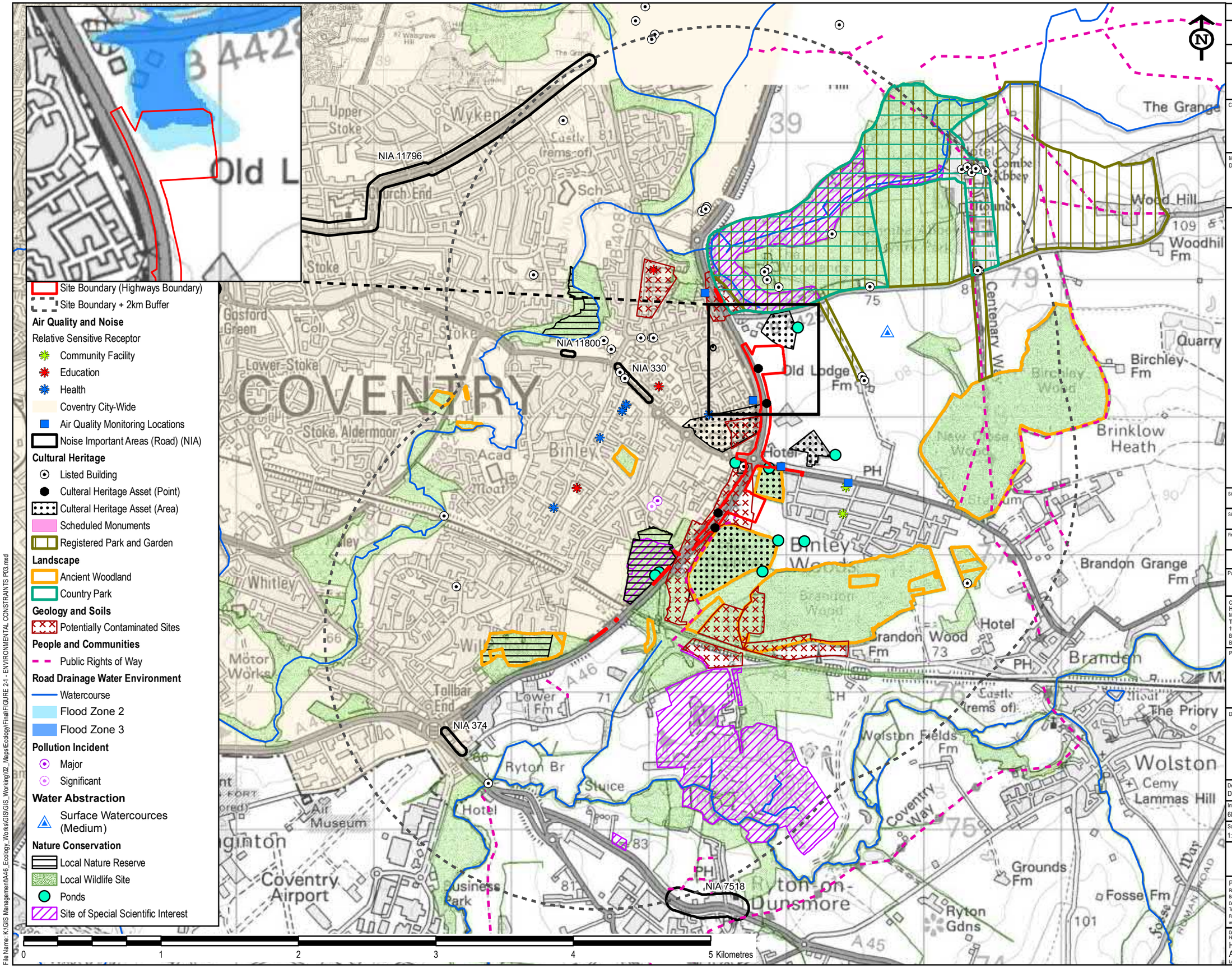
Project Office
Royal Court
Basil Close, Chesterfield
Derbyshire. S41 7SL
Tel: (01246) 209221
Fax: (01246) 209229
www.aecom.com

AECOM Infrastructure & Environment UK Limited
Registered in England Registered number: 880328
Registered office: Scott House, Alencon Link, Basingstoke, Hampshire RG21 7PP

Drawing Number Highways England PIN	Originator	Volume		Rev
HE551486	-ACM	-EGN	-	P03
A46_SW_ZZ		-DR	-EG -00006	
Location		Type	Role Number	

Plot Date: 22 March 2018 14:39:44
File Name: K:\GIS Management\A46_Ecology_Works\GIS\GIS_Working\02_Maps\Ecology\Final\FIGURE 1-1 - SITE LOCATION PLAN P03.mxd

Figure 2.1 Environmental Constraints



Site Boundary (Highways Boundary)
Site Boundary + 2km Buffer

Air Quality and Noise
Relative Sensitive Receptor
- Community Facility
- Education
- Health
- Coventry City-Wide
- Air Quality Monitoring Locations
- Noise Important Areas (Road) (NIA)

Cultural Heritage
- Listed Building
- Culteral Heritage Asset (Point)
- Culteral Heritage Asset (Area)
- Scheduled Monuments
- Registered Park and Garden

Landscape
- Ancient Woodland
- Country Park

Geology and Soils
- Potentially Contaminated Sites

People and Communities
- Public Rights of Way

Road Drainage Water Environment
- Watercourse
- Flood Zone 2
- Flood Zone 3

Pollution Incident
- Major
- Significant

Water Abstraction
- Surface Watercources (Medium)

Nature Conservation
- Local Nature Reserve
- Local Wildlife Site
- Ponds
- Site of Special Scientific Interest

SAFETY, HEALTH AND ENVIRONMENTAL INFORMATION BOX

IT IS ASSUMED THAT ALL WORKS ON THIS DRAWING WILL BE CARRIED OUT BY A COMPETENT CONTRACTOR WORKING, WHERE APPROPRIATE, TO AN APPROPRIATE METHOD STATEMENT.

THIS DRAWING IS TO BE USED ONLY FOR THE PURPOSE OF ISSUE THAT IT WAS ISSUED FOR AND IS SUBJECT TO AMENDMENT.

EXCEPTIONAL RISKS RELATING TO THE WORKS ASSOCIATED WITH THIS DRAWING ARE IDENTIFIED BELOW.

CONSTRUCTION

MAINTENANCE / OPERATION / DECOMMISSIONING / DEMOLITION

Revision Details	By / Check	Date	Suffix
Site Boundary Revised	GB / NT	22/03/18	P03
Site Boundary Revised	GB / CG	19/10/17	P02
First Issue	DM / OP	07/09/17	P01

Purpose of issue: FOR INFORMATION

Client: Highways England, Major Projects, The Cube, 199 Wharfside Street, Birmingham, B1 1RN

Working on behalf of: highways england

Project Title: A46 COVENTRY JUNCTION UPGRADE

Drawing Title: FIGURE 2-1 ENVIRONMENTAL CONSTRAINTS

Designed	Drawn	Checked	Approved	Date
DM	DM	NT	NT	22/03/2018

Internal Project No.	Suitability
60547444	S0
Scale @ A3	Zone
1:25,000	BINLEY JUNCTION

THIS DOCUMENT HAS BEEN PREPARED PURSUANT TO AND SUBJECT TO THE TERMS OF AECOMS APPOINTMENT BY ITS CLIENT. AECOM ACCEPTS NO LIABILITY FOR ANY USE OF THIS DOCUMENT OTHER THAN BY ITS ORIGINAL CLIENT OR FOLLOWING AECOM'S EXPRESS AGREEMENT TO SUCH USE, AND ONLY FOR THE PURPOSES FOR WHICH IT WAS PREPARED AND PROVIDED.

Project Office
Royal Court
Basil Close, Chesterfield
Derbyshire. S41 7SL
Tel: (01246) 209221
Fax: (01246) 209229
www.aecom.com

AECOM
AECOM Infrastructure & Environment UK Limited
Registered in England Registered number: 880328
Registered office: Scott House, Alencon Link, Basingstoke, Hampshire RG21 7PP

Drawing Number	Originator	Volume	Rev
Highways England PIN: HE551486	-ACM	-EGN -	P03
Location: A46_SW_ZZ		-DR -EG -00001	
		Type / Role / Number	

Plot Date: 22 March 2018 14:46:01
File Name: K:\GIS Management\A46_Ecology_Work\GIS\GIS_Working\02_Maps\Ecology\Final\FIGURE 2-1 - ENVIRONMENTAL CONSTRAINTS P03.mxd

Figure 2.2 Binley Junction General Arrangement

GATED ACCESS TO CLAYBROOKES MARSH NATURE RESERVE

OAK TREE ROAD - LEOFRIC BUSINESS PARK

BP

FRAIKIN LIMITED

PROGRESS CLOSE - LEOFRIC BUSINESS PARK

MILLBROOK HEALTHCARE

BRANDON COURT

TANGI-FLOW - LEOFRIC BUSINESS PARK

A46 NORTHBOUND

A46 SOUTHBOUND

EXTENT OF WORKS

ACCESS TO SERVICES

PILES COPPICE (PROTECTED WOODLAND)

BALANCING POND

SEE DRAWING HE551486-ACM-HGN-A46_SW_000_Z-DR-CH-0102

H.1 H.3 H.4

1175 1180 1185 1190 1195 1200 1205 1210 1215 1220

LOCATION PLAN
SCALE 1:1000

KEY PLAN
SCALE 1:5000

KEY

- PROPOSED CARRIAGEWAY
- PROPOSED VERGE (VEGETATION)
- PROPOSED EARTHWORKS (FILL)
- PROPOSED EARTHWORKS (CUT)
- PROPOSED HARD VERGE
- PROPOSED SHARED FOOTWAY / CYCLEWAY
- ANCIENT WOODLAND
- PROPOSED REINFORCED EARTH RETAINING WALLS
- OVERHEAD HV POWERLINES
- PROPOSED LAYBY / HARDSTANDING
- CHAINAGE LINE
- RED LINE BOUNDARY
- NOISE BARRIER

© Crown copyright and database rights 2017 Ordnance Survey 100030649 (2018)

Plot Date: 27 March 2018 16:05:03
File Name: C:\Projects\60547444\ACAD\DS02_UK-CLTHENRY-HJVYNH@AECOM.COM\DMS\01600\HE551486-ACM-HGN-A46_SW_000_Z-DR-CH-0101

SAFETY, HEALTH AND ENVIRONMENTAL INFORMATION BOX

IT IS ASSUMED THAT ALL WORKS ON THIS DRAWING WILL BE CARRIED OUT BY A COMPETENT CONTRACTOR WORKING, WHERE APPROPRIATE, TO AN APPROPRIATE METHOD STATEMENT.

THIS DRAWING IS TO BE USED ONLY FOR THE PURPOSE OF ISSUE THAT IT WAS ISSUED FOR AND IS SUBJECT TO AMENDMENT.

EXCEPTIONAL RISKS RELATING TO THE WORKS ASSOCIATED WITH THIS DRAWING ARE IDENTIFIED BELOW.

HAZARD WARNINGS (SEE BELOW)

CONSTRUCTION

- H.1 EXCAVATION IN THIS AREA MAY EXPOSE HAZARDOUS MATERIAL (DHAR REF. GEN_VER_1).
- H.2 EXCAVATION ADJACENT TO LIVE TRAFFIC LANE (DHAR REF. GEN_CAR_1).
- H.3 EXISTING STATUTORY UNDERTAKERS - BURIED (DHAR REF. GEN_CAR_2).
- H.4 EXISTING STATUTORY UNDERTAKERS - OVERHEAD (DHAR REF. GEN_CAR_2).
- H.5 CONSTRUCTION ADJACENT TO ACCESS ROAD (DHAR REF. ND_SLR_2).
- H.6 WORKING CLOSE TO FLOOD PLAIN AREA (DHAR REF. MR_GEN_4).
- H.7 WORKING AT HEIGHTS (DHAR REF. MR_GEN_2).
- H.8 LIFTING OPERATIONS (DHAR REF. MR_GEN_2).
- H.9 LIMITED SPACE FOR STORAGE (DHAR REF. MR_GEN_2).

NOTES

1. THIS DRAWING IS TO BE READ IN CONJUNCTION WITH ALL OTHER RELEVANT DOCUMENTATION.
2. DO NOT SCALE FROM THIS DRAWING, USE ONLY PRINTED DIMENSIONS.
3. ALL DIMENSIONS, CHAINAGES, LEVELS AND COORDINATES ARE IN METRES UNLESS DEFINED OTHERWISE.
4. THIS DRAWING SHOWS INDICATIVE APPARATUS LOCATIONS ONLY. THE ACCURACY AND COMPLETENESS OF THE INFORMATION SHOWN ON THIS DRAWING CAN NOT BE GUARANTEED.THE PRINCIPAL CONTRACTOR SHALL CARRY OUT INVESTIGATIONS AS APPROPRIATE BY LOCATING THE PRECISE ROUTES OF KNOWN SERVICES PRIOR TO ANY GROUND WORKS.
5. THIS DRAWING SHOULD BE READ IN CONJUNCTION WITH THE PRE-CONSTRUCTION INFORMATION DOCUMENT REF. HE551486-ACM-GHS-A46_SW_000_Z-RP-ZS-0005 AND DHAR ENTRIES APPENDED THEREIN.

First Issue	RD / JW	02/03/18	P01	
First Issue	LB / JW	27/03/18	P02	
Revision Details	By / Check	Date	Suffix	

Purpose of issue

SUITABLE FOR STAGE APPROVAL

Client
Highways England
The Cube
199 Wharfside Street
Birmingham
B1 1RN

Working on behalf of highways england

Project Title

A46 COVENTRY JUNCTIONS UPGRADE

Drawing Title

BINLEY JUNCTION GENERAL ARRANGEMENT SHEET 1 OF 3

Designed	Drawn	Checked	Approved	Date
AP	LB	HH	JW	27/03/18

Internal Project No. 60547444	Suitability S4
Scale @ A1 1:1000	Zone General

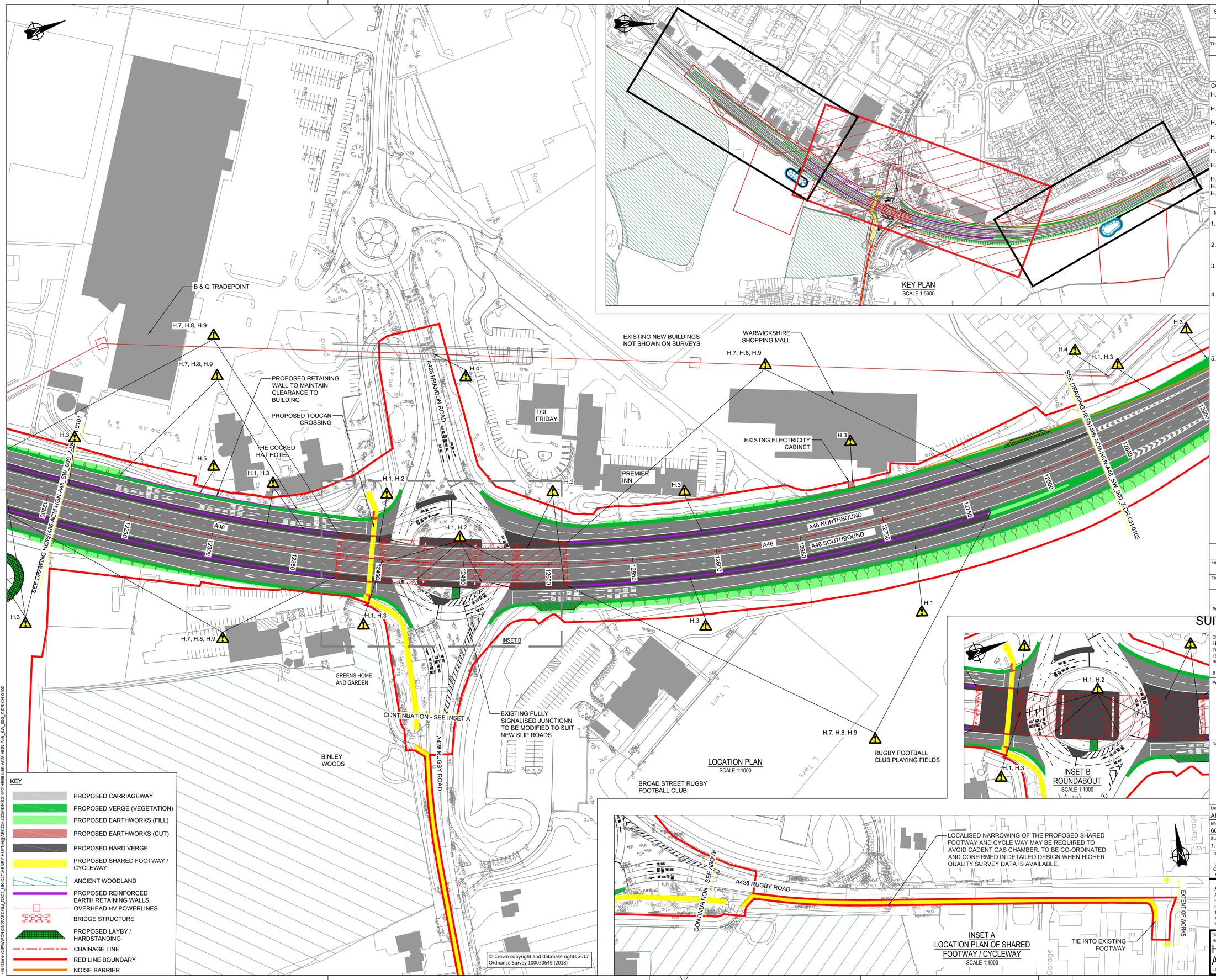
THIS DOCUMENT HAS BEEN PREPARED PURSUANT TO AND SUBJECT TO THE TERMS OF AECOM'S APPOINTMENT BY ITS CLIENT. AECOM ACCEPTS NO LIABILITY FOR ANY USE OF THIS DOCUMENT OTHER THAN BY ITS ORIGINAL CLIENT OR FOLLOWING AECOM'S EXPRESS AGREEMENT TO SUCH USE, AND ONLY FOR THE PURPOSES FOR WHICH IT WAS PREPARED AND PROVIDED.

AECOM
AECOM House
Horne Lane
Bedford, MK40 1TS
Tel:+44 (0)1234 349 641
Fax:
www.aecom.com

AECOM Infrastructure & Environment UK Limited
Registered in England Registered number: 880328
Registered office: Midpoint, Alencon Link, Basingstoke, Hampshire RG21 7PP

Drawing Number
Highways England PIN | Originator | Volume | Location | Type | Role | Number
HE551486 -ACM -HGN - A46_SW_000_Z -DR -CH-0101

Rev P02



© Crown copyright and database rights 2017 Ordnance Survey 100030649 (2018)

SAFETY, HEALTH AND ENVIRONMENTAL INFORMATION BOX

IT IS ASSUMED THAT ALL WORKS ON THIS DRAWING WILL BE CARRIED OUT BY A COMPETENT CONTRACTOR WORKING, WHERE APPROPRIATE, TO AN APPROPRIATE METHOD STATEMENT.

THIS DRAWING IS TO BE USED ONLY FOR THE PURPOSE OF ISSUE THAT IT WAS ISSUED FOR AND IS SUBJECT TO AMENDMENT.

EXCEPTIONAL RISKS RELATING TO THE WORKS ASSOCIATED WITH THIS DRAWING ARE IDENTIFIED BELOW.

HAZARD WARNINGS (SEE BELOW)

CONSTRUCTION

H.1 EXCAVATION IN THIS AREA MAY EXPOSE HAZARDOUS MATERIAL (DHAR REF. GEN_VER_1).
H.2 EXCAVATION ADJACENT TO LIVE TRAFFIC LANE (DHAR REF. GEN_CAR_1).
H.3 EXISTING STATUTORY UNDERTAKERS - BURIED (DHAR REF. GEN_CAR_2).
H.4 EXISTING STATUTORY UNDERTAKERS - OVERHEAD (DHAR REF. GEN_CAR_2).
H.5 CONSTRUCTION ADJACENT TO ACCESS ROAD (DHAR REF. ND_SLR_2).
H.6 WORKING CLOSE TO FLOOD PLAIN AREA (DHAR REF. MR_GEN_4).
H.7 WORKING AT HEIGHTS (DHAR REF. MR_GEN_2).
H.8 LIFTING OPERATIONS (DHAR REF. MR_GEN_2).
H.9 LIMITED SPACE FOR STORAGE (DHAR REF. MR_GEN_2).

NOTES

1. THIS DRAWING IS TO BE READ IN CONJUNCTION WITH ALL OTHER RELEVANT DOCUMENTATION.
2. DO NOT SCALE FROM THIS DRAWING, USE ONLY PRINTED DIMENSIONS.
3. ALL DIMENSIONS, CHAINAGES, LEVELS AND COORDINATES ARE IN METRES UNLESS DEFINED OTHERWISE.
4. THIS DRAWING SHOWS INDICATIVE APPARATUS LOCATIONS ONLY. THE ACCURACY AND COMPLETENESS OF THE INFORMATION SHOWN ON THIS DRAWING CAN NOT BE GUARANTEED.THE PRINCIPAL CONTRACTOR SHALL CARRY OUT INVESTIGATIONS AS APPROPRIATE BY LOCATING THE PRECISE ROUTES OF KNOWN SERVICES PRIOR TO ANY GROUND WORKS.
5. THIS DRAWING SHOULD BE READ IN CONJUNCTION WITH THE PRE-CONSTRUCTION INFORMATION DOCUMENT REF. HE551486-ACM-GHS-A46_SW_000_Z-RP-ZS-0005 AND DHAR ENTRIES APPENDED THEREIN.

First Issue	RD / JW		27/02/18	P01
First Issue	LB / JW		27/03/18	P02
Revision Details	By / Check		Date	Suffix

Purpose of issue

SUITABLE FOR STAGE APPROVAL

Client
Highways England
The Cube
199 Wharfside Street
Birmingham
B1 1RN

Working on behalf of highways england

Project Title

A46 COVENTRY JUNCTIONS UPGRADE

Drawing Title

BINLEY JUNCTION GENERAL ARRANGMENT SHEET 2 OF 3

Designed	Drawn	Checked	Approved	Date
AP	LB	HH	JW	27/03/18

Internal Project No. 60547444	Suitability S4
Scale @ A1 1:1000	Zone General

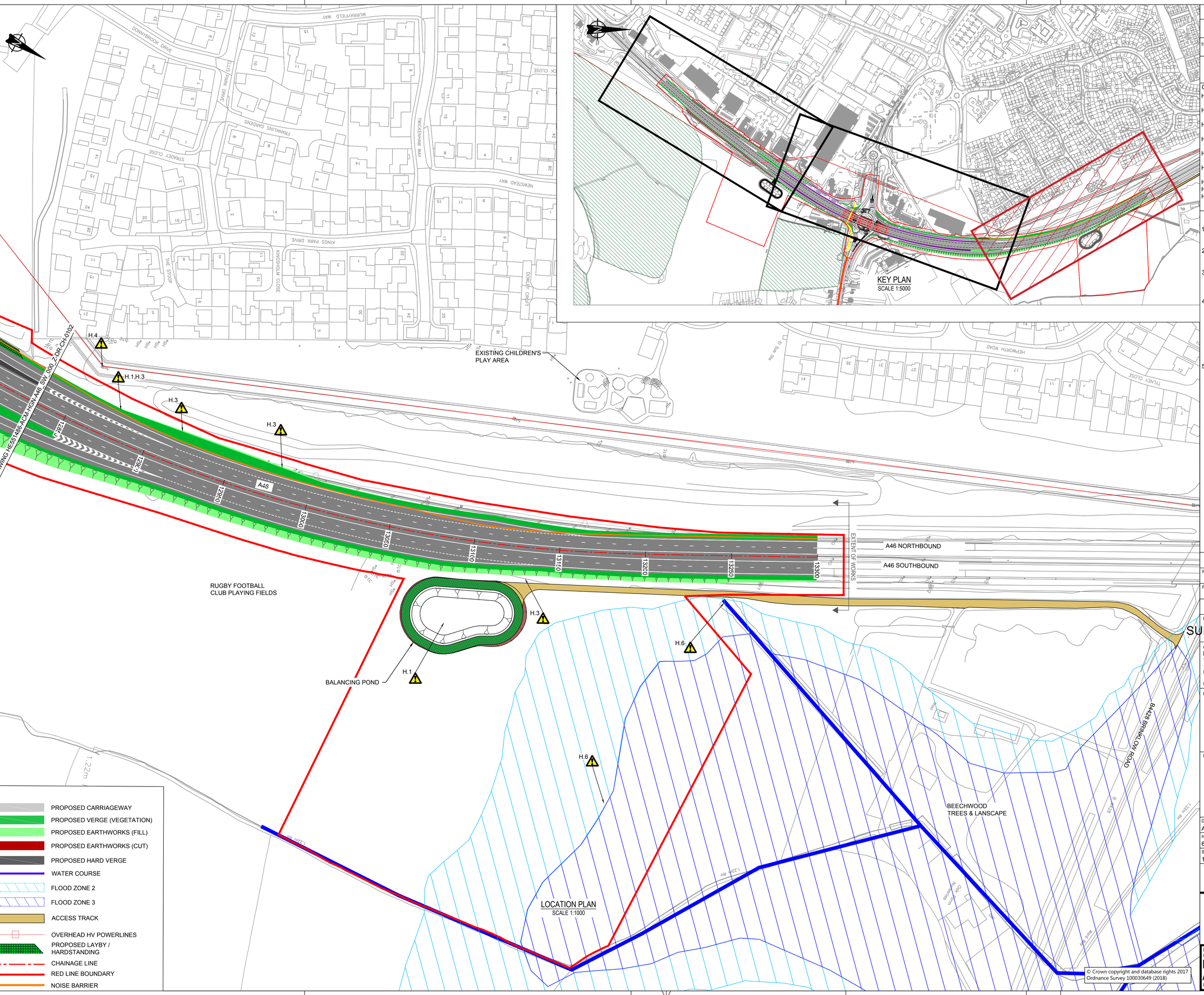
THIS DOCUMENT HAS BEEN PREPARED PURSUANT TO AND SUBJECT TO THE TERMS OF AECOM'S APPOINTMENT BY ITS CLIENT. AECOM ACCEPTS NO LIABILITY FOR ANY USE OF THIS DOCUMENT OTHER THAN BY ITS ORIGINAL CLIENT OR FOLLOWING AECOM'S EXPRESS AGREEMENT TO SUCH USE, AND ONLY FOR THE PURPOSES FOR WHICH IT WAS PREPARED AND PROVIDED.

AECOM
AECOM House
Horne Lane
Bedford, MK40 1TS
Tel:+44 (0)1234 349 641
Fax:
www.aecom.com

AECOM Infrastructure & Environment UK Limited
Registered in England Registered number: 880328
Registered office: Midpoint, Alencon Link, Basingstoke, Hampshire RG21 7PP

Drawing Number
Highways England PIN | Originator | Volume | Location | Type | Role | Number | Rev
HE551486 | -ACM | -HGN- | A46_SW_000_Z | -DR- | CH-0102 | P02

Plot Date: 27 March 2018 16:06:06
File Name: C:\Work\Work\Work\AECOM_DSQ_UK-GLT\HENRY.HUYNH@AECOM.COM\DMS\616809\HE551486-ACM-HGN-A46_SW_000_Z-DR-CH-0102



KEY PLAN
SCALE 1:5000

LOCATION PLAN
SCALE 1:1000

© Crown copyright and database rights 2017
Ordnance Survey 100030649 (2018)

SAFETY, HEALTH AND ENVIRONMENTAL INFORMATION BOX

IT IS ASSUMED THAT ALL WORKS ON THIS DRAWING WILL BE CARRIED OUT BY A COMPETENT CONTRACTOR WORKING, WHERE APPROPRIATE, TO AN APPROPRIATE METHOD STATEMENT.

THIS DRAWING IS TO BE USED ONLY FOR THE PURPOSE OF ISSUE THAT IT WAS ISSUED FOR AND IS SUBJECT TO AMENDMENT.

EXCEPTIONAL RISKS RELATING TO THE WORKS ASSOCIATED WITH THIS DRAWING ARE IDENTIFIED BELOW.

⚠ HAZARD WARNINGS (SEE BELOW)

CONSTRUCTION

- H.1 EXCAVATION IN THIS AREA MAY EXPOSE HAZARDOUS MATERIAL (DHAR REF. GEN_VER_1).
- H.2 EXCAVATION ADJACENT TO LIVE TRAFFIC LANE (DHAR REF. GEN_CAR_1).
- H.3 EXISTING STATUTORY UNDERTAKERS - BURIED (DHAR REF. GEN_CAR_2).
- H.4 EXISTING STATUTORY UNDERTAKERS - OVERHEAD (DHAR REF. GEN_CAR_2).
- H.5 CONSTRUCTION ADJACENT TO ACCESS ROAD (DHAR REF. ND_SLR_2).
- H.6 WORKING CLOSE TO FLOOD PLAIN AREA (DHAR REF. MR_GEN_4).
- H.7 WORKING AT HEIGHTS (DHAR REF. MR_GEN_2).
- H.8 LIFTING OPERATIONS (DHAR REF. MR_GEN_2).
- H.9 LIMITED SPACE FOR STORAGE (DHAR REF. MR_GEN_2).

NOTES

1. THIS DRAWING IS TO BE READ IN CONJUNCTION WITH ALL OTHER RELEVANT DOCUMENTATION.
2. DO NOT SCALE FROM THIS DRAWING, USE ONLY PRINTED DIMENSIONS.
3. ALL DIMENSIONS, CHAINAGES, LEVELS AND COORDINATES ARE IN METRES UNLESS DEFINED OTHERWISE.
4. THIS DRAWING SHOWS INDICATIVE APPARATUS LOCATIONS ONLY. THE ACCURACY AND COMPLETENESS OF THE INFORMATION SHOWN ON THIS DRAWING CAN NOT BE GUARANTEED.THE PRINCIPAL CONTRACTOR SHALL CARRY OUT INVESTIGATIONS AS APPROPRIATE BY LOCATING THE PRECISE ROUTES OF KNOWN SERVICES PRIOR TO ANY GROUND WORKS.
5. THIS DRAWING SHOULD BE READ IN CONJUNCTION WITH THE PRE-CONSTRUCTION INFORMATION DOCUMENT REF. HE551486-ACM-GHS-A46_SW_000 _Z-RP-ZS-0005 AND DHAR ENTRIES APPENDED THEREIN.

First Issue	RD / JW	02/03/18	P01	
First Issue	LB / JW	27/03/18	P02	
Revision Details	By / Check	Date	Suffix	

Purpose of issue

SUITABLE FOR STAGE APPROVAL

Client
Highways England
The Cube
199 Wharfside Street
Birmingham
B1 1RN

Working on behalf of highways england

Project Title

A46 COVENTRY JUNCTIONS UPGRADE

Drawing Title

BINLEY JUNCTION GENERAL ARRANGEMENT SHEET 3 OF 3

Designed	Drawn	Checked	Approved	Date
AP	LB	HH	JW	27/03/18

Internal Project No. 60547444	Suitability S4
Scale @ A1 1:1000	Zone General

THIS DOCUMENT HAS BEEN PREPARED PURSUANT TO AND SUBJECT TO THE TERMS OF AECOM'S APPOINTMENT BY ITS CLIENT. AECOM ACCEPTS NO LIABILITY FOR ANY USE OF THIS DOCUMENT OTHER THAN BY ITS ORIGINAL CLIENT OR FOLLOWING AECOM'S EXPRESS AGREEMENT TO SUCH USE, AND ONLY FOR THE PURPOSES FOR WHICH IT WAS PREPARED AND PROVIDED.

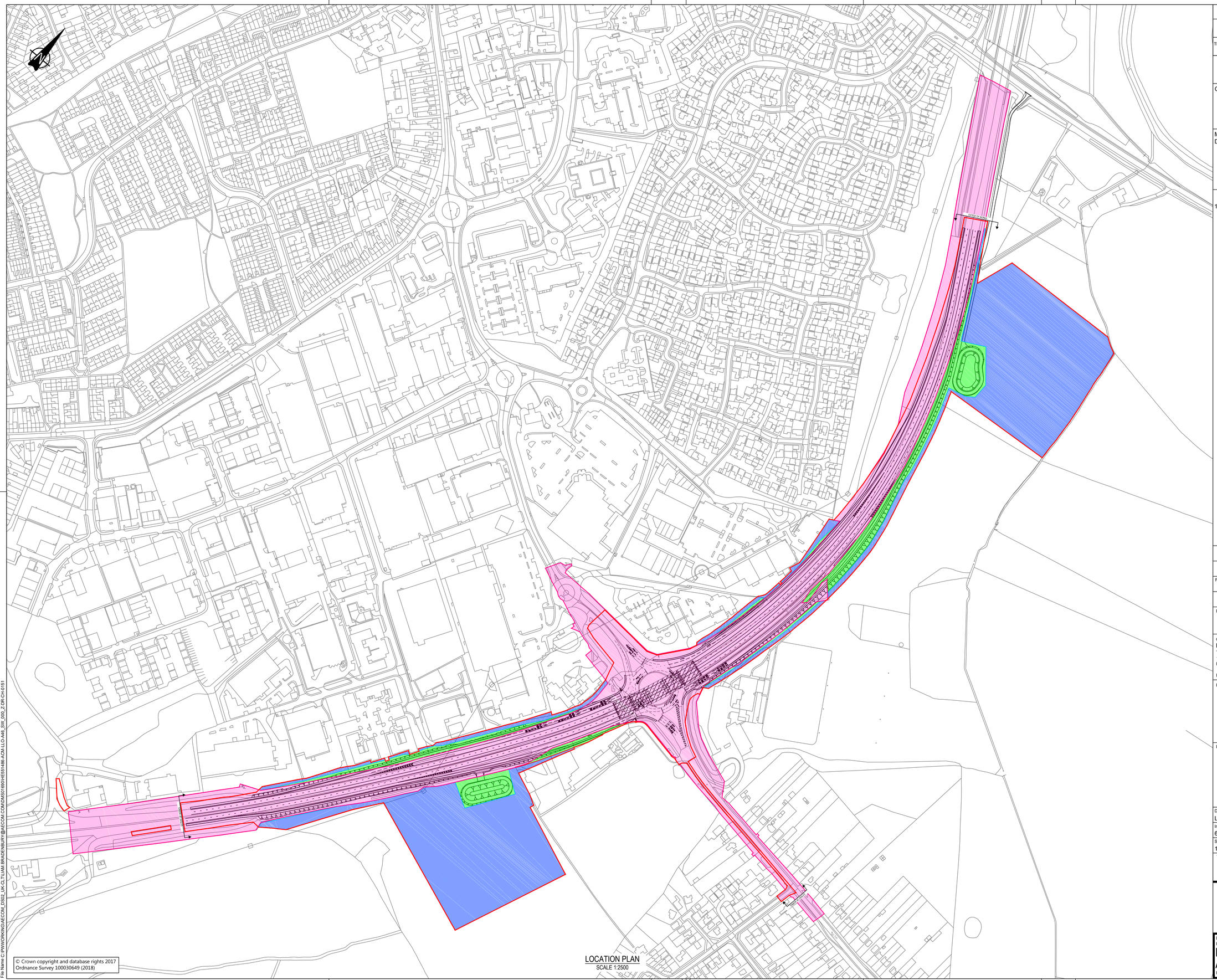
AECOM
AECOM House
Horne Lane
Bedford, MK40 1TS
Tel:+44 (0)1234 349 641
Fax:
www.aecom.com

AECOM Infrastructure & Environment UK Limited
Registered in England Registered number: 880328
Registered office: Midpoint, Alencon Link, Basingstoke, Hampshire RG21 7PP

Drawing Number				Rev
Highways England PIN	Originator	Volume		
HE551486	-ACM	-HGN-		P02
A46_SW_000_Z	-DR	-CH	-0103	
Location	Type	Role	Number	

Plot Date: 27 March 2018 15:07:24
File Name: C:\Work\Projects\AECOM_DSG2_UK-CLT\HENRY.HUYNH@AECOM.COM\DMS\0160\HE551486-ACM-HGN-A46_SW_000_Z-DR-CH-0103

Figure 2.3 Binley Junction Scheme Land Take Boundary



LOCATION PLAN
SCALE 1:2500

© Crown copyright and database rights 2017
Ordnance Survey 100030649 (2018)

Plot Date: 23 March 2018 15:14:49
File Name: C:\Projects\60547444\CAD_DSD2_UK-CLTLIAM.BRADENBURY@AECOM.COM\DMS\0160\HE551486-ACM-LLO-A46_SW_000_Z_DR-CH-0151

SAFETY, HEALTH AND ENVIRONMENTAL INFORMATION BOX

IT IS ASSUMED THAT ALL WORKS ON THIS DRAWING WILL BE CARRIED OUT BY A COMPETENT CONTRACTOR WORKING, WHERE APPROPRIATE, TO AN APPROPRIATE METHOD STATEMENT.

THIS DRAWING IS TO BE USED ONLY FOR THE PURPOSE OF ISSUE THAT IT WAS ISSUED FOR AND IS SUBJECT TO AMENDMENT.

EXCEPTIONAL RISKS RELATING TO THE WORKS ASSOCIATED WITH THIS DRAWING ARE IDENTIFIED BELOW.

CONSTRUCTION

MAINTENANCE / OPERATION / DECOMMISSIONING / DEMOLITION

NOTES

1. APPROXIMATE CONSTRUCTION AREA IS ESTIMATED USING AN 8m OFFSET FROM THE EARTHWORKS. THE OFFSET HAS BEEN REDUCED LOCALLY TO AVOID OBSTRUCTIONS E.G. BUILDINGS.

KEY

- RED LINE BOUNDARY
- LAND TO BE ACQUIRED TEMPORARY (8.16 Ha)
- LAND TO BE ACQUIRED PERMANENTLY (1.9 Ha)
- LAND OWNED BY SECRETARY OF STATE

First Issue	LB		23/03/18	P01.1
Revision Details	By / Check		Date	Suffix

Purpose of issue

INITIAL STATUS OR WIP

Client
Highways England
The Cube
199 Wharfside Street
Birmingham

B1 1RN

Working on behalf of highways england

Project Title

A46 COVENTRY JUNCTIONS UPGRADE

Drawing Title

BINLEY JUNCTION SCHEME LAND TAKE BOUNDARY

Designed	Drawn	Checked	Approved	Date
LB	LB	---	---	---

Internal Project No. 60547444	Suitability S0
Scale @ A1 1:2500	Zone Land Ownership Boundaries

THIS DOCUMENT HAS BEEN PREPARED PURSUANT TO AND SUBJECT TO THE TERMS OF AECOM'S APPOINTMENT BY ITS CLIENT. AECOM ACCEPTS NO LIABILITY FOR ANY USE OF THIS DOCUMENT OTHER THAN BY ITS ORIGINAL CLIENT OR FOLLOWING AECOM'S EXPRESS AGREEMENT TO SUCH USE, AND ONLY FOR THE PURPOSES FOR WHICH IT WAS PREPARED AND PROVIDED.

AECOM
AECOM House
Horne Lane
Bedford, MK40 1TS
Tel:+44 (0)1234 349 641
Fax:
www.aecom.com

AECOM Infrastructure & Environment UK Limited
Registered in England Registered number: 880328
Registered office: Midpoint, Alencon Link, Basingstoke, Hampshire RG21 7PP

Drawing Number
Highways England PIN | Originator | Volume | Rev
HE551486 -ACM -LLO - P01.1
A46_SW_000_Z -DR -CH-0151
Location | Type | Role | Number

Figure 2.4 Binley Junction Proposed Drainage

PROPOSED CHAMBER TO TIE INTO EXISTING DRAINAGE

PROPOSED CHAMBER TO TIE INTO EXISTING DRAINAGE

PROPOSED CHAMBER TO TIE INTO EXISTING DRAINAGE

PROPOSED DRAINAGE PIPE TO TIE INTO EXISTING CHAMBER

EXTENT OF WORKS

SEE ABOVE

SEE BELOW

SEE DRAWING HE551486-ACM-HDG-A46_SW_000_Z-DR-CD-0512

OUTFALL B

POND A
IL=82.700

POA10
HEADWALL 1

POA11
HEADWALL 2

OUTFALL B
PROPOSED POND DRAINAGE PIPE TO TIE INTO EXISTING CHAMBER

0 12.5 25 m
1:500

NOTES

1. THIS DRAWING IS TO BE READ IN CONJUNCTION WITH ALL OTHER RELEVANT DOCUMENTATION.
2. DO NOT SCALE FROM THIS DRAWING, USE ONLY PRINTED DIMENSIONS.
3. ALL DIMENSIONS, CHAINAGES, LEVELS AND COORDINATES ARE IN METRES UNLESS DEFINED OTHERWISE.
4. THIS DRAWING IS TO BE READ IN CONJUNCTION WITH THE PROJECT HEALTH & SAFETY FILE FOR ANY IDENTIFIED POTENTIAL RISKS.
5. FOR PIPE, CHAMBER AND COLLECTION SYSTEM DETAILS SEE PROJECT DRAINAGE STRATEGY REPORT REF:HE551486-ACM-HDG-A46_SW_000_Z-RP-CD-0001.
6. THE EXISTING DRAINAGE NETWORK IS BASED ON SURVEY UNDERTAKEN BY CARNELL ON BEHALF OF KIER AND HIGHWAYS ENGLAND IN JULY 2017.
7. THIS DRAWING SHOULD BE READ IN CONJUNCTION WITH THE PRE-CONSTRUCTION INFORMATION DOCUMENT REF. HE551486-ACM-GHS-A46_SW_000 _Z-RP-ZS-0005 AND DHAR ENTRIES APPENDED THERIN.

SAFETY, HEALTH AND ENVIRONMENTAL INFORMATION BOX

IT IS ASSUMED THAT ALL WORKS ON THIS DRAWING WILL BE CARRIED OUT BY A COMPETENT CONTRACTOR WORKING, WHERE APPROPRIATE, TO AN APPROPRIATE METHOD STATEMENT.

THIS DRAWING IS TO BE USED ONLY FOR THE PURPOSE OF ISSUE THAT IT WAS ISSUED FOR AND IS SUBJECT TO AMENDMENT.

EXCEPTIONAL RISKS RELATING TO THE WORKS ASSOCIATED WITH THIS DRAWING ARE IDENTIFIED BELOW.

HAZARD WARNINGS (SEE BELOW)

CONSTRUCTION

- H.1 EXCAVATION IN THIS AREA MAY EXPOSE HAZARDOUS MATERIAL (DHAR REF. GEN_VER_1).
- H.2 EXCAVATION ADJACENT TO LIVE TRAFFIC LANE (DHAR REF. GEN_CAR_1).
- H.3 EXISTING STATUTORY UNDERTAKERS - BURIED (DHAR REF. GEN_CAR_2).
- H.4 EXISTING STATUTORY UNDERTAKERS - OVERHEAD (DHAR REF. GEN_CAR_2).
- H.5 CONSTRUCTION ADJACENT TO ACCESS ROAD (DHAR REF. ND_SLR_2).
- H.6 WORKING CLOSE TO FLOOD PLAIN AREA (DHAR REF. MR_GEN_4).

KEY

- PROPOSED CHANNEL DRAIN (CD XXX1.000)
- PROPOSED CARRIER PIPE (XXX1.000)
- PROPOSED FIN DRAIN (FD FD)
- PROPOSED FILTER DRAIN (F XXX1.000)
- PROPOSED KERB DRAIN (K)
- PROPOSED BRIDGE DECK UNITS (BD BD)
- PROPOSED MANHOLE AND REFERENCE (XXX1)
- PROPOSED OUTLET UNIT FOR COMBINED KERB DRAIN (KDXXX1)
- PROPOSED RODDING UNIT FOR BRIDGE DECK UNITS (BDXXX1)
- PROPOSED OUTLET UNIT FOR CHANNEL DRAIN (XXX1)
- EXISTING CULVERT
- EXISTING MANHOLE
- EXISTING DRAINAGE NETWORK
- RED LINE BOUNDARY
- BRIDGE STRUCTURE

First Issue	AR / GP	17/01/18	P01
First Issue	JB / GP	15/02/18	P02
First Issue	JB / JW	21/03/18	P03
Revision Details	By / Check	Date	Suffix

Purpose of issue: SUITABLE FOR STAGE APPROVAL

Client
Highways England
The Cube
199 Wharfside Street
Birmingham
B1 1RN

Working on behalf of highways england

Project Title

A46 COVENTRY JUNCTIONS UPGRADE

Drawing Title

BINLEY JUNCTION PROPOSED DRAINAGE SHEET 1 OF 3

Designed	Drawn	Checked	Approved	Date
OO	JB	GP	JW	21/03/18

Internal Project No.	Suitability
60547444	S4
Scale @ A1	Zone
1:500	Drainage

THIS DOCUMENT HAS BEEN PREPARED PURSUANT TO AND SUBJECT TO THE TERMS OF AECOM'S APPOINTMENT BY ITS CLIENT. AECOM ACCEPTS NO LIABILITY FOR ANY USE OF THIS DOCUMENT OTHER THAN BY ITS ORIGINAL CLIENT OR FOLLOWING AECOM'S EXPRESS AGREEMENT TO SUCH USE, AND ONLY FOR THE PURPOSES FOR WHICH IT WAS PREPARED AND PROVIDED.

AECOM
AECOM House
Horne Lane
Bedford, MK40 1TS
Tel:+44 (0)1234 349 641
Fax:
www.aecom.com

AECOM Infrastructure & Environment UK Limited
Registered in England Registered number: 880328
Registered office: Midpoint, Alencon Link, Basingstoke, Hampshire RG21 7PP

Drawing Number					Rev
Highways England PIN	Originator	Volume			
HE551486	-ACM	-HDG -			P03
A46_SW_000_Z	-DR	-CD	-0511		
Location	Type	Role	Number		

© Crown copyright and database rights 2017 Ordnance Survey 100030649 (2018)

Plot Date: 21 March 2018 17:00:25
File Name: C:\PWORKING\ACECOM_DS02_UK-CLTLIAM.BRADENBURY@AECOM.COM\DMS\0019494\HE551486-ACM-HDG-A46_SW_000_Z-DR-CD-0511

SAFETY, HEALTH AND ENVIRONMENTAL INFORMATION BOX

IT IS ASSUMED THAT ALL WORKS ON THIS DRAWING WILL BE CARRIED OUT BY A COMPETENT CONTRACTOR WORKING, WHERE APPROPRIATE, TO AN APPROPRIATE METHOD STATEMENT.

THIS DRAWING IS TO BE USED ONLY FOR THE PURPOSE OF ISSUE THAT IT WAS ISSUED FOR AND IS SUBJECT TO AMENDMENT.

EXCEPTIONAL RISKS RELATING TO THE WORKS ASSOCIATED WITH THIS DRAWING ARE IDENTIFIED BELOW.

HAZARD WARNINGS (SEE BELOW)

CONSTRUCTION

H.1 EXCAVATION IN THIS AREA MAY EXPOSE HAZARDOUS MATERIAL (DHAR REF. GEN_VER_1).
H.2 EXCAVATION ADJACENT TO LIVE TRAFFIC LANE (DHAR REF. GEN_CAR_1).
H.3 EXISTING STATUTORY UNDERTAKERS - BURIED (DHAR REF. GEN_CAR_2).
H.4 EXISTING STATUTORY UNDERTAKERS - OVERHEAD (DHAR REF. GEN_CAR_2).
H.5 CONSTRUCTION ADJACENT TO ACCESS ROAD (DHAR REF. ND_SLR_2).
H.6 WORKING CLOSE TO FLOOD PLAIN AREA (DHAR REF. MR_GEN_4).

KEY

- PROPOSED CHANNEL DRAIN (CD — XXX1.000)
- PROPOSED CARRIER PIPE (XXX1.000)
- PROPOSED FIN DRAIN (FD — FD)
- PROPOSED FILTER DRAIN (F — XXX1.000)
- PROPOSED KERB DRAIN (K)
- PROPOSED BRIDGE DECK UNITS (BD — BD)
- PROPOSED MANHOLE AND REFERENCE (XXX1)
- PROPOSED OUTLET UNIT FOR COMBINED KERB DRAIN (KDXXX1)
- PROPOSED RODDING UNIT FOR BRIDGE DECK UNITS (BDXXX1)
- PROPOSED OUTLET UNIT FOR CHANNEL DRAIN (XXX1)
- EXISTING CULVERT
- EXISTING MANHOLE
- EXISTING DRAINAGE NETWORK
- RED LINE BOUNDARY
- BRIDGE STRUCTURE

Revision Details	By / Check	Date	Suffix
First Issue	AR / GP	17/01/18	P01
First Issue	JB / GP	15/02/18	P02
First Issue	JB / JW	21/03/18	P03

Purpose of issue

SUITABLE FOR STAGE APPROVAL

Client
Highways England
The Cube
199 Wharfside Street
Birmingham
B1 1RN

Working on behalf of highways england

Project Title

A46 COVENTRY JUNCTIONS UPGRADE

Drawing Title

BINLEY JUNCTION PROPOSED DRAINAGE SHEET 3 OF 3

Designed	Drawn	Checked	Approved	Date
OO	JB	GP	JW	21/03/18

Internal Project No. 60547444	Suitability S4
Scale @ A1 1:500	Zone Drainage

THIS DOCUMENT HAS BEEN PREPARED PURSUANT TO AND SUBJECT TO THE TERMS OF AECOM'S APPOINTMENT BY ITS CLIENT. AECOM ACCEPTS NO LIABILITY FOR ANY USE OF THIS DOCUMENT OTHER THAN BY ITS ORIGINAL CLIENT OR FOLLOWING AECOM'S EXPRESS AGREEMENT TO SUCH USE, AND ONLY FOR THE PURPOSES FOR WHICH IT WAS PREPARED AND PROVIDED.

AECOM
AECOM House
Home Lane
Bedford, MK40 1TS
Tel:+44 (0)1234 349 641
Fax:
www.aecom.com

AECOM Infrastructure & Environment UK Limited
Registered in England Registered number: 880328
Registered office: Midpoint, Alencon Link, Basingstoke, Hampshire RG21 7PP

Drawing Number	Originator	Volume	Rev
Highways England PIN: HE551486	-ACM	-HDG-	P03
A46_SW_000_Z	-DR	-CD-0513	
Location	Type	Role	Number

NOTES

1. THIS DRAWING IS TO BE READ IN CONJUNCTION WITH ALL OTHER RELEVANT DOCUMENTATION.
2. DO NOT SCALE FROM THIS DRAWING, USE ONLY PRINTED DIMENSIONS.
3. ALL DIMENSIONS, CHAINAGES, LEVELS AND COORDINATES ARE IN METRES UNLESS DEFINED OTHERWISE.
4. THIS DRAWING IS TO BE READ IN CONJUNCTION WITH THE PROJECT HEALTH & SAFETY FILE FOR ANY IDENTIFIED POTENTIAL RISKS.
5. FOR PIPE, CHAMBER AND COLLECTION SYSTEM DETAILS SEE PROJECT DRAINAGE STRATEGY REPORT REF:HE551486-ACM-HDG-A46_SW_000_Z-RP-CD-0001.
6. THE EXISTING DRAINAGE NETWORK IS BASED ON SURVEY UNDERTAKEN BY CARNELL ON BEHALF OF KIER AND HIGHWAYS ENGLAND IN JULY 2017.
5. THIS DRAWING SHOULD BE READ IN CONJUNCTION WITH THE PRE-CONSTRUCTION INFORMATION DOCUMENT REF. HE551486-ACM-GHS-A46_SW_000_Z-RP-ZS-0005 AND DHAR ENTRIES APPENDED THEREIN.

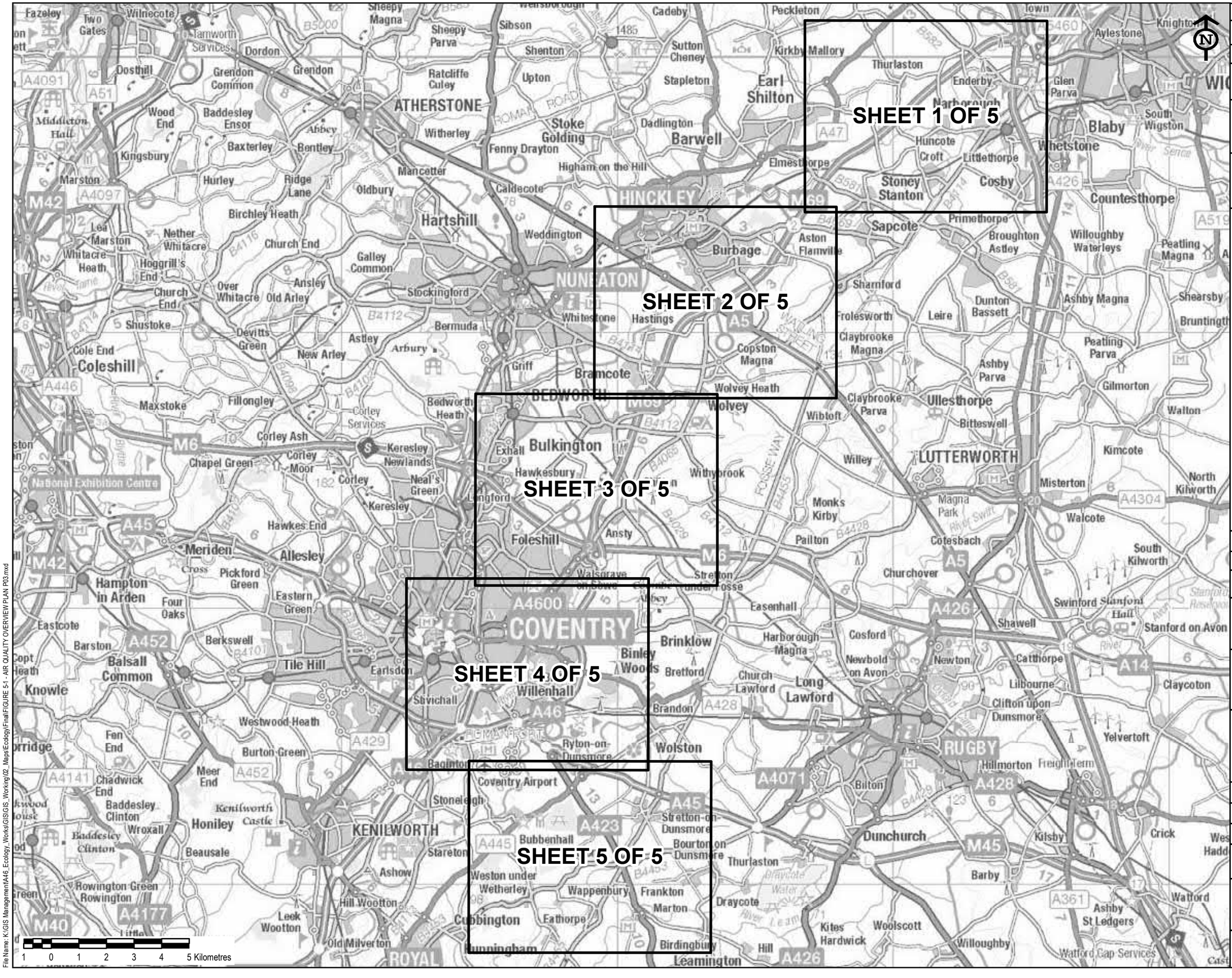
© Crown copyright and database rights 2017 Ordnance Survey 100030649 (2018)

0 12.5 25 m
1:500

INSET A
SCALE 1:500

Plot Date: 21 March 2018 17:01:20
File Name: C:\Work\60547444\ECDM_DSO2_UK-CI\TUAM.BRADENBURY@AECOM.COM\DM\5016641HE551486-ACM-HDG-A46_SW_000_Z-DR-CD-0513

Figure 5.1 Air Quality Overview Plan



SAFETY, HEALTH AND ENVIRONMENTAL INFORMATION BOX

IT IS ASSUMED THAT ALL WORKS ON THIS DRAWING WILL BE CARRIED OUT BY A COMPETENT CONTRACTOR WORKING, WHERE APPROPRIATE, TO AN APPROPRIATE METHOD STATEMENT.

THIS DRAWING IS TO BE USED ONLY FOR THE PURPOSE OF ISSUE THAT IT WAS ISSUED FOR AND IS SUBJECT TO AMENDMENT.

EXCEPTIONAL RISKS RELATING TO THE WORKS ASSOCIATED WITH THIS DRAWING ARE IDENTIFIED BELOW.

CONSTRUCTION

MAINTENANCE / OPERATION / DECOMMISSIONING / DEMOLITION

NOTES

1. THIS DRAWING IS TO BE READ IN CONJUNCTION WITH ALL OTHER RELEVANT DOCUMENTATION.
2. DO NOT SCALE FROM THIS DRAWING, USE ONLY PRINTED DIMENSIONS.
3. ALL DIMENSIONS IN MILLIMETRES, ALL CHAINAGES, LEVELS AND COORDINATES ARE IN METRES UNLESS DEFINED OTHERWISE.
4. THIS DRAWING IS TO BE READ IN CONJUNCTION WITH THE PROJECT HEALTH & SAFETY FILE FOR ANY IDENTIFIED POTENTIAL RISKS.
5. CONTAINS OS DATA © CROWN COPYRIGHT AND DATABASE RIGHT 2017

First Issue	DM / NT	22/03/18	P03
Revision Details	By / Check	Date	Suffix

Purpose of issue: FOR INFORMATION

Client: Highways England, Major Projects, The Cube, 199 Wharfside Street, Birmingham, B1 1RN

Working on behalf of: highways england

Project Title: A46 COVENTRY JUNCTION UPGRADE

Drawing Title: FIGURE 5-1 OVERVIEW MAP

Designed	Drawn	Checked	Approved	Date
DM	DM	AR	PB	22/03/2018

Internal Project No. 60547444	Suitability S0
Scale @ A3 1:125,000	Zone BINLEY JUNCTION

THIS DOCUMENT HAS BEEN PREPARED PURSUANT TO AND SUBJECT TO THE TERMS OF AECOM'S APPOINTMENT BY ITS CLIENT. AECOM ACCEPTS NO LIABILITY FOR ANY USE OF THIS DOCUMENT OTHER THAN BY ITS ORIGINAL CLIENT OR FOLLOWING AECOM'S EXPRESS AGREEMENT TO SUCH USE, AND ONLY FOR THE PURPOSES FOR WHICH IT WAS PREPARED AND PROVIDED.

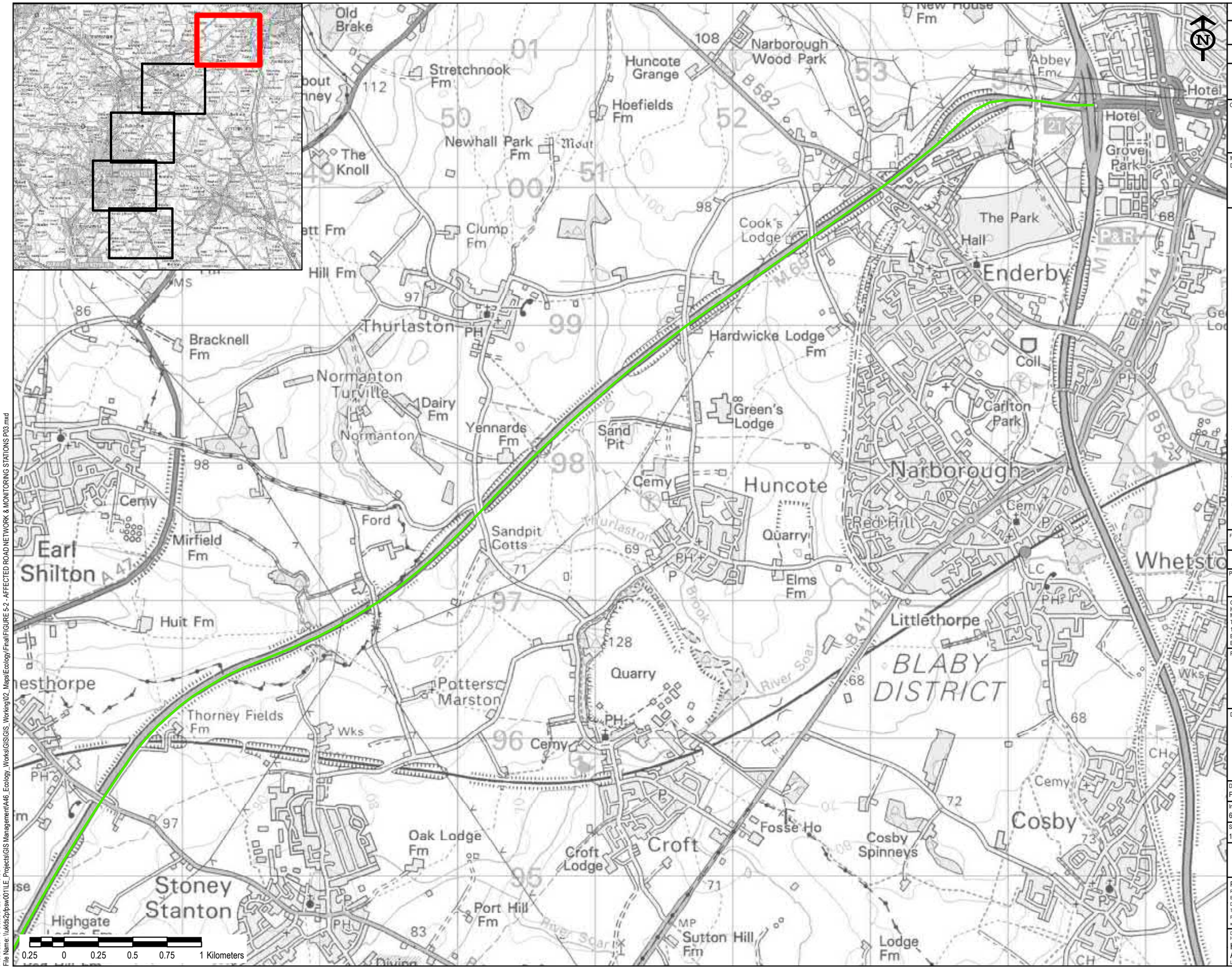
Project Office
Royal Court
Basil Close, Chesterfield
Derbyshire. S41 7SL
Tel: (01246) 209221
Fax: (01246) 209229
www.aecom.com

AECOM Infrastructure & Environment UK Limited
Registered in England Registered number: 898328
Registered office: Scott House, Alencon Link, Basingstoke, Hampshire RG21 7PP

Drawing Number: Highways England PIN HE551486 | Originator -ACM | Volume -EGN - | Location A46_SW_ZZ | Type -DR | Role -EG | Number -00001 | Rev P03

Plot Date: 22 March 2018 15:16:18
File Name: K:\GIS Management\A46_Ecology_Works\GIS\GIS_Working\02_Maps\Ecology\Final\FIGURE 5-1 - AIR QUALITY OVERVIEW PLAN P03.mxd

Figure 5.2 Affected Road Network and Monitoring Locations



Plot Date: 15 October 2019 11:48:50
File Name: \\ukhs2pfpsw001\LE_Projects\GIS Management\A46_Ecology_Works\GIS\GIS_Working\02_Maps\Ecology\Final\FIGURE 5-2 - AFFECTED ROAD NETWORK & MONITORING STATIONS P03.mxd

SAFETY, HEALTH AND ENVIRONMENTAL INFORMATION BOX

IT IS ASSUMED THAT ALL WORKS ON THIS DRAWING WILL BE CARRIED OUT BY A COMPETENT CONTRACTOR WORKING, WHERE APPROPRIATE, TO AN APPROPRIATE METHOD STATEMENT.

THIS DRAWING IS TO BE USED ONLY FOR THE PURPOSE OF ISSUE THAT IT WAS ISSUED FOR AND IS SUBJECT TO AMENDMENT.

EXCEPTIONAL RISKS RELATING TO THE WORKS ASSOCIATED WITH THIS DRAWING ARE IDENTIFIED BELOW.

CONSTRUCTION

MAINTENANCE / OPERATION / DECOMMISSIONING / DEMOLITION

KEY:

- Site Boundary (Highways Boundary)
- Affected Road Network
- Monitoring Location
- Site of Special Scientific Interest

NOTES

1. THIS DRAWING IS TO BE READ IN CONJUNCTION WITH ALL OTHER RELEVANT DOCUMENTATION.
2. DO NOT SCALE FROM THIS DRAWING, USE ONLY PRINTED DIMENSIONS.
3. ALL DIMENSIONS IN MILLIMETRES, ALL CHAINAGES, LEVELS AND COORDINATES ARE IN METRES UNLESS DEFINED OTHERWISE.
4. THIS DRAWING IS TO BE READ IN CONJUNCTION WITH THE PROJECT HEALTH & SAFETY FILE FOR ANY IDENTIFIED POTENTIAL RISKS.
5. CONTAINS OS DATA © CROWN COPYRIGHT AND DATABASE RIGHT 2017

First Issue	DM / NT	22/03/18	P03	
Revision Details	By / Check	Date	Suffix	

Purpose of issue: FOR INFORMATION

Client
Highways England
Major Projects
The Cube
199 Wharfside Street
Birmingham
B1 1RN

Working on behalf of highways england

Project Title
A46 COVENTRY JUNCTION UPGRADE

Drawing Title
FIGURE 5-2
AFFECTED ROAD NETWORK & MONITORING STATIONS
SHEET 1 OF 5

Designed	Drawn	Checked	Approved	Date
PB	DM	AR	NT	15/10/2019

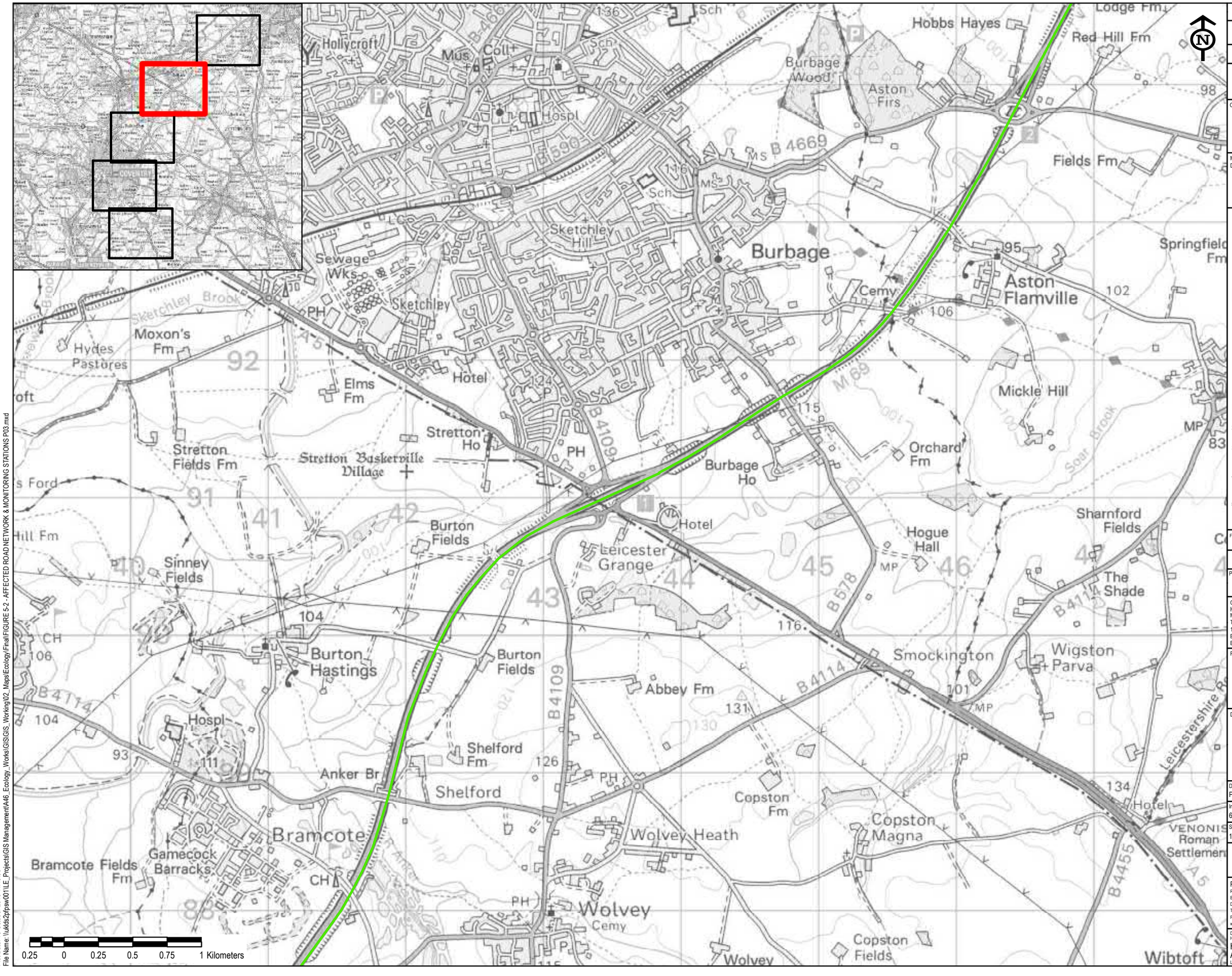
Internal Project No. 60547444	Suitability S0
Scale @ A3 1:25,000	Zone BINLEY JUNCTION

THIS DOCUMENT HAS BEEN PREPARED PURSUANT TO AND SUBJECT TO THE TERMS OF AECOM'S APPOINTMENT BY ITS CLIENT. AECOM ACCEPTS NO LIABILITY FOR ANY USE OF THIS DOCUMENT OTHER THAN BY ITS ORIGINAL CLIENT OR FOLLOWING AECOM'S EXPRESS AGREEMENT TO SUCH USE, AND ONLY FOR THE PURPOSES FOR WHICH IT WAS PREPARED AND PROVIDED.

Project Office
Royal Court
Basil Close, Chesterfield
Derbyshire. S41 7SL
Tel: (01246) 209221
Fax: (01246) 209229
www.aecom.com

AECOM Infrastructure & Environment UK Limited
Registered in England Registered number: 880328
Registered office: Scott House, Alencon Link, Basingstoke, Hampshire RG21 7PP

Drawing Number	Originator	Volume			Rev
Highways England PIN: HE551486	-ACM	-EGN	-		P03
Location: A46_SW_ZZ		-DR	-EG	-00001	
		Type	Role	Number	



Plot Date: 15 October 2019 11:48:50
File Name: \\ukkds2pfpsw001\LE_Projects\GIS Management\A46_Ecology_Works\GIS\GIS_Working\02_Maps\Ecology\Final\FIGURE 5-2 - AFFECTED ROAD NETWORK & MONITORING STATIONS P03.mxd

SAFETY, HEALTH AND ENVIRONMENTAL INFORMATION BOX

IT IS ASSUMED THAT ALL WORKS ON THIS DRAWING WILL BE CARRIED OUT BY A COMPETENT CONTRACTOR WORKING, WHERE APPROPRIATE, TO AN APPROPRIATE METHOD STATEMENT.

THIS DRAWING IS TO BE USED ONLY FOR THE PURPOSE OF ISSUE THAT IT WAS ISSUED FOR AND IS SUBJECT TO AMENDMENT.

EXCEPTIONAL RISKS RELATING TO THE WORKS ASSOCIATED WITH THIS DRAWING ARE IDENTIFIED BELOW.

CONSTRUCTION

MAINTENANCE / OPERATION / DECOMMISSIONING / DEMOLITION

KEY:

- Site Boundary (Highways Boundary)
- Affected Road Network
- Monitoring Location
- Site of Special Scientific Interest

NOTES

1. THIS DRAWING IS TO BE READ IN CONJUNCTION WITH ALL OTHER RELEVANT DOCUMENTATION.
2. DO NOT SCALE FROM THIS DRAWING, USE ONLY PRINTED DIMENSIONS.
3. ALL DIMENSIONS IN MILLIMETRES, ALL CHAINAGES, LEVELS AND COORDINATES ARE IN METRES UNLESS DEFINED OTHERWISE.
4. THIS DRAWING IS TO BE READ IN CONJUNCTION WITH THE PROJECT HEALTH & SAFETY FILE FOR ANY IDENTIFIED POTENTIAL RISKS.
5. CONTAINS OS DATA © CROWN COPYRIGHT AND DATABASE RIGHT 2017

First Issue	DM / NT	22/03/18	P03	
Revision Details	By / Check	Date	Suffix	

Purpose of issue: FOR INFORMATION

Client
Highways England
Major Projects
The Cube
199 Wharfside Street
Birmingham
B1 1RN

Working on behalf of highways england

Project Title

A46 COVENTRY JUNCTION UPGRADE

Drawing Title

FIGURE 5-2
AFFECTED ROAD NETWORK & MONITORING STATIONS
SHEET 2 OF 5

Designed	Drawn	Checked	Approved	Date
PB	DM	AR	NT	15/10/2019

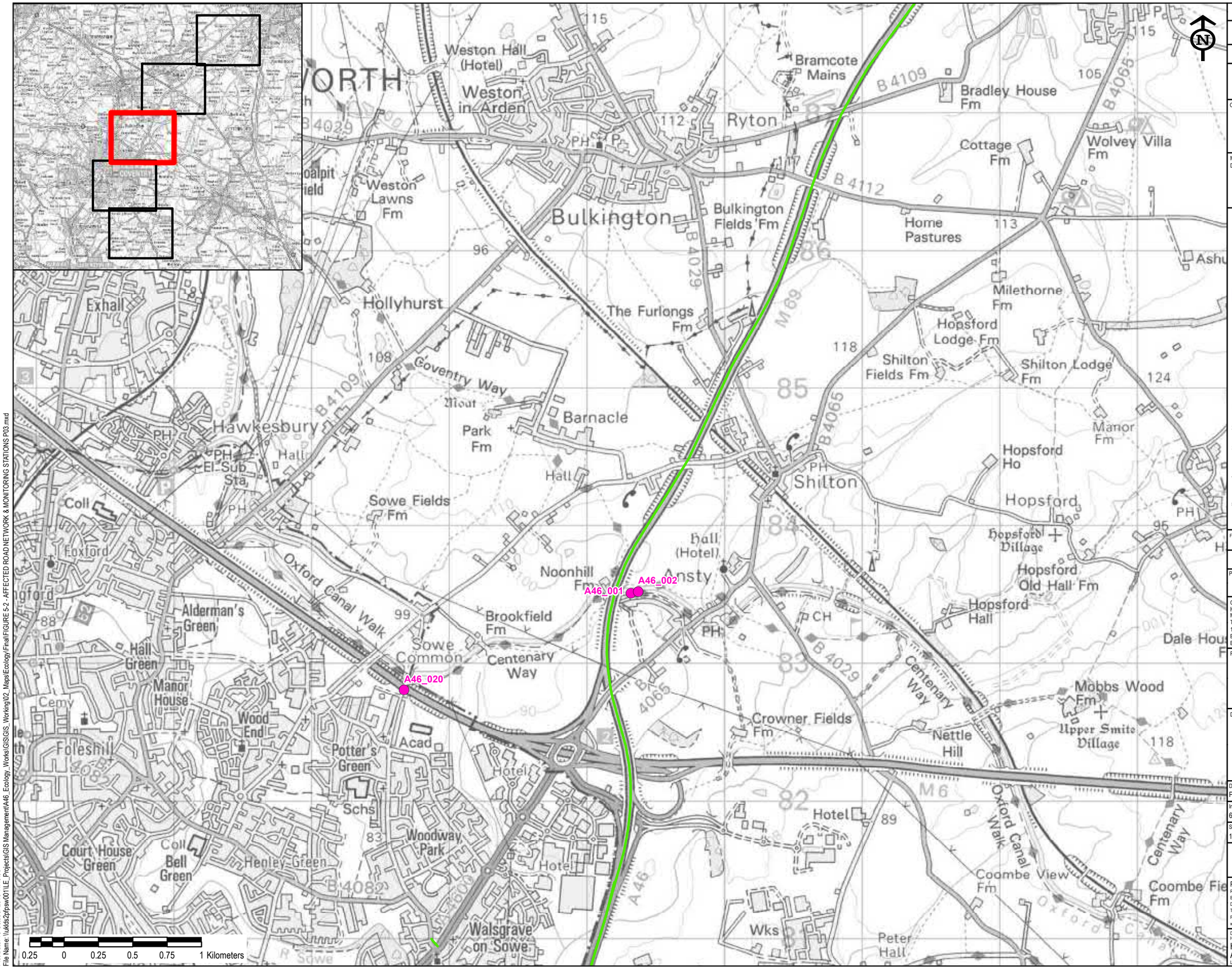
Internal Project No. 60547444	Suitability S0
Scale @ A3 1:25,000	Zone BINLEY JUNCTION

THIS DOCUMENT HAS BEEN PREPARED PURSUANT TO AND SUBJECT TO THE TERMS OF AECOM'S APPOINTMENT BY ITS CLIENT. AECOM ACCEPTS NO LIABILITY FOR ANY USE OF THIS DOCUMENT OTHER THAN BY ITS ORIGINAL CLIENT OR FOLLOWING AECOM'S EXPRESS AGREEMENT TO SUCH USE, AND ONLY FOR THE PURPOSES FOR WHICH IT WAS PREPARED AND PROVIDED.

Project Office
Royal Court
Basil Close, Chesterfield
Derbyshire, S41 7SL
Tel: (01246) 209221
Fax: (01246) 209229
www.aecom.com

AECOM Infrastructure & Environment UK Limited
Registered in England Registered number: 868328
Registered office: Scott House, Alencon Link, Basingstoke, Hampshire RG21 7PP

Drawing Number
Highways England PIN | Originator | Volume | Location | Type | Role | Number | Rev
HE551486 | -ACM | -EGN | A46_SW_ZZ | -DR | -EG | -00001 | P03



SAFETY, HEALTH AND ENVIRONMENTAL INFORMATION BOX

IT IS ASSUMED THAT ALL WORKS ON THIS DRAWING WILL BE CARRIED OUT BY A COMPETENT CONTRACTOR WORKING, WHERE APPROPRIATE, TO AN APPROPRIATE METHOD STATEMENT.

THIS DRAWING IS TO BE USED ONLY FOR THE PURPOSE OF ISSUE THAT IT WAS ISSUED FOR AND IS SUBJECT TO AMENDMENT.

EXCEPTIONAL RISKS RELATING TO THE WORKS ASSOCIATED WITH THIS DRAWING ARE IDENTIFIED BELOW.

CONSTRUCTION

MAINTENANCE / OPERATION / DECOMMISSIONING / DEMOLITION

KEY:

- Site Boundary (Highways Boundary)
- Affected Road Network
- Monitoring Location
- Site of Special Scientific Interest

NOTES

1. THIS DRAWING IS TO BE READ IN CONJUNCTION WITH ALL OTHER RELEVANT DOCUMENTATION.
2. DO NOT SCALE FROM THIS DRAWING, USE ONLY PRINTED DIMENSIONS.
3. ALL DIMENSIONS IN MILLIMETRES, ALL CHAINAGES, LEVELS AND COORDINATES ARE IN METRES UNLESS DEFINED OTHERWISE.
4. THIS DRAWING IS TO BE READ IN CONJUNCTION WITH THE PROJECT HEALTH & SAFETY FILE FOR ANY IDENTIFIED POTENTIAL RISKS.
5. CONTAINS OS DATA © CROWN COPYRIGHT AND DATABASE RIGHT 2017

First Issue	DM / NT	22/03/18	P03
Revision Details	By / Check	Date	Suffix

Purpose of issue: FOR INFORMATION

Client
Highways England
Major Projects
The Cube
199 Wharfside Street
Birmingham
B1 1RN

Working on behalf of highways england

Project Title

A46 COVENTRY JUNCTION UPGRADE

Drawing Title

FIGURE 5-2
AFFECTED ROAD NETWORK & MONITORING STATIONS
SHEET 3 OF 5

Designed	Drawn	Checked	Approved	Date
PB	DM	AR	NT	15/10/2019

Internal Project No.	Suitability
60547444	S0
Scale @ A3: 1:25,000	Zone: BINLEY JUNCTION

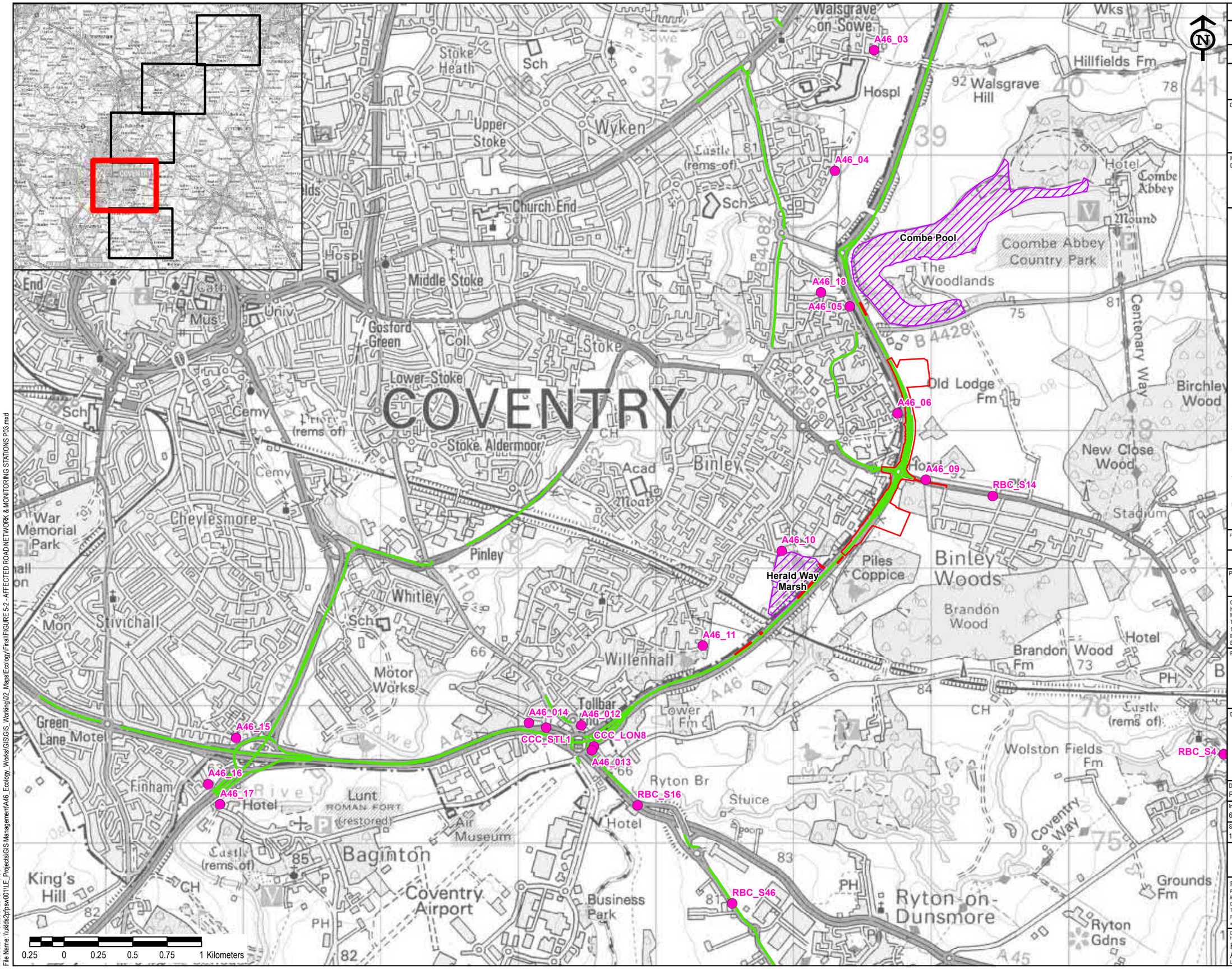
THIS DOCUMENT HAS BEEN PREPARED PURSUANT TO AND SUBJECT TO THE TERMS OF AECOM'S APPOINTMENT BY ITS CLIENT. AECOM ACCEPTS NO LIABILITY FOR ANY USE OF THIS DOCUMENT OTHER THAN BY ITS ORIGINAL CLIENT OR FOLLOWING AECOM'S EXPRESS AGREEMENT TO SUCH USE, AND ONLY FOR THE PURPOSES FOR WHICH IT WAS PREPARED AND PROVIDED.

Project Office
Royal Court
Basil Close, Chesterfield
Derbyshire, S41 7SL
Tel: (01246) 209221
Fax: (01246) 209229
www.aecom.com

AECOM
AECOM Infrastructure & Environment UK Limited
Registered in England Registered number: 887328
Registered office: Scott House, Alencon Link, Basingstoke, Hampshire RG21 7PP

Drawing Number: Highways England PIN	Originator	Volume	Rev
HE551486 A46_SW_ZZ	-ACM	-EGN - -DR -EG -00001	P03
Location		Type | Role | Number	

Plot Date: 15 October 2019 11:48:50
File Name: \\ukhs2pfsw001\LE_Projects\GIS Management\A46_Ecology_Works\GIS\GIS_Working\02_Maps\Ecology\Final\FIGURE 5-2 - AFFECTED ROAD NETWORK & MONITORING STATIONS P03.mxd



SAFETY, HEALTH AND ENVIRONMENTAL INFORMATION BOX

IT IS ASSUMED THAT ALL WORKS ON THIS DRAWING WILL BE CARRIED OUT BY A COMPETENT CONTRACTOR WORKING, WHERE APPROPRIATE, TO AN APPROPRIATE METHOD STATEMENT.

THIS DRAWING IS TO BE USED ONLY FOR THE PURPOSE OF ISSUE THAT IT WAS ISSUED FOR AND IS SUBJECT TO AMENDMENT.

EXCEPTIONAL RISKS RELATING TO THE WORKS ASSOCIATED WITH THIS DRAWING ARE IDENTIFIED BELOW.

CONSTRUCTION

MAINTENANCE / OPERATION / DECOMMISSIONING / DEMOLITION

KEY:

- Site Boundary (Highways Boundary)
- Affected Road Network
- Monitoring Location
- Site of Special Scientific Interest

NOTES

1. THIS DRAWING IS TO BE READ IN CONJUNCTION WITH ALL OTHER RELEVANT DOCUMENTATION.
2. DO NOT SCALE FROM THIS DRAWING, USE ONLY PRINTED DIMENSIONS.
3. ALL DIMENSIONS IN MILLIMETRES, ALL CHAINAGES, LEVELS AND COORDINATES ARE IN METRES UNLESS DEFINED OTHERWISE.
4. THIS DRAWING IS TO BE READ IN CONJUNCTION WITH THE PROJECT HEALTH & SAFETY FILE FOR ANY IDENTIFIED POTENTIAL RISKS.
5. CONTAINS OS DATA © CROWN COPYRIGHT AND DATABASE RIGHT 2017

First Issue	DM / NT	22/03/18	P03
Revision Details	By / Check	Date	Suffix

Purpose of issue: FOR INFORMATION

Client
Highways England
Major Projects
The Cube
199 Wharfside Street
Birmingham
B1 1RN

Working on behalf of highways england

Project Title
A46 COVENTRY JUNCTION UPGRADE

Drawing Title
FIGURE 5-2
AFFECTED ROAD NETWORK & MONITORING STATIONS
SHEET 4 OF 5

Designed	Drawn	Checked	Approved	Date
PB	DM	AR	NT	15/10/2019

Internal Project No. 60547444	Suitability S0
Scale @ A3 1:25,000	Zone BINLEY JUNCTION

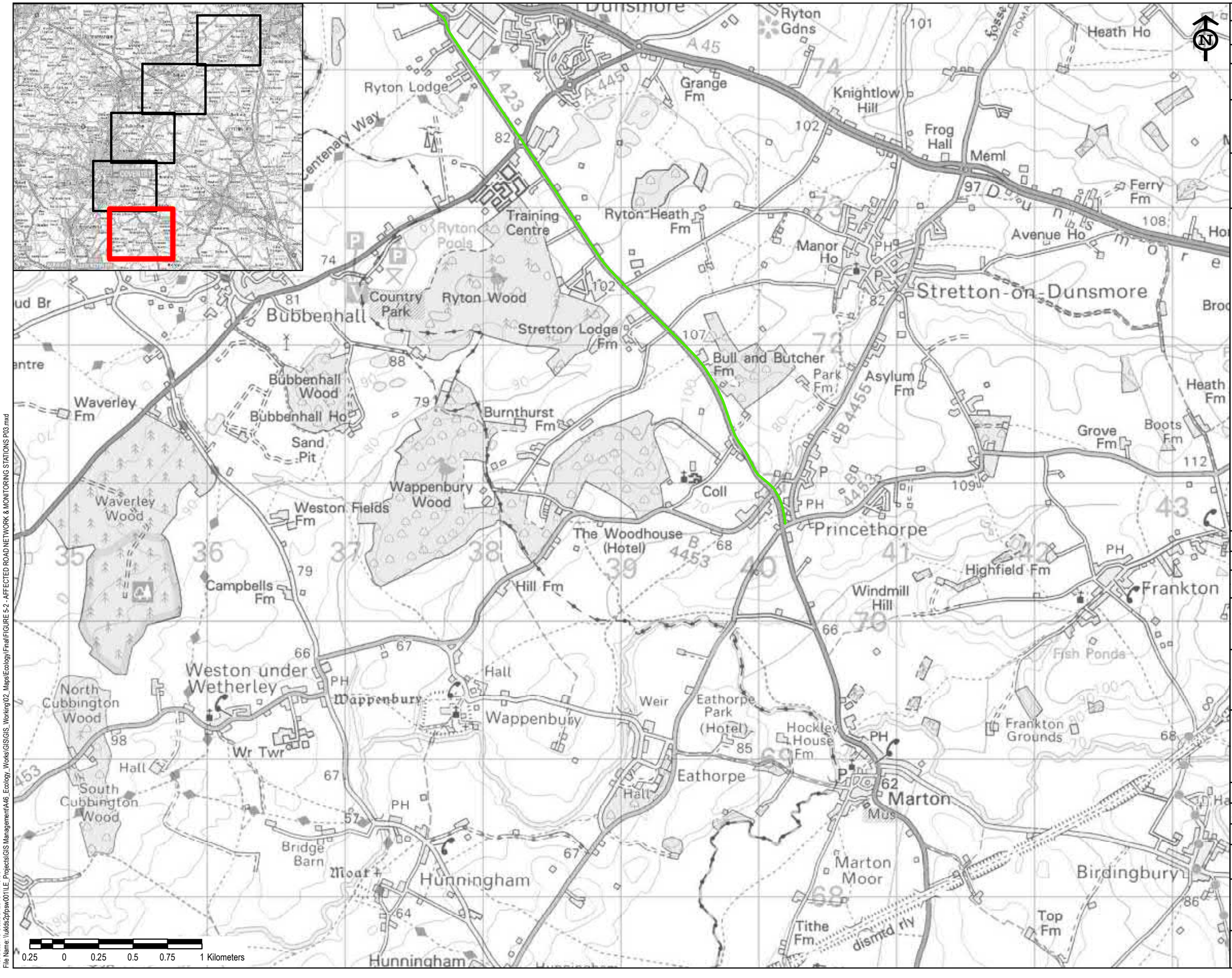
THIS DOCUMENT HAS BEEN PREPARED PURSUANT TO AND SUBJECT TO THE TERMS OF AECOM'S APPOINTMENT BY ITS CLIENT. AECOM ACCEPTS NO LIABILITY FOR ANY USE OF THIS DOCUMENT OTHER THAN BY ITS ORIGINAL CLIENT OR FOLLOWING AECOM'S EXPRESS AGREEMENT TO SUCH USE, AND ONLY FOR THE PURPOSES FOR WHICH IT WAS PREPARED AND PROVIDED.

Project Office
Royal Court
Basil Close, Chesterfield
Derbyshire, S41 7SL
Tel: (01246) 209221
Fax: (01246) 209229
www.aecom.com

AECOM Infrastructure & Environment UK Limited
Registered in England Registered number: 887328
Registered office: Scott House, Alencon Link, Basingstoke, Hampshire RG21 7PP

Drawing Number	Originator	Volume	Rev
Highways England PIN HE551486 A46_SW_ZZ	-ACM	-EGN - -DR -EG -00001	P03
Location		Type | Role | Number	

Plot Date: 15 October 2019 11:48:50
File Name: \\ukds2pfpsw001\LE_Projects\GIS Management\A46_Ecology_Works\GIS\GIS_Working\02_Maps\Ecology\Final\FIGURE 5-2 - AFFECTED ROAD NETWORK & MONITORING STATIONS P03.mxd



0.25 0 0.25 0.5 0.75 1 Kilometers

SAFETY, HEALTH AND ENVIRONMENTAL INFORMATION BOX

IT IS ASSUMED THAT ALL WORKS ON THIS DRAWING WILL BE CARRIED OUT BY A COMPETENT CONTRACTOR WORKING, WHERE APPROPRIATE, TO AN APPROPRIATE METHOD STATEMENT.

THIS DRAWING IS TO BE USED ONLY FOR THE PURPOSE OF ISSUE THAT IT WAS ISSUED FOR AND IS SUBJECT TO AMENDMENT.

EXCEPTIONAL RISKS RELATING TO THE WORKS ASSOCIATED WITH THIS DRAWING ARE IDENTIFIED BELOW.

CONSTRUCTION

MAINTENANCE / OPERATION / DECOMMISSIONING / DEMOLITION

KEY:

- Site Boundary (Highways Boundary)
- Affected Road Network
- Monitoring Location
- Site of Special Scientific Interest

NOTES

1. THIS DRAWING IS TO BE READ IN CONJUNCTION WITH ALL OTHER RELEVANT DOCUMENTATION.
2. DO NOT SCALE FROM THIS DRAWING, USE ONLY PRINTED DIMENSIONS.
3. ALL DIMENSIONS IN MILLIMETRES, ALL CHAINAGES, LEVELS AND COORDINATES ARE IN METRES UNLESS DEFINED OTHERWISE.
4. THIS DRAWING IS TO BE READ IN CONJUNCTION WITH THE PROJECT HEALTH & SAFETY FILE FOR ANY IDENTIFIED POTENTIAL RISKS.
5. CONTAINS OS DATA © CROWN COPYRIGHT AND DATABASE RIGHT 2017

First Issue	DM / NT	22/03/18	P03
Revision Details	By / Check	Date	Suffix

Purpose of issue: FOR INFORMATION

Client
Highways England
Major Projects
The Cube
199 Wharfside Street
Birmingham
B1 1RN

Working on behalf of highways england

Project Title

A46 COVENTRY JUNCTION UPGRADE

Drawing Title

FIGURE 5-2
AFFECTED ROAD NETWORK & MONITORING STATIONS
SHEET 5 OF 5

Designed	Drawn	Checked	Approved	Date
PB	DM	AR	NT	15/10/2019

Internal Project No. 60547444	Suitability S0
Scale @ A3 1:25,000	Zone BINLEY JUNCTION

THIS DOCUMENT HAS BEEN PREPARED PURSUANT TO AND SUBJECT TO THE TERMS OF AECOM'S APPOINTMENT BY ITS CLIENT. AECOM ACCEPTS NO LIABILITY FOR ANY USE OF THIS DOCUMENT OTHER THAN BY ITS ORIGINAL CLIENT OR FOLLOWING AECOM'S EXPRESS AGREEMENT TO SUCH USE, AND ONLY FOR THE PURPOSES FOR WHICH IT WAS PREPARED AND PROVIDED.

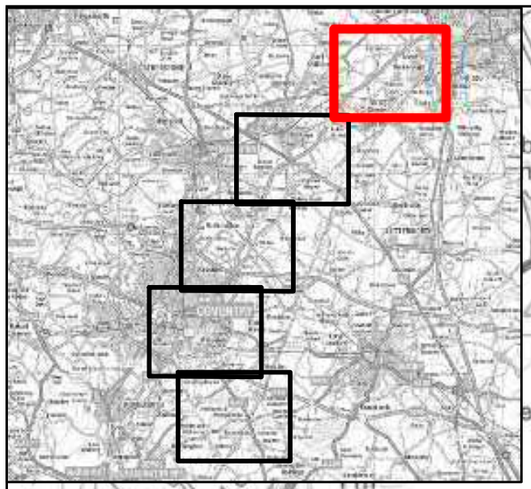
Project Office
Royal Court
Basil Close, Chesterfield
Derbyshire. S41 7SL
Tel: (01246) 209221
Fax: (01246) 209229
www.aecom.com

AECOM
AECOM Infrastructure & Environment UK Limited
Registered in England Registered number: 880328
Registered office: Scott House, Alencon Link, Basingstoke, Hampshire RG21 7PP

Drawing Number	Originator	Volume			Rev
Highways England PIN HE551486 A46_SW_ZZ	-ACM	-EGN	-DR	-EG -00001	P03
Location			Type	Role Number	

Plot Date: 15 October 2019 11:48:50
File Name: \\ukfs2p\psw001\LE_Projects\GIS Management\A46_Ecology_Work\GIS\GIS_Working\02_Maps\Ecology\Final\FIGURE 5-2 - AFFECTED ROAD NETWORK & MONITORING STATIONS P03.mxd

Figure 5.3 Receptor Locations



R10
R09
Old Brake
Stretchnook Fm
Huncote Grange
Narborough Wood Park
New House Fm
Abbey Fm
Hotel
Hoefields Fm
Newhall Park Fm
The Knoll
Grove Park
Hotel
Cook's Lodge
The Park
Hall
Clump Fm
Hill Fm
Enderby
Thurlaston
PH
Bracknell Fm
Hardwicke Lodge Fm
Coll
Normanton Turville
Dairy Fm
Carlton Park
Green's Lodge
Yennards Fm
Normanton
Sand Pit
Narborough
Cemy
Huncote
Ford
Sandpit Cotts
Quarry
Red Hill
Earl Shilton
Mirfield Fm
Elms Fm
Huit Fm
Littlethorpe
Potters Marston
Quarry
BLABY DISTRICT
Thorney Fields Fm
Wks
Cemy
Fosse Ho
Cosby Spinneys
Oak Lodge Fm
Croft Lodge
Croft
Stoney Stanton
Highgate
Port Hill Fm
Sutton Hill Fm
Lodge Fm
River Soar
Brook
M69
B582
B4114
A47
0.25 0 0.25 0.5 0.75 1 Kilometers

KEY:
- Site Boundary (Highways Boundary)
- Site of Special Scientific Interest
- Modelled links
- Ecological receptors

Do-Something Annual Mean NO2 Concentrations
- <36

Change in Annual mean NO2 with Scheme at Receptors (µg/m3)
- <-4
- -0.4 to -2
- -0.4 to 0.4
- 0.4 to 2

Plot Date: 22 March 2018 15:19:59
File Name: K:\GIS Management\A46_Ecology_Works\GIS\GIS_Working\02_Maps\Ecology\Final\FIGURE 5-3 - RECEPTORS P03.mxd

SAFETY, HEALTH AND ENVIRONMENTAL INFORMATION BOX

IT IS ASSUMED THAT ALL WORKS ON THIS DRAWING WILL BE CARRIED OUT BY A COMPETENT CONTRACTOR WORKING, WHERE APPROPRIATE, TO AN APPROPRIATE METHOD STATEMENT.

THIS DRAWING IS TO BE USED ONLY FOR THE PURPOSE OF ISSUE THAT IT WAS ISSUED FOR AND IS SUBJECT TO AMENDMENT.

EXCEPTIONAL RISKS RELATING TO THE WORKS ASSOCIATED WITH THIS DRAWING ARE IDENTIFIED BELOW.

CONSTRUCTION

MAINTENANCE / OPERATION / DECOMMISSIONING / DEMOLITION

NOTES

1. THIS DRAWING IS TO BE READ IN CONJUNCTION WITH ALL OTHER RELEVANT DOCUMENTATION.
2. DO NOT SCALE FROM THIS DRAWING, USE ONLY PRINTED DIMENSIONS.
3. ALL DIMENSIONS IN MILLIMETRES, ALL CHAINAGES, LEVELS AND COORDINATES ARE IN METRES UNLESS DEFINED OTHERWISE.
4. THIS DRAWING IS TO BE READ IN CONJUNCTION WITH THE PROJECT HEALTH & SAFETY FILE FOR ANY IDENTIFIED POTENTIAL RISKS.
5. CONTAINS OS DATA © CROWN COPYRIGHT AND DATABASE RIGHT 2017

First Issue	DM / NT	22/03/18	P03	
Revision Details	By / Check	Date	Suffix	

Purpose of issue: FOR INFORMATION

Client: Highways England, Major Projects, The Cube, 199 Wharfside Street, Birmingham, B1 1RN

Working on behalf of highways england

Project Title: A46 COVENTRY JUNCTION UPGRADE

Drawing Title: FIGURE 3 RECEPTORS SHEET 1 OF 5

Designed	Drawn	Checked	Approved	Date
PB	DM	AR	NT	22/03/2018

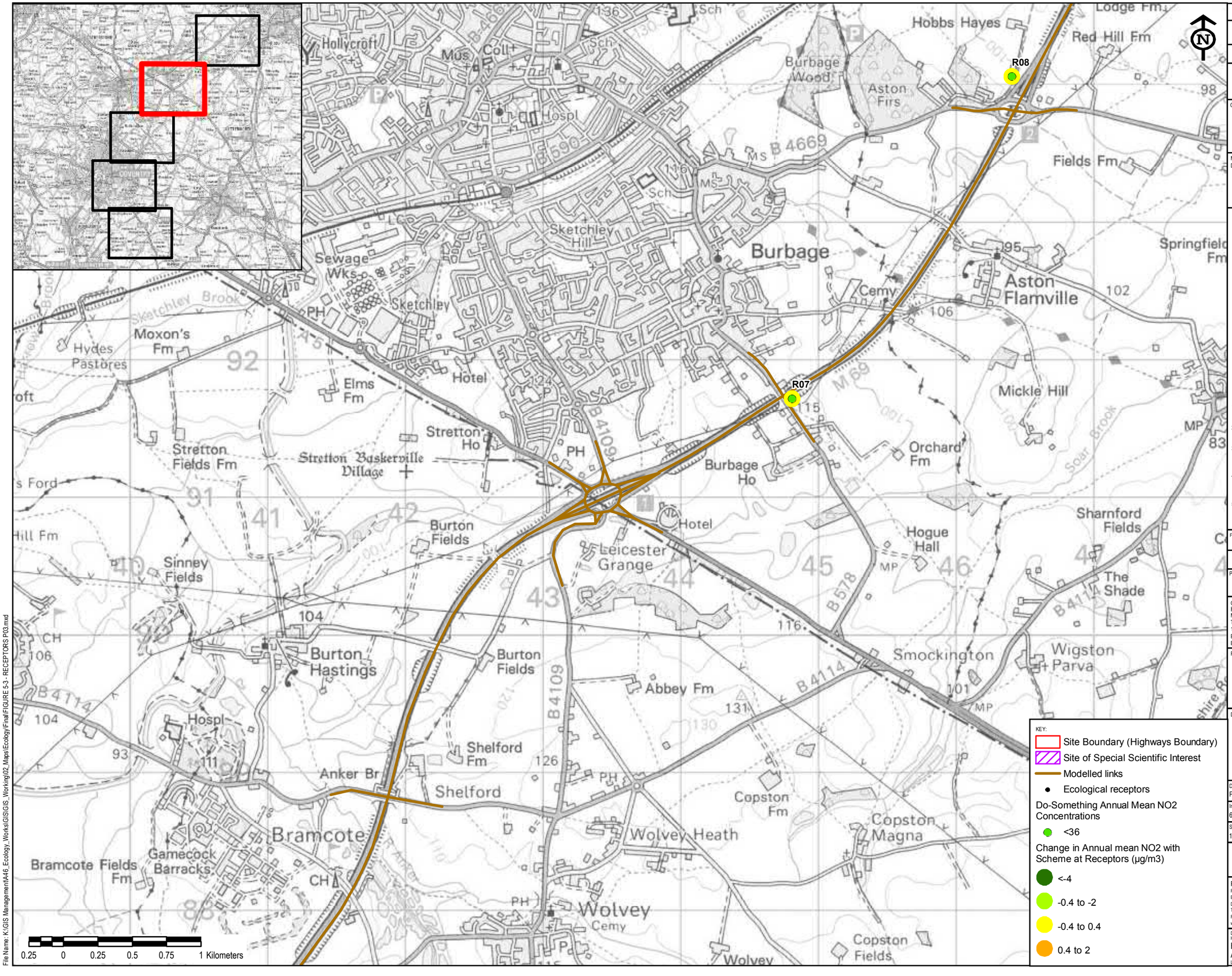
Internal Project No. 60547444	Suitability S0
Scale @ A3 1:25,000	Zone BINLEY JUNCTION

THIS DOCUMENT HAS BEEN PREPARED PURSUANT TO AND SUBJECT TO THE TERMS OF AECOM'S APPOINTMENT BY ITS CLIENT. AECOM ACCEPTS NO LIABILITY FOR ANY USE OF THIS DOCUMENT OTHER THAN BY ITS ORIGINAL CLIENT OR FOLLOWING AECOM'S EXPRESS AGREEMENT TO SUCH USE, AND ONLY FOR THE PURPOSES FOR WHICH IT WAS PREPARED AND PROVIDED.

Project Office
Royal Court
Basil Close, Chesterfield
Derbyshire. S41 7SL
Tel: (01246) 209221
Fax: (01246) 209229
www.aecom.com

AECOM
AECOM Infrastructure & Environment UK Limited
Registered in England Registered number: 880328
Registered office: Scott House, Alencon Link, Basingstoke, Hampshire RG21 7PP

Drawing Number	Originator	Volume		Rev
Highways England PIN: HE551486	-ACM	-EGN	-	P03
Location: A46_SW_ZZ		-DR	-EG -00001	
		Type	Role Number	



KEY:

- Site Boundary (Highways Boundary)
- Site of Special Scientific Interest
- Modelled links
- Ecological receptors

Do-Something Annual Mean NO2 Concentrations

- <36

Change in Annual mean NO2 with Scheme at Receptors (µg/m3)

- <-4
- -0.4 to -2
- -0.4 to 0.4
- 0.4 to 2

SAFETY, HEALTH AND ENVIRONMENTAL INFORMATION BOX

IT IS ASSUMED THAT ALL WORKS ON THIS DRAWING WILL BE CARRIED OUT BY A COMPETENT CONTRACTOR WORKING, WHERE APPROPRIATE, TO AN APPROPRIATE METHOD STATEMENT.

THIS DRAWING IS TO BE USED ONLY FOR THE PURPOSE OF ISSUE THAT IT WAS ISSUED FOR AND IS SUBJECT TO AMENDMENT.

EXCEPTIONAL RISKS RELATING TO THE WORKS ASSOCIATED WITH THIS DRAWING ARE IDENTIFIED BELOW.

CONSTRUCTION

MAINTENANCE / OPERATION / DECOMMISSIONING / DEMOLITION

NOTES

1. THIS DRAWING IS TO BE READ IN CONJUNCTION WITH ALL OTHER RELEVANT DOCUMENTATION.
2. DO NOT SCALE FROM THIS DRAWING, USE ONLY PRINTED DIMENSIONS.
3. ALL DIMENSIONS IN MILLIMETRES, ALL CHAINAGES, LEVELS AND COORDINATES ARE IN METRES UNLESS DEFINED OTHERWISE.
4. THIS DRAWING IS TO BE READ IN CONJUNCTION WITH THE PROJECT HEALTH & SAFETY FILE FOR ANY IDENTIFIED POTENTIAL RISKS.
5. CONTAINS OS DATA © CROWN COPYRIGHT AND DATABASE RIGHT 2017

First Issue	DM / NT	22/03/18	P03	
Revision Details	By / Check	Date	Suffix	

Purpose of issue: FOR INFORMATION

Client: Highways England, Major Projects, The Cube, 199 Wharfside Street, Birmingham, B1 1RN

Working on behalf of highways england

Project Title: A46 COVENTRY JUNCTION UPGRADE

Drawing Title: FIGURE 3 RECEPTORS SHEET 2 OF 5

Designed	Drawn	Checked	Approved	Date
PB	DM	AR	NT	22/03/2018

Internal Project No. 60547444	Suitability S0
Scale @ A3 1:25,000	Zone BINLEY JUNCTION

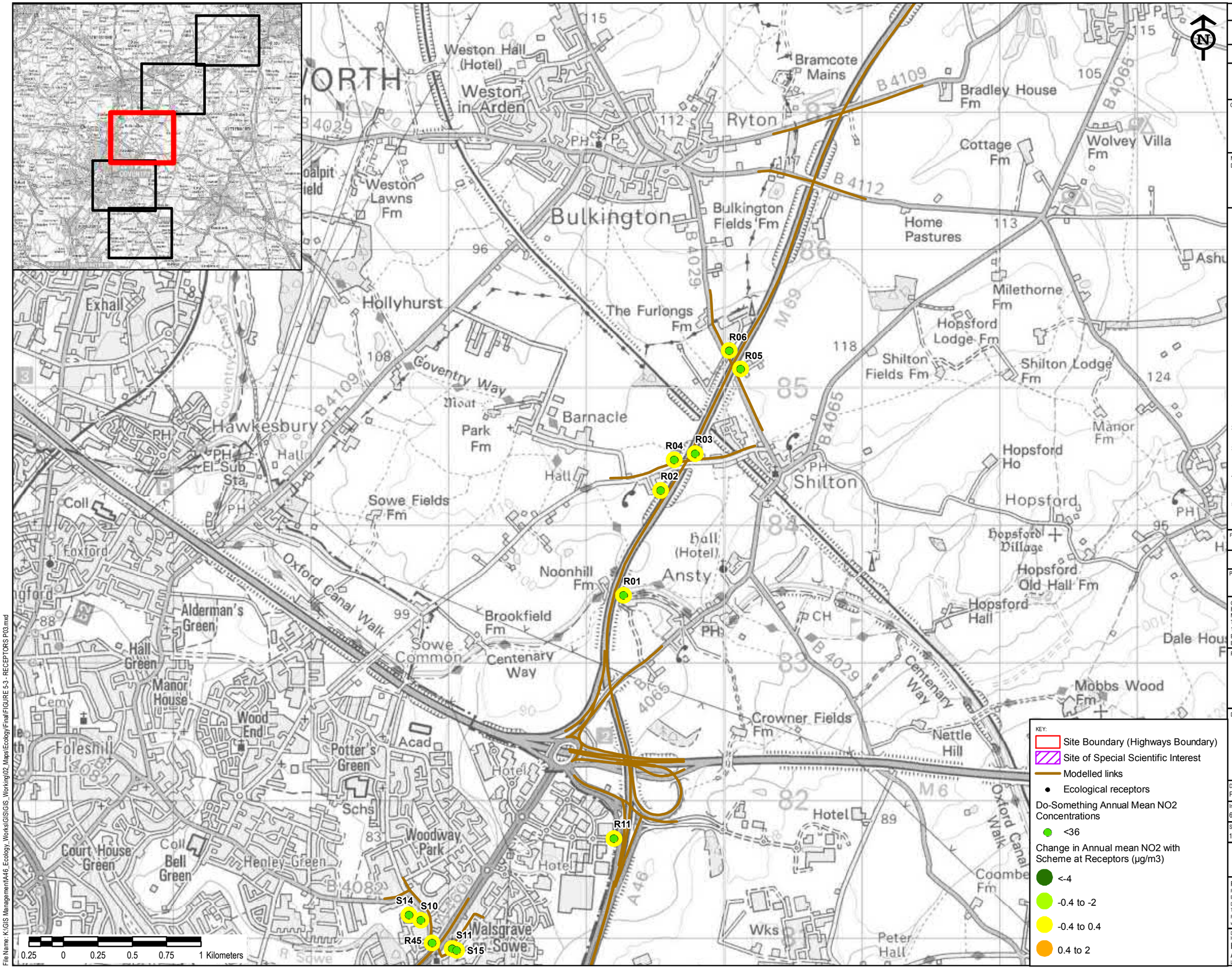
THIS DOCUMENT HAS BEEN PREPARED PURSUANT TO AND SUBJECT TO THE TERMS OF AECOM'S APPOINTMENT BY ITS CLIENT. AECOM ACCEPTS NO LIABILITY FOR ANY USE OF THIS DOCUMENT OTHER THAN BY ITS ORIGINAL CLIENT OR FOLLOWING AECOM'S EXPRESS AGREEMENT TO SUCH USE, AND ONLY FOR THE PURPOSES FOR WHICH IT WAS PREPARED AND PROVIDED.

Project Office
Royal Court
Basil Close, Chesterfield
Derbyshire. S41 7SL
Tel: (01246) 209221
Fax: (01246) 209229
www.aecom.com

AECOM Infrastructure & Environment UK Limited
Registered in England Registered number: 888328
Registered office: Scott House, Alencon Link, Basingstoke, Hampshire RG21 7PP

Drawing Number: Highways England PIN HE551486 | Originator -ACM | Volume -EGN - | Location A46_SW_ZZ | Type -DR | Role -EG | Number -00001 | Rev P03

Plot Date: 22 March 2018 15:19:59
File Name: K:\GIS Management\A46_Ecology_Works\GIS\GIS_Working\02_Maps\Ecology\Final\FIGURE 5-3 - RECEPTORS P03.mxd



KEY:

- Site Boundary (Highways Boundary)
- Site of Special Scientific Interest
- Modelled links
- Ecological receptors

Do-Something Annual Mean NO2 Concentrations

- <36

Change in Annual mean NO2 with Scheme at Receptors (µg/m3)

- <-4
- -0.4 to -2
- -0.4 to 0.4
- 0.4 to 2

SAFETY, HEALTH AND ENVIRONMENTAL INFORMATION BOX

IT IS ASSUMED THAT ALL WORKS ON THIS DRAWING WILL BE CARRIED OUT BY A COMPETENT CONTRACTOR WORKING, WHERE APPROPRIATE, TO AN APPROPRIATE METHOD STATEMENT.

THIS DRAWING IS TO BE USED ONLY FOR THE PURPOSE OF ISSUE THAT IT WAS ISSUED FOR AND IS SUBJECT TO AMENDMENT.

EXCEPTIONAL RISKS RELATING TO THE WORKS ASSOCIATED WITH THIS DRAWING ARE IDENTIFIED BELOW.

CONSTRUCTION

MAINTENANCE / OPERATION / DECOMMISSIONING / DEMOLITION

NOTES

1. THIS DRAWING IS TO BE READ IN CONJUNCTION WITH ALL OTHER RELEVANT DOCUMENTATION.
2. DO NOT SCALE FROM THIS DRAWING, USE ONLY PRINTED DIMENSIONS.
3. ALL DIMENSIONS IN MILLIMETRES, ALL CHAINAGES, LEVELS AND COORDINATES ARE IN METRES UNLESS DEFINED OTHERWISE.
4. THIS DRAWING IS TO BE READ IN CONJUNCTION WITH THE PROJECT HEALTH & SAFETY FILE FOR ANY IDENTIFIED POTENTIAL RISKS.
5. CONTAINS OS DATA © CROWN COPYRIGHT AND DATABASE RIGHT 2017

First Issue	DM / NT	22/03/18	P03
Revision Details	By / Check	Date	Suffix

Purpose of issue: FOR INFORMATION

Client
Highways England
Major Projects
The Cube
199 Wharfside Street
Birmingham
B1 1RN

Working on behalf of highways england

Project Title

A46 COVENTRY JUNCTION UPGRADE

Drawing Title

FIGURE 3 RECEPTORS SHEET 3 OF 5

Designed	Drawn	Checked	Approved	Date
PB	DM	AR	NT	22/03/2018

Internal Project No.	Suitability
60547444	S0
Scale @ A3 1:25,000	Zone BINLEY JUNCTION

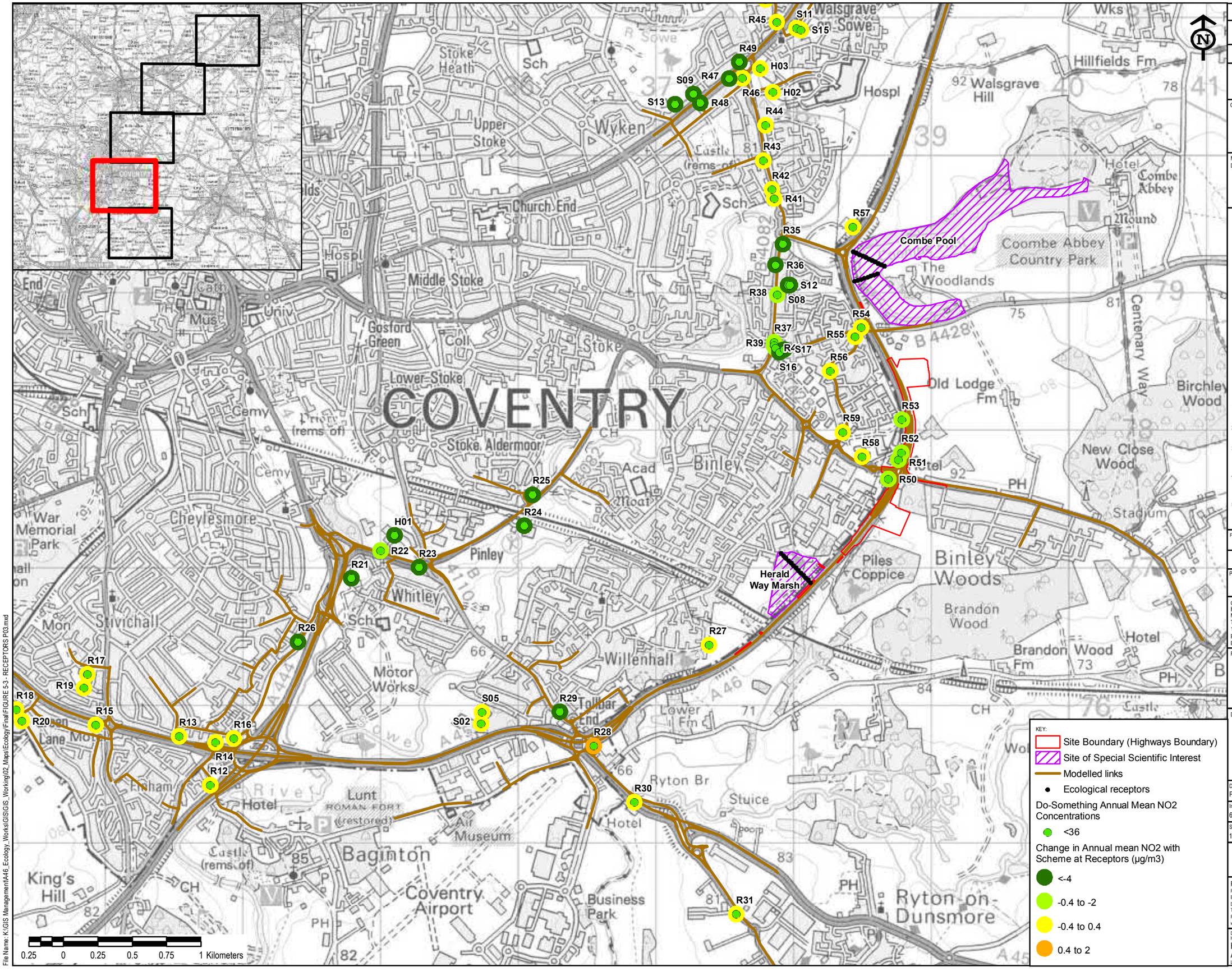
THIS DOCUMENT HAS BEEN PREPARED PURSUANT TO AND SUBJECT TO THE TERMS OF AECOM'S APPOINTMENT BY ITS CLIENT. AECOM ACCEPTS NO LIABILITY FOR ANY USE OF THIS DOCUMENT OTHER THAN BY ITS ORIGINAL CLIENT OR FOLLOWING AECOM'S EXPRESS AGREEMENT TO SUCH USE, AND ONLY FOR THE PURPOSES FOR WHICH IT WAS PREPARED AND PROVIDED.

Project Office
Royal Court
Basil Close, Chesterfield
Derbyshire. S41 7SL
Tel: (01246) 209221
Fax: (01246) 209229
www.aecom.com

AECOM
AECOM Infrastructure & Environment UK Limited
Registered in England Registered number: 880328
Registered office: Scott House, Alencon Link, Basingstoke, Hampshire RG21 7PP

Drawing Number	Originator	Volume			Rev
Highways England PIN					
HE551486	-ACM	-EGN	-		P03
A46_SW_ZZ		-DR	-EG	-00001	
Location		Type	Role	Number	

Plot Date: 22 March 2018 15:19:59
File Name: K:\GIS Management\A46_Ecology_Works\GIS\GIS_Working\02_Maps\Ecology\Final\FIGURE 5-3 - RECEPTORS P03.mxd



KEY:

- Site Boundary (Highways Boundary)
- Site of Special Scientific Interest
- Modelled links
- Ecological receptors

Do-Something Annual Mean NO2 Concentrations

- <36

Change in Annual mean NO2 with Scheme at Receptors (µg/m3)

- <-4
- -0.4 to -2
- -0.4 to 0.4
- 0.4 to 2

SAFETY, HEALTH AND ENVIRONMENTAL INFORMATION BOX

IT IS ASSUMED THAT ALL WORKS ON THIS DRAWING WILL BE CARRIED OUT BY A COMPETENT CONTRACTOR WORKING, WHERE APPROPRIATE, TO AN APPROPRIATE METHOD STATEMENT.

THIS DRAWING IS TO BE USED ONLY FOR THE PURPOSE OF ISSUE THAT IT WAS ISSUED FOR AND IS SUBJECT TO AMENDMENT.

EXCEPTIONAL RISKS RELATING TO THE WORKS ASSOCIATED WITH THIS DRAWING ARE IDENTIFIED BELOW.

CONSTRUCTION

MAINTENANCE / OPERATION / DECOMMISSIONING / DEMOLITION

NOTES

1. THIS DRAWING IS TO BE READ IN CONJUNCTION WITH ALL OTHER RELEVANT DOCUMENTATION.
2. DO NOT SCALE FROM THIS DRAWING, USE ONLY PRINTED DIMENSIONS.
3. ALL DIMENSIONS IN MILLIMETRES, ALL CHAINAGES, LEVELS AND COORDINATES ARE IN METRES UNLESS DEFINED OTHERWISE.
4. THIS DRAWING IS TO BE READ IN CONJUNCTION WITH THE PROJECT HEALTH & SAFETY FILE FOR ANY IDENTIFIED POTENTIAL RISKS.
5. CONTAINS OS DATA © CROWN COPYRIGHT AND DATABASE RIGHT 2017

First Issue	DM / NT	22/03/18	P03
Revision Details	By / Check	Date	Suffix

Purpose of issue: FOR INFORMATION

Client: Highways England, Major Projects, The Cube, 199 Wharfside Street, Birmingham, B1 1RN

Working on behalf of highways england

Project Title: A46 COVENTRY JUNCTION UPGRADE

Drawing Title: FIGURE 3 RECEPTORS SHEET 4 OF 5

Designed	Drawn	Checked	Approved	Date
PB	DM	AR	NT	22/03/2018

Internal Project No.	Suitability
60547444	S0
Scale @ A3: 1:25,000	Zone: BINLEY JUNCTION

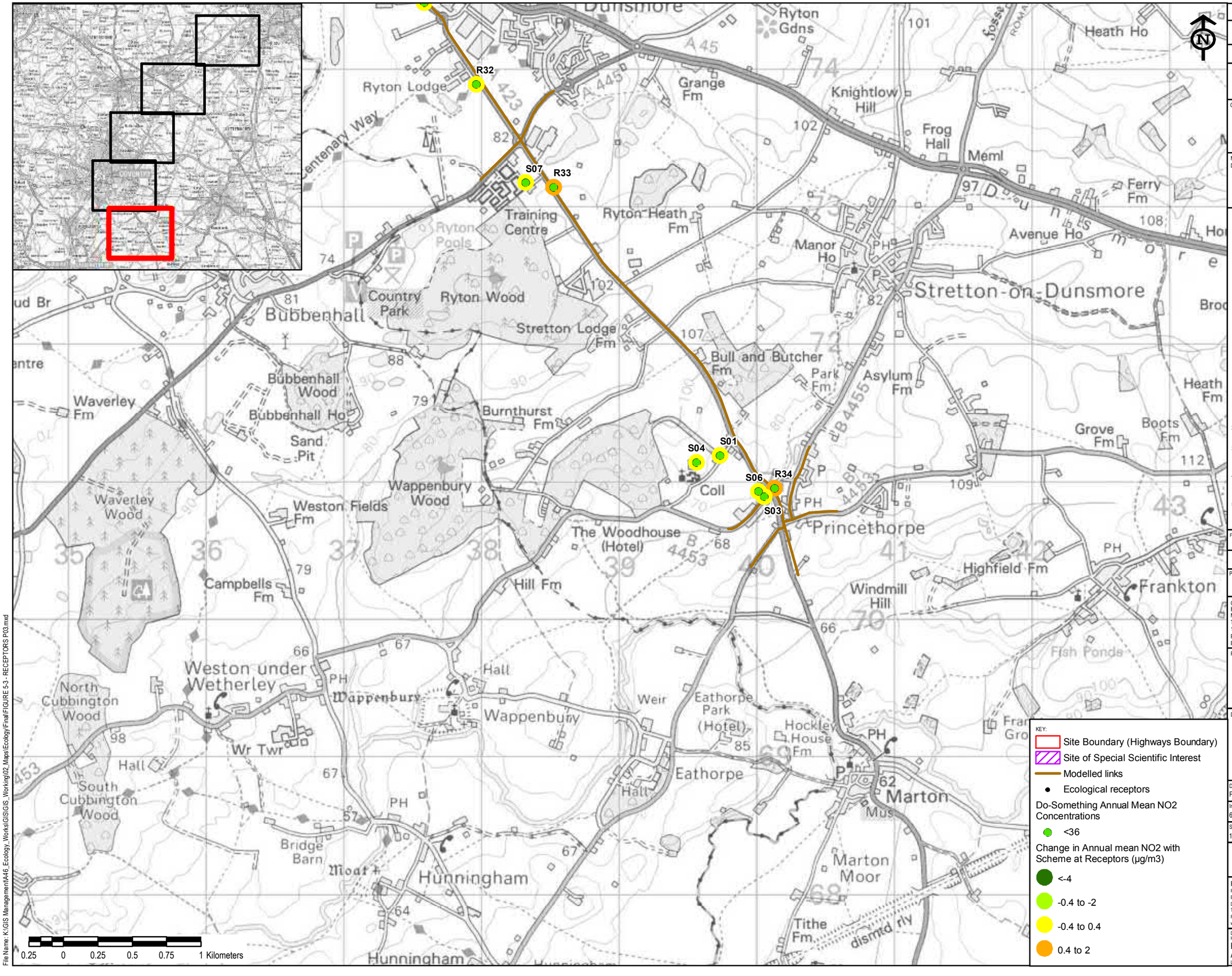
THIS DOCUMENT HAS BEEN PREPARED PURSUANT TO AND SUBJECT TO THE TERMS OF AECOM'S APPOINTMENT BY ITS CLIENT. AECOM ACCEPTS NO LIABILITY FOR ANY USE OF THIS DOCUMENT OTHER THAN BY ITS ORIGINAL CLIENT OR FOLLOWING AECOM'S EXPRESS AGREEMENT TO SUCH USE, AND ONLY FOR THE PURPOSES FOR WHICH IT WAS PREPARED AND PROVIDED.

Project Office
Royal Court
Basil Close, Chesterfield
Derbyshire. S41 7SL
Tel: (01246) 209221
Fax: (01246) 209229
www.aecom.com

AECOM Infrastructure & Environment UK Limited
Registered in England Registered number: 868328
Registered office: Scott House, Alencon Link, Basingstoke, Hampshire RG21 7PP

Drawing Number: Highways England PIN	Originator	Volume	Rev
HE551486 A46_SW_ZZ	-ACM	-EGN -DR -EG -00001	P03
Location		Type / Role / Number	

Plot Date: 22 March 2018 15:19:59
File Name: K:\GIS Management\A46_Ecology_Works\GIS\GIS_Working\02_Maps\Ecology\Final\FIGURE 5-3 - RECEPTORS P03.mxd



KEY:

- Site Boundary (Highways Boundary)
- Site of Special Scientific Interest
- Modelled links
- Ecological receptors

Do-Something Annual Mean NO2 Concentrations

- <36

Change in Annual mean NO2 with Scheme at Receptors (µg/m3)

- <-4
- -0.4 to -2
- -0.4 to 0.4
- 0.4 to 2

SAFETY, HEALTH AND ENVIRONMENTAL INFORMATION BOX

IT IS ASSUMED THAT ALL WORKS ON THIS DRAWING WILL BE CARRIED OUT BY A COMPETENT CONTRACTOR WORKING, WHERE APPROPRIATE, TO AN APPROPRIATE METHOD STATEMENT.

THIS DRAWING IS TO BE USED ONLY FOR THE PURPOSE OF ISSUE THAT IT WAS ISSUED FOR AND IS SUBJECT TO AMENDMENT.

EXCEPTIONAL RISKS RELATING TO THE WORKS ASSOCIATED WITH THIS DRAWING ARE IDENTIFIED BELOW.

CONSTRUCTION

MAINTENANCE / OPERATION / DECOMMISSIONING / DEMOLITION

NOTES

1. THIS DRAWING IS TO BE READ IN CONJUNCTION WITH ALL OTHER RELEVANT DOCUMENTATION.
2. DO NOT SCALE FROM THIS DRAWING, USE ONLY PRINTED DIMENSIONS.
3. ALL DIMENSIONS IN MILLIMETRES, ALL CHAINAGES, LEVELS AND COORDINATES ARE IN METRES UNLESS DEFINED OTHERWISE.
4. THIS DRAWING IS TO BE READ IN CONJUNCTION WITH THE PROJECT HEALTH & SAFETY FILE FOR ANY IDENTIFIED POTENTIAL RISKS.
5. CONTAINS OS DATA © CROWN COPYRIGHT AND DATABASE RIGHT 2017

First Issue	By: DM	Check: NT	22/03/18	P03
Revision Details			Date	Suffix

Purpose of issue: FOR INFORMATION

Client: Highways England, Major Projects, The Cube, 199 Wharfside Street, Birmingham, B1 1RN

Working on behalf of: highways england

Project Title: A46 COVENTRY JUNCTION UPGRADE

Drawing Title: FIGURE 3 RECEPTORS SHEET 5 OF 5

Designed	Drawn	Checked	Approved	Date
PB	DM	AR	NT	22/03/2018

Internal Project No.: 60547444	Suitability: S0
Scale @ A3: 1:25,000	Zone: BINLEY JUNCTION

THIS DOCUMENT HAS BEEN PREPARED PURSUANT TO AND SUBJECT TO THE TERMS OF AECOM'S APPOINTMENT BY ITS CLIENT. AECOM ACCEPTS NO LIABILITY FOR ANY USE OF THIS DOCUMENT OTHER THAN BY ITS ORIGINAL CLIENT OR FOLLOWING AECOM'S EXPRESS AGREEMENT TO SUCH USE, AND ONLY FOR THE PURPOSES FOR WHICH IT WAS PREPARED AND PROVIDED.

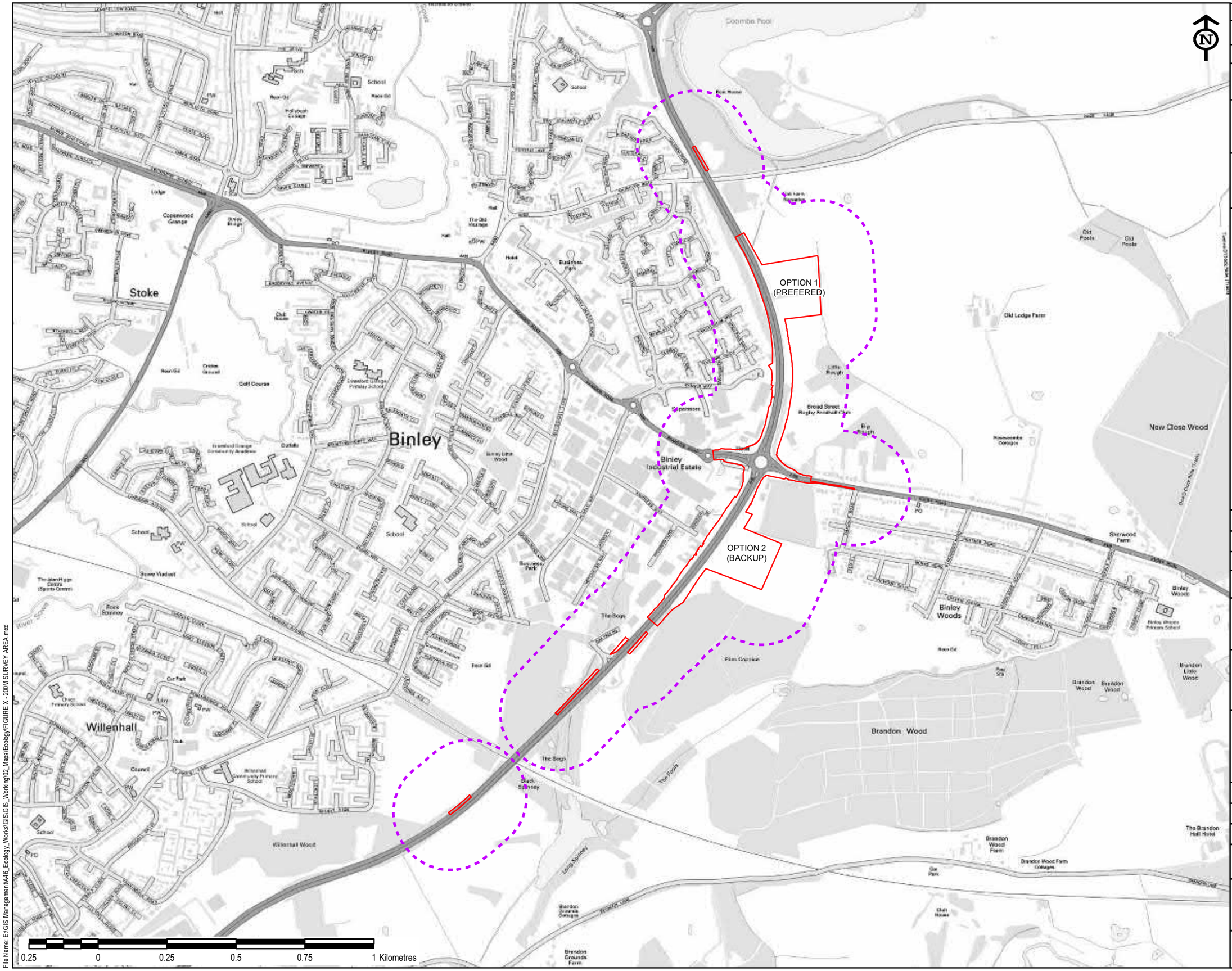
Project Office
Royal Court
Basil Close, Chesterfield
Derbyshire. S41 7SL
Tel: (01246) 209221
Fax: (01246) 209229
www.aecom.com

AECOM Infrastructure & Environment UK Limited
Registered in England Registered number: 898328
Registered office: Scott House, Alencon Link, Basingstoke, Hampshire RG21 7PP

Drawing Number	Originator	Volume	Rev
Highways England PIN: HE551486	-ACM	-EGN -	P03
Location: A46_SW_ZZ		-DR -EG -00001	
		Type Role Number	

Plot Date: 22 March 2018 15:19:59
File Name: K:\GIS Management\A46_Ecology_Works\GIS\GIS_Working\02_Maps\Ecology\Final\FIGURE 5-3 - RECEPTORS P03.mxd

Figure 5.4 200m Air Quality Study Area



Plot Date: 06 November 2017 13:41:26
File Name: E:\GIS Management\A46_Ecology_Works\GIS\GIS_Working\02_Maps\Ecology\FIGURE X - 200M SURVEY AREA.mxd

SAFETY, HEALTH AND ENVIRONMENTAL INFORMATION BOX

IT IS ASSUMED THAT ALL WORKS ON THIS DRAWING WILL BE CARRIED OUT BY A COMPETENT CONTRACTOR WORKING, WHERE APPROPRIATE, TO AN APPROPRIATE METHOD STATEMENT.

THIS DRAWING IS TO BE USED ONLY FOR THE PURPOSE OF ISSUE THAT IT WAS ISSUED FOR AND IS SUBJECT TO AMENDMENT.

EXCEPTIONAL RISKS RELATING TO THE WORKS ASSOCIATED WITH THIS DRAWING ARE IDENTIFIED BELOW.

CONSTRUCTION

MAINTENANCE / OPERATION / DECOMMISSIONING / DEMOLITION

KEY:

- Site Boundary (Highways Boundary)
- Site Boundary + 200m Buffer

NOTES

1. THIS DRAWING IS TO BE READ IN CONJUNCTION WITH ALL OTHER RELEVANT DOCUMENTATION.
2. DO NOT SCALE FROM THIS DRAWING, USE ONLY PRINTED DIMENSIONS.
3. ALL DIMENSIONS IN MILLIMETRES, ALL CHAINAGES, LEVELS AND COORDINATES ARE IN METRES UNLESS DEFINED OTHERWSE.
4. THIS DRAWING IS TO BE READ IN CONJUNCTION WITH THE PROJECT HEALTH & SAFETY FILE FOR ANY IDENTIFIED POTENTIAL RISKS.
5. CONTAINS OS DATA © CROWN COPYRIGHT AND DATABASE RIGHT 2017

Revision Details	By / Check	Date	Suffix
Additional survey area added	GB / OP	01/11/17	P02
First Issue	DM / OP	07/09/17	P01

Purpose of issue: FOR INFORMATION

Client
Highways England
Major Projects
The Cube
199 Wharfside Street
Birmingham
B1 1RN

Working on behalf of: highways england

Project Title
A46 COVENTRY JUNCTION UPGRADE

Drawing Title
FIGURE 5-4
200M STUDY AREA

Designed	Drawn	Checked	Approved	Date
HP	GB	AR	NT	06/11/2017

Internal Project No.	Suitability
60547444	S0
Scale @ A3	Zone
1:12,500	BINLEY JUNCTION

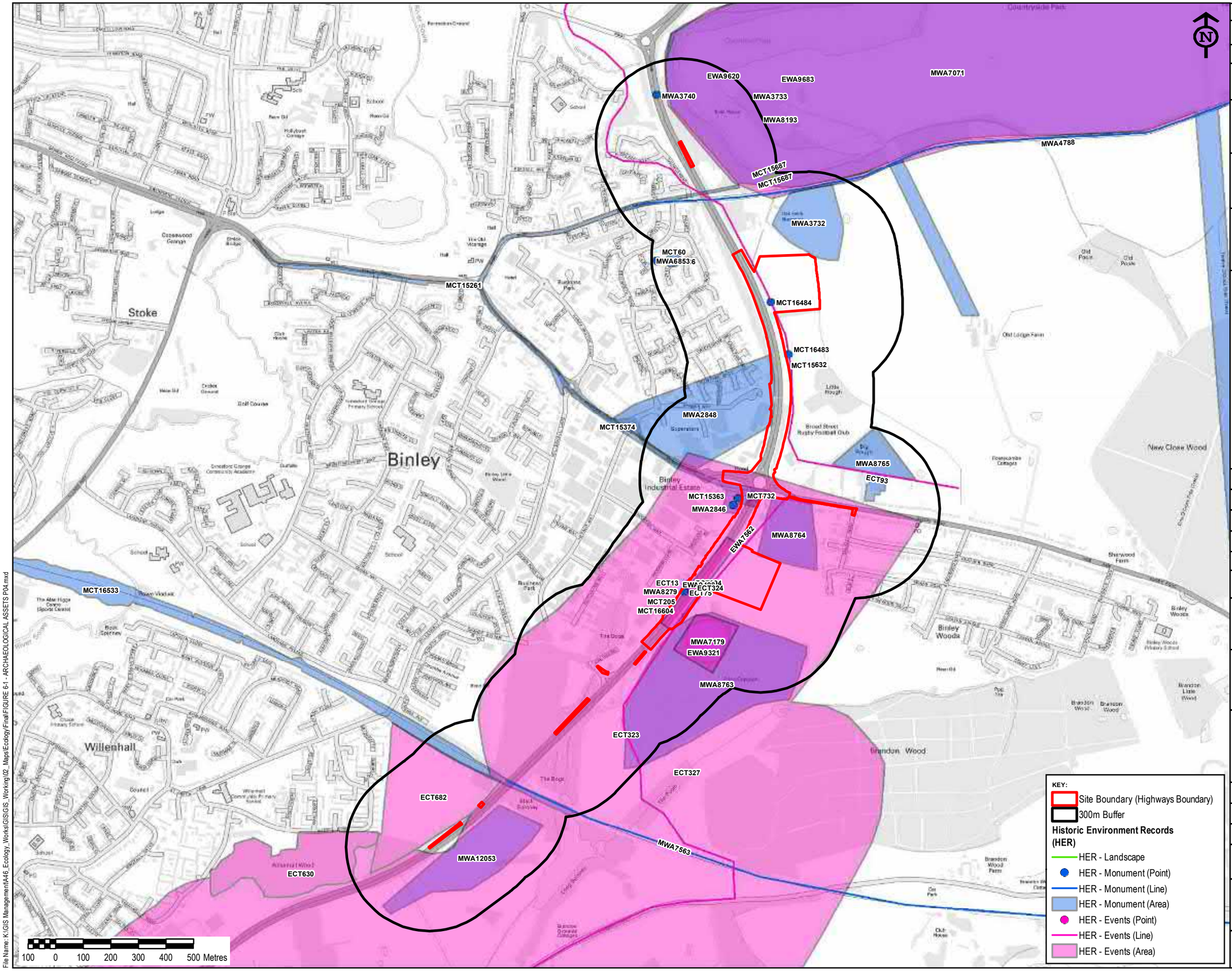
THIS DOCUMENT HAS BEEN PREPARED PURSUANT TO AND SUBJECT TO THE TERMS OF AECOM'S APPOINTMENT BY ITS CLIENT. AECOM ACCEPTS NO LIABILITY FOR ANY USE OF THIS DOCUMENT OTHER THAN BY ITS ORIGINAL CLIENT OR FOLLOWING AECOM'S EXPRESS AGREEMENT TO SUCH USE, AND ONLY FOR THE PURPOSES FOR WHICH IT WAS PREPARED AND PROVIDED.

Project Office
Royal Court
Basil Close, Chesterfield
Derbyshire. S41 7SL
Tel: (01246) 209221
Fax: (01246) 209229
www.aecom.com

AECOM Infrastructure & Environment UK Limited
Registered in England Registered number: 880328
Registered office: Scott House, Alencon Link, Basingstoke, Hampshire RG21 7PP

Drawing Number	Originator	Volume	Rev
Highways England PIN: HE551486 A46_SW_ZZ	-ACM	-EGN - -DR -EG -00001	P02
Location		Type / Role / Number	

Figure 6.1 Archaeological Assets



SAFETY, HEALTH AND ENVIRONMENTAL INFORMATION BOX

IT IS ASSUMED THAT ALL WORKS ON THIS DRAWING WILL BE CARRIED OUT BY A COMPETENT CONTRACTOR WORKING, WHERE APPROPRIATE, TO AN APPROPRIATE METHOD STATEMENT.

THIS DRAWING IS TO BE USED ONLY FOR THE PURPOSE OF ISSUE THAT IT WAS ISSUED FOR AND IS SUBJECT TO AMENDMENT.

EXCEPTIONAL RISKS RELATING TO THE WORKS ASSOCIATED WITH THIS DRAWING ARE IDENTIFIED BELOW.

CONSTRUCTION

MAINTENANCE / OPERATION / DECOMMISSIONING / DEMOLITION

COPYRIGHT
Historic Environment Record (HER) © Warwickshire County Council 09/08/2017. Data reproduced with permission from Warwickshire Historic Environment Record.

Historic Environment Record (HER) © Coventry City Council 26/07/2017. Data reproduced with permission from Coventry Historic Environment Record.

National Heritage List for England © Historic England 2017

NOTES

1. THIS DRAWING IS TO BE READ IN CONJUNCTION WITH ALL OTHER RELEVANT DOCUMENTATION.
2. DO NOT SCALE FROM THIS DRAWING, USE ONLY PRINTED DIMENSIONS.
3. ALL DIMENSIONS IN MILLIMETRES, ALL CHAINAGES, LEVELS AND COORDINATES ARE IN METRES UNLESS DEFINED OTHERWISE.
4. THIS DRAWING IS TO BE READ IN CONJUNCTION WITH THE PROJECT HEALTH & SAFETY FILE FOR ANY IDENTIFIED POTENTIAL RISKS.
5. CONTAINS OS DATA © CROWN COPYRIGHT AND DATABASE RIGHT 2017

Site boundary revised	DM / NT	22/03/18	P04
Heritage assets removed outside buffer	DM / OP	05/12/17	P03
Site Boundary Revised	GB / CG	19/10/17	P02
First Issue	DM / OP	07/09/17	P01
Revision Details	By / Check	Date	Suffix

Purpose of issue: FOR INFORMATION

Client
Highways England
Major Projects
The Cube
199 Wharfeside Street
Birmingham
B1 1RN

Working on behalf of: highways england

Project Title
A46 COVENTRY JUNCTION UPGRADE

Drawing Title
FIGURE 6-1
ARCHAEOLOGICAL ASSETS

Designed	Drawn	Checked	Approved	Date
DM	DM	OP	OP	22/03/2018

Internal Project No. 60547444	Suitability S0
Scale @ A3 1:12,500	Zone BINLEY JUNCTION

THIS DOCUMENT HAS BEEN PREPARED PURSUANT TO AND SUBJECT TO THE TERMS OF AECOM'S APPOINTMENT BY ITS CLIENT. AECOM ACCEPTS NO LIABILITY FOR ANY USE OF THIS DOCUMENT OTHER THAN BY ITS ORIGINAL CLIENT OR FOLLOWING AECOM'S EXPRESS AGREEMENT TO SUCH USE, AND ONLY FOR THE PURPOSES FOR WHICH IT WAS PREPARED AND PROVIDED.

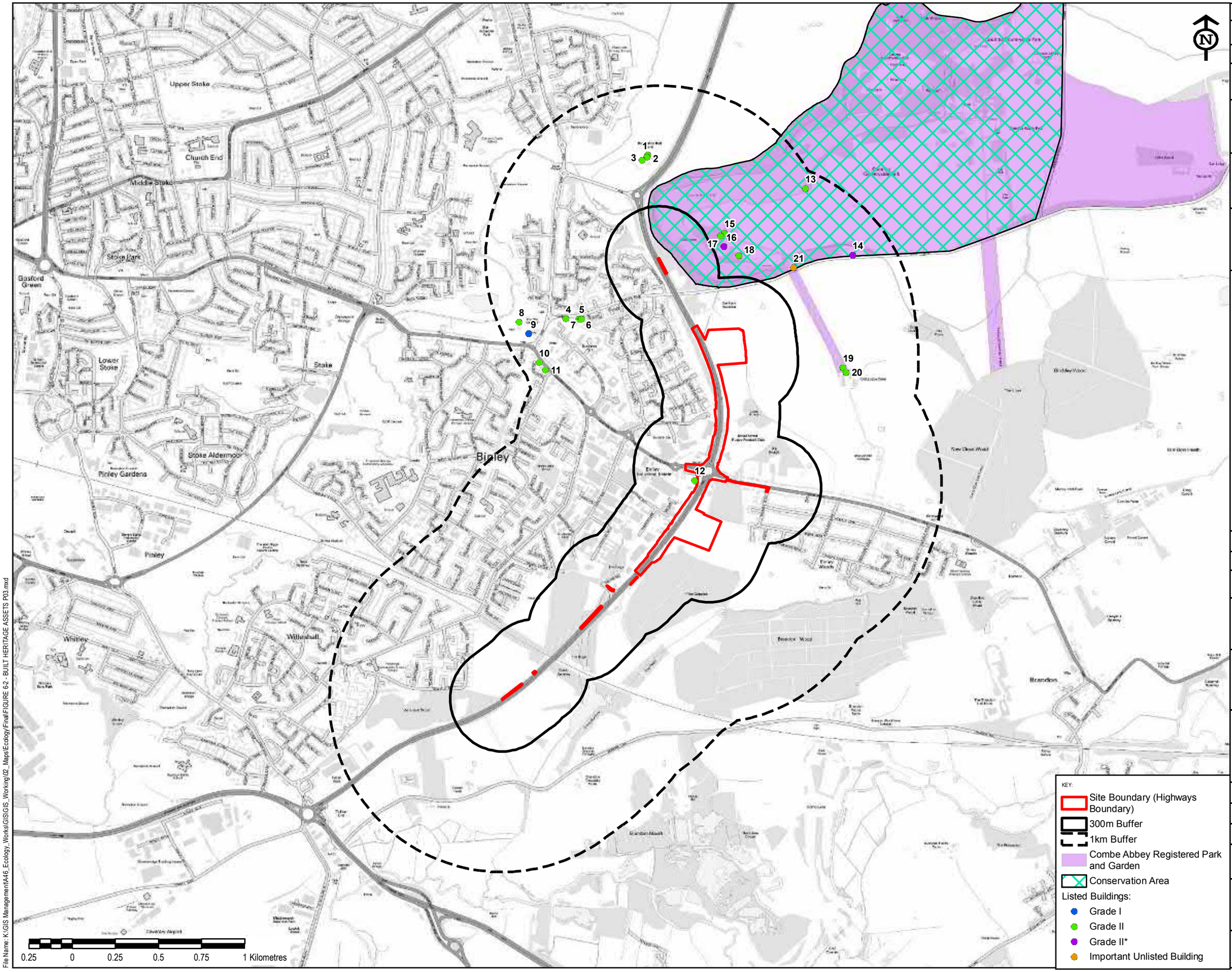
Project Office
Royal Court
Basil Close, Chesterfield
Derbyshire. S41 7SL
Tel: (01246) 209221
Fax: (01246) 209229
www.aecom.com

AECOM Infrastructure & Environment UK Limited
Registered in England Registered number: 880328
Registered office: Scott House, Alencon Link, Basingstoke, Hampshire RG21 7PP

Drawing Number: Highways England PIN HE551486 A46_SW_ZZ | Originator -ACM | Volume -EGN - | Type -DR | Role -LE | Number -00005 | Location | Rev P04

Plot Date: 22 March 2018 15:27:36
File Name: K:\GIS Management\A46_Ecology_Work\GIS\GIS_Working\02_Maps\Ecology\Final\FIGURE 6-1 - ARCHAEOLOGICAL ASSETS P04.mxd

Figure 6.2 Build Heritage Assets



KEY:

- Site Boundary (Highways Boundary)
- 300m Buffer
- 1km Buffer
- Combe Abbey Registered Park and Garden
- Conservation Area

Listed Buildings:

- Grade I
- Grade II
- Grade II*
- Important Unlisted Building

SAFETY, HEALTH AND ENVIRONMENTAL INFORMATION BOX

IT IS ASSUMED THAT ALL WORKS ON THIS DRAWING WILL BE CARRIED OUT BY A COMPETENT CONTRACTOR WORKING, WHERE APPROPRIATE, TO AN APPROPRIATE METHOD STATEMENT.

THIS DRAWING IS TO BE USED ONLY FOR THE PURPOSE OF ISSUE THAT IT WAS ISSUED FOR AND IS SUBJECT TO AMENDMENT.

EXCEPTIONAL RISKS RELATING TO THE WORKS ASSOCIATED WITH THIS DRAWING ARE IDENTIFIED BELOW.

CONSTRUCTION

MAINTENANCE / OPERATION / DECOMMISSIONING / DEMOLITION

COPYRIGHT
Historic Environment Record (HER) © Warwickshire County Council 09/08/2017. Data reproduced with permission from Warwickshire Historic Environment Record.

Historic Environment Record (HER) © Coventry City Council 26/07/2017. Data reproduced with permission from Coventry Historic Environment Record.

National Heritage List for England © Historic England 2017

NOTES

1. THIS DRAWING IS TO BE READ IN CONJUNCTION WITH ALL OTHER RELEVANT DOCUMENTATION.
2. DO NOT SCALE FROM THIS DRAWING, USE ONLY PRINTED DIMENSIONS.
3. ALL DIMENSIONS IN MILLIMETRES, ALL CHAINAGES, LEVELS AND COORDINATES ARE IN METRES UNLESS DEFINED OTHERWISE.
4. THIS DRAWING IS TO BE READ IN CONJUNCTION WITH THE PROJECT HEALTH & SAFETY FILE FOR ANY IDENTIFIED POTENTIAL RISKS.
5. CONTAINS OS DATA © CROWN COPYRIGHT AND DATABASE RIGHT 2017

Revision Details	By	Check	Date	Suffix
Site boundary revised	DM	NT	22/03/18	P03

Purpose of issue: FOR INFORMATION

Client
Highways England
Major Projects
The Cube
199 Wharfside Street
Birmingham
B1 1RN

Working on behalf of: highways england

Project Title: A46 COVENTRY JUNCTION UPGRADE

Drawing Title: FIGURE 6-2 BUILT HERITAGE ASSETS

Designed	Drawn	Checked	Approved	Date
KK	DM	AR	NT	22/03/2018

Internal Project No.	Suitability
60547444	S0
Scale @ A3: 1:20,000	Zone: BINLEY JUNCTION

THIS DOCUMENT HAS BEEN PREPARED PURSUANT TO AND SUBJECT TO THE TERMS OF AECOMS APPOINTMENT BY ITS CLIENT. AECOM ACCEPTS NO LIABILITY FOR ANY USE OF THIS DOCUMENT OTHER THAN BY ITS ORIGINAL CLIENT OR FOLLOWING AECOM'S EXPRESS AGREEMENT TO SUCH USE, AND ONLY FOR THE PURPOSES FOR WHICH IT WAS PREPARED AND PROVIDED.

Project Office
Royal Court
Basil Close, Chesterfield
Derbyshire. S41 7SL
Tel: (01246) 209221
Fax: (01246) 209229
www.aecom.com

AECOM
AECOM Infrastructure & Environment UK Limited
Registered in England Registered number: 880328
Registered office: Scott House, Alencon Link, Basingstoke, Hampshire RG21 7PP

Drawing Number	Originator	Volume			Rev
Highways England PIN					
HE551486	-ACM	-EGN	-		P03
A46_SW_ZZ		-DR	-EG	-00001	
Location		Type	Role	Number	

Plot Date: 22 March 2018 15:32:19
File Name: K:\GIS Management\A46_Ecology_Works\GIS\GIS_Working\02_Maps\Ecology\Final\FIGURE 6-2 - BUILT HERITAGE ASSETS P03.mxd

Figure 6.3 Historic Landscapes

HLC Area 43

Combe Abbey

HLC Area 9

HLC Area 28

HLC Area 8

HLC Area 7

Upper Stoke
Church End
Middle Stoke
Stoke Park
Lower Stoke
Stoke
Stoke Aldermoor
Pinley Gardens
Pinley
Whitley
Willenhall
Binley
Brandon
Wyken

0.25 0 0.25 0.5 0.75 1 Kilometres

KEY:

- Site Boundary (Highways Boundary)
- 300m Buffer
- 1km Buffer
- Registered Park and Garden
- Warwickshire Historic Landscape Character Areas:

Coventry Historic Landscape Character Areas:

- Binley Character Area
- Dorchester Way Character Area
- East Binley Character Area
- South Sowe Character Area
- Willenhall Character Area

SAFETY, HEALTH AND ENVIRONMENTAL INFORMATION BOX

IT IS ASSUMED THAT ALL WORKS ON THIS DRAWING WILL BE CARRIED OUT BY A COMPETENT CONTRACTOR WORKING, WHERE APPROPRIATE, TO AN APPROPRIATE METHOD STATEMENT.

THIS DRAWING IS TO BE USED ONLY FOR THE PURPOSE OF ISSUE THAT IT WAS ISSUED FOR AND IS SUBJECT TO AMENDMENT.

EXCEPTIONAL RISKS RELATING TO THE WORKS ASSOCIATED WITH THIS DRAWING ARE IDENTIFIED BELOW.

CONSTRUCTION

MAINTENANCE / OPERATION / DECOMMISSIONING / DEMOLITION

COPYRIGHT
Warwickshire Historic Landscape Characterisation © Warwickshire County Council 09/08/2017. Data reproduced with permission from Warwickshire Historic Environment Record.

Coventry Historic Landscape Characterisation © Coventry City Council 26/07/2017. Data reproduced with permission from Coventry Historic Environment Record.

National Heritage List for England © Historic England 2018

NOTES

1. THIS DRAWING IS TO BE READ IN CONJUNCTION WITH ALL OTHER RELEVANT DOCUMENTATION.
2. DO NOT SCALE FROM THIS DRAWING, USE ONLY PRINTED DIMENSIONS.
3. ALL DIMENSIONS IN MILLIMETRES, ALL CHAINAGES, LEVELS AND COORDINATES ARE IN METRES UNLESS DEFINED OTHERWISE.
4. THIS DRAWING IS TO BE READ IN CONJUNCTION WITH THE PROJECT HEALTH & SAFETY FILE FOR ANY IDENTIFIED POTENTIAL RISKS.
5. CONTAINS OS DATA © CROWN COPYRIGHT AND DATABASE RIGHT 2017

Revision Details	By / Check	Date	Suffix
Site boundary revised	DM / NT	22/03/18	P03

Purpose of issue: FOR INFORMATION

Client
Highways England
Major Projects
The Cube
199 Wharfeside Street
Birmingham
B1 1RN

Working on behalf of: highways england

Project Title

A46 COVENTRY JUNCTION UPGRADE

Drawing Title

FIGURE 6-3 HISTORIC LANDSCAPE

Designed	Drawn	Checked	Approved	Date
KK	DM	AR	NT	22/03/2018

Internal Project No.	Suitability
60547444	S0
Scale @ A3: 1:20,000	Zone: BINLEY JUNCTION

THIS DOCUMENT HAS BEEN PREPARED PURSUANT TO AND SUBJECT TO THE TERMS OF AECOM'S APPOINTMENT BY ITS CLIENT. AECOM ACCEPTS NO LIABILITY FOR ANY USE OF THIS DOCUMENT OTHER THAN BY ITS ORIGINAL CLIENT OR FOLLOWING AECOM'S EXPRESS AGREEMENT TO SUCH USE, AND ONLY FOR THE PURPOSES FOR WHICH IT WAS PREPARED AND PROVIDED.

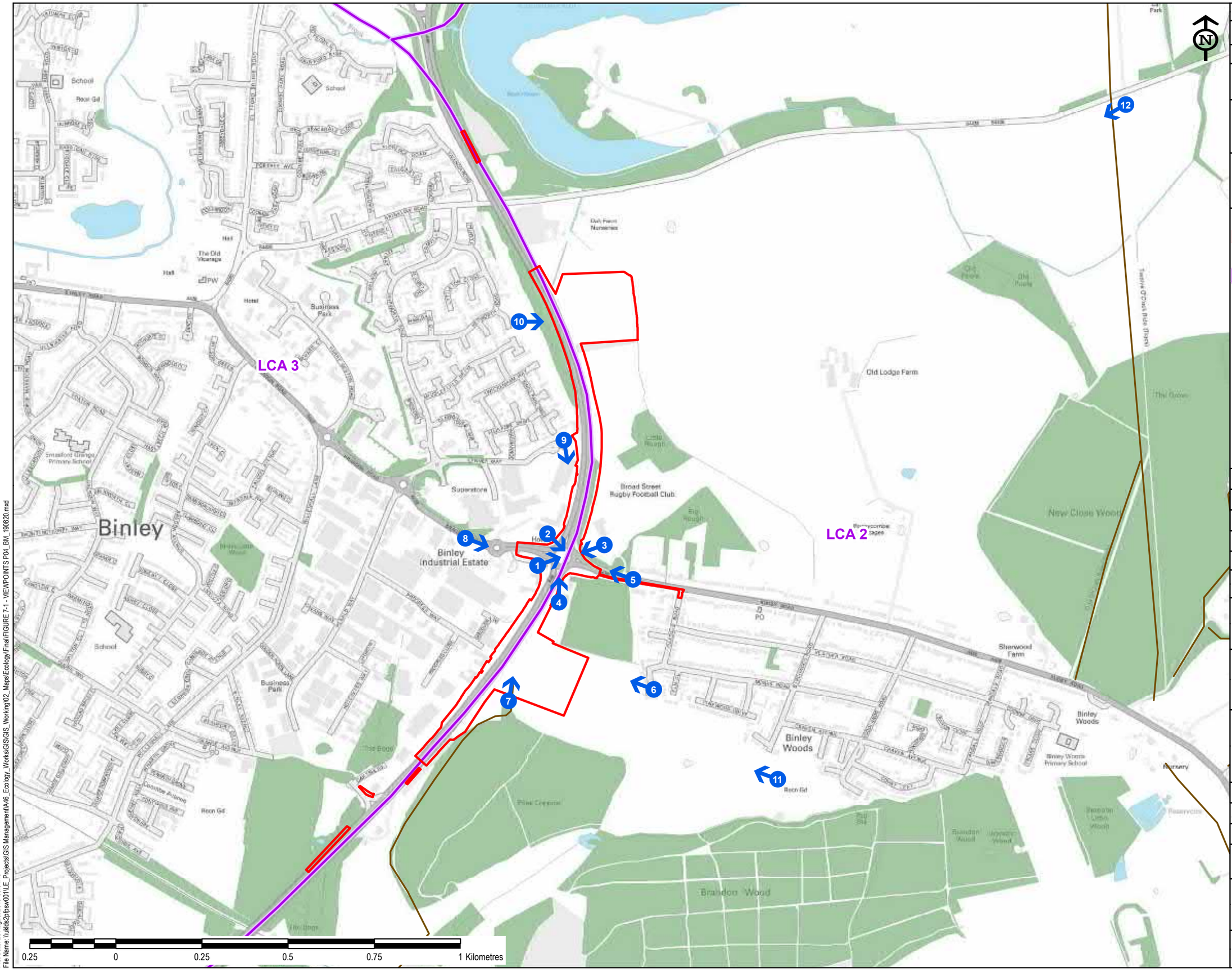
Project Office
Royal Court
Basil Close, Chesterfield
Derbyshire. S41 7SL
Tel: (01246) 209221
Fax: (01246) 209229
www.aecom.com

AECOM Infrastructure & Environment UK Limited
Registered in England Registered number: 880328
Registered office: Scott House, Alencon Link, Basingstoke, Hampshire RG21 7PP

Drawing Number	Originator	Volume	Rev
Highways England PIN: HE551486 A46_SW_ZZ (Location)	-ACM	-EGN -	P03
		-DR -EG -00001 (Type | Role | Number)	

Plot Date: 22 March 2018 15:34:40
File Name: K:\GIS Management\A46_Ecology_Works\GIS\GIS_Working\02_Maps\Ecology\Final\FIGURE 6-3 - HISTORIC LANDSCAPES.mxd

Figure 7.1 Locations of LCAs and Viewpoints for Visual Assessment



SAFETY, HEALTH AND ENVIRONMENTAL INFORMATION BOX

IT IS ASSUMED THAT ALL WORKS ON THIS DRAWING WILL BE CARRIED OUT BY A COMPETENT CONTRACTOR WORKING, WHERE APPROPRIATE, TO AN APPROPRIATE METHOD STATEMENT.

THIS DRAWING IS TO BE USED ONLY FOR THE PURPOSE OF ISSUE THAT IT WAS ISSUED FOR AND IS SUBJECT TO AMENDMENT.

EXCEPTIONAL RISKS RELATING TO THE WORKS ASSOCIATED WITH THIS DRAWING ARE IDENTIFIED BELOW.

CONSTRUCTION

MAINTENANCE / OPERATION / DECOMMISSIONING / DEMOLITION

KEY:

- Site Boundary (Highways Boundary)
- Viewpoint
- Local Character Area (LCA)
- Public Rights of Way
- Water
- Woodland

NOTES

1. THIS DRAWING IS TO BE READ IN CONJUNCTION WITH ALL OTHER RELEVANT DOCUMENTATION.
2. DO NOT SCALE FROM THIS DRAWING, USE ONLY PRINTED DIMENSIONS.
3. ALL DIMENSIONS IN MILLIMETRES, ALL CHAINAGES, LEVELS AND COORDINATES ARE IN METRES UNLESS DEFINED OTHERWISE.
4. THIS DRAWING IS TO BE READ IN CONJUNCTION WITH THE PROJECT HEALTH & SAFETY FILE FOR ANY IDENTIFIED POTENTIAL RISKS.
5. CONTAINS OS DATA © CROWN COPYRIGHT AND DATABASE RIGHT 2017

Revision Details	By / Check	Date	Suffix
Site Boundary Revised	GB / NT	22/03/18	P04
Site Boundary Revised	GB / JA	09/11/17	P03
Site Boundary Revised	GB / CG	19/10/17	P02
First Issue	DM / OP	07/09/17	P01

Purpose of issue: FOR INFORMATION

Client
Highways England
Major Projects
The Cube
199 Wharfside Street
Birmingham
B1 1RN

Working on behalf of highways england

Project Title
A46 COVENTRY JUNCTION UPGRADE

Drawing Title
FIGURE 7-1
VIEWPOINTS FOR VISUAL ASSESMENT

Designed	Drawn	Checked	Approved	Date
HP	GB	AR	NT	20/08/2019

Internal Project No.	Suitability
60547444	S0
Scale @ A3: 1:10,000	Zone: BINLEY JUNCTION

THIS DOCUMENT HAS BEEN PREPARED PURSUANT TO AND SUBJECT TO THE TERMS OF AECOM'S APPOINTMENT BY ITS CLIENT. AECOM ACCEPTS NO LIABILITY FOR ANY USE OF THIS DOCUMENT OTHER THAN BY ITS ORIGINAL CLIENT OR FOLLOWING AECOM'S EXPRESS AGREEMENT TO SUCH USE, AND ONLY FOR THE PURPOSES FOR WHICH IT WAS PREPARED AND PROVIDED.

Project Office
Royal Court
Basil Close, Chesterfield
Derbyshire. S41 7SL
Tel: (01246) 209221
Fax: (01246) 209229
www.aecom.com

AECOM
AECOM Infrastructure & Environment UK Limited
Registered in England Registered number: 880328
Registered office: Scott House, Alencon Link, Basingstoke, Hampshire RG21 7PP

Drawing Number
Highways England PIN | Originator | Volume | Rev
HE551486 | -ACM | -EGN - | P04
Location: A46_SW_ZZ | Type -DR | Role -LE | Number -00002

Plot Date: 20 August 2019 09:34:15
File Name: \\ukkds2pfsw001\LE_Projects\GIS Management\A46_Ecology_Works\GIS\GIS_Working\02_Maps\Ecology\Final\FIGURE 7-1 - VIEWPOINTS P04_BM_190820.mxd

Figure 7.2 Zones of Theoretical Visibility

Figure 7.2 (a) ZTV 1.5m Observer Heights



SAFETY, HEALTH AND ENVIRONMENTAL INFORMATION BOX

IT IS ASSUMED THAT ALL WORKS ON THIS DRAWING WILL BE CARRIED OUT BY A COMPETENT CONTRACTOR WORKING, WHERE APPROPRIATE, TO AN APPROPRIATE METHOD STATEMENT.

THIS DRAWING IS TO BE USED ONLY FOR THE PURPOSE OF ISSUE THAT IT WAS ISSUED FOR AND IS SUBJECT TO AMENDMENT.

EXCEPTIONAL RISKS RELATING TO THE WORKS ASSOCIATED WITH THIS DRAWING ARE IDENTIFIED BELOW.

CONSTRUCTION

MAINTENANCE / OPERATION / DECOMMISSIONING / DEMOLITION

KEY:

- AECOM VE Scheme
- AECOM VE Scheme + 1km Buffer
- National Forest Inventory
- Buildings

Zone of Theoretical Visibility (ZTV)

- Not Visible
- Visible

NOTES

1. THIS DRAWING IS TO BE READ IN CONJUNCTION WITH ALL OTHER RELEVANT DOCUMENTATION.
2. DO NOT SCALE FROM THIS DRAWING, USE ONLY PRINTED DIMENSIONS.
3. ALL DIMENSIONS IN MILLIMETRES, ALL CHAINAGES, LEVELS AND COORDINATES ARE IN METRES UNLESS DEFINED OTHERWISE.
4. THIS DRAWING IS TO BE READ IN CONJUNCTION WITH THE PROJECT HEALTH & SAFETY FILE FOR ANY IDENTIFIED POTENTIAL RISKS.
5. CONTAINS OS DATA © CROWN COPYRIGHT AND DATABASE RIGHT 2017

First Issue	BM / AR	26/10/17	P01	
Revision Details	By / Check	Date	Suffix	

Purpose of issue: FOR INFORMATION

Client
Highways England
Major Projects
The Cube
199 Wharfside Street
Birmingham
B1 1RN

Working on behalf of highways england

Project Title

A46 COVENTRY JUNCTION UPGRADE

Drawing Title

ZONE OF THEORETICAL VISIBILITY (ZTV) 1.5M OBSERVER HEIGHTS

Designed	Drawn	Checked	Approved	Date
BM	BM	AR	JA	26/10/2017

Internal Project No.	Suitability
60547444	S0
Scale @ A3	Zone
1:15,000	BINLEY JUNCTION

THIS DOCUMENT HAS BEEN PREPARED PURSUANT TO AND SUBJECT TO THE TERMS OF AECOM'S APPOINTMENT BY ITS CLIENT. AECOM ACCEPTS NO LIABILITY FOR ANY USE OF THIS DOCUMENT OTHER THAN BY ITS ORIGINAL CLIENT OR FOLLOWING AECOM'S EXPRESS AGREEMENT TO SUCH USE, AND ONLY FOR THE PURPOSES FOR WHICH IT WAS PREPARED AND PROVIDED.

Project Office
Royal Court
Basil Close, Chesterfield
Derbyshire. S41 7SL
Tel: (01246) 209221
Fax: (01246) 209229
www.aecom.com

AECOM

AECOM Infrastructure & Environment UK Limited
Registered in England Registered number: 880328
Registered office: Scott House, Alencon Link, Basingstoke, Hampshire RG21 7PP

Drawing Number	Originator	Volume			Rev
Highways England PIN					
HE551486	-ACM	-EGN	-		P01
A46_SW_ZZ		-DR	-EG	-00001	
Location		Type	Role	Number	

Plot Date: 26 October 2017 11:01:11
File Name: Y:\GIS\Bath Working\02. Jobs\20171023 - A46\171026_ZTV_1.5m.mxd

Figure 7.2 (b) ZTV 4.5m Observer Heights



N

SAFETY, HEALTH AND ENVIRONMENTAL INFORMATION BOX

IT IS ASSUMED THAT ALL WORKS ON THIS DRAWING WILL BE CARRIED OUT BY A COMPETENT CONTRACTOR WORKING, WHERE APPROPRIATE, TO AN APPROPRIATE METHOD STATEMENT.

THIS DRAWING IS TO BE USED ONLY FOR THE PURPOSE OF ISSUE THAT IT WAS ISSUED FOR AND IS SUBJECT TO AMENDMENT.

EXCEPTIONAL RISKS RELATING TO THE WORKS ASSOCIATED WITH THIS DRAWING ARE IDENTIFIED BELOW.

CONSTRUCTION

MAINTENANCE / OPERATION / DECOMMISSIONING / DEMOLITION

KEY:

- AECOM VE Scheme
- AECOM VE Scheme + 1km Buffer
- National Forest Inventory
- Buildings

Zone of Theoretical Visibility (ZTV)

- Not Visible
- Visible

NOTES

1. THIS DRAWING IS TO BE READ IN CONJUNCTION WITH ALL OTHER RELEVANT DOCUMENTATION.
2. DO NOT SCALE FROM THIS DRAWING, USE ONLY PRINTED DIMENSIONS.
3. ALL DIMENSIONS IN MILLIMETRES, ALL CHAINAGES, LEVELS AND COORDINATES ARE IN METRES UNLESS DEFINED OTHERWISE.
4. THIS DRAWING IS TO BE READ IN CONJUNCTION WITH THE PROJECT HEALTH & SAFETY FILE FOR ANY IDENTIFIED POTENTIAL RISKS.
5. CONTAINS OS DATA © CROWN COPYRIGHT AND DATABASE RIGHT 2017

Revision Details	By	Check	Date	Suffix
First Issue	BM	AR	26/10/17	P01

Purpose of issue: FOR INFORMATION

Client
Highways England
Major Projects
The Cube
199 Wharfside Street
Birmingham
B1 1RN

Working on behalf of highways england

Project Title

A46 COVENTRY JUNCTION UPGRADE

Drawing Title

ZONE OF THEORETICAL VISIBILITY (ZTV) 4.5M OBSERVER HEIGHTS

Designed	Drawn	Checked	Approved	Date
BM	BM	AR	JA	26/10/2017

Internal Project No.	Suitability
60547444	S0
Scale @ A3	Zone
1:15,000	BINLEY JUNCTION

THIS DOCUMENT HAS BEEN PREPARED PURSUANT TO AND SUBJECT TO THE TERMS OF AECOM'S APPOINTMENT BY ITS CLIENT. AECOM ACCEPTS NO LIABILITY FOR ANY USE OF THIS DOCUMENT OTHER THAN BY ITS ORIGINAL CLIENT OR FOLLOWING AECOM'S EXPRESS AGREEMENT TO SUCH USE, AND ONLY FOR THE PURPOSES FOR WHICH IT WAS PREPARED AND PROVIDED.

Project Office
Royal Court
Basil Close, Chesterfield
Derbyshire. S41 7SL
Tel: (01246) 209221
Fax: (01246) 209229
www.aecom.com

AECOM
AECOM Infrastructure & Environment UK Limited
Registered in England Registered number: 880328
Registered office: Scott House, Alencon Link, Basingstoke, Hampshire RG21 7PP

Drawing Number	Originator	Volume			Rev
Highways England PIN					
HE551486	-ACM	-EGN	-		P01
A46_SW_ZZ		-DR	-EG	-00001	
Location		Type	Role	Number	

Plot Date: 26 October 2017 10:59:54
File Name: Y:\GIS\Beth Workinn\02. Jobs\20171023 - A46\171026_ZTV_4_5m.mxd

Figure 7.2 (c) ZTV 12.5m Observer Heights

SAFETY, HEALTH AND ENVIRONMENTAL INFORMATION BOX

IT IS ASSUMED THAT ALL WORKS ON THIS DRAWING WILL BE CARRIED OUT BY A COMPETENT CONTRACTOR WORKING, WHERE APPROPRIATE, TO AN APPROPRIATE METHOD STATEMENT.

THIS DRAWING IS TO BE USED ONLY FOR THE PURPOSE OF ISSUE THAT IT WAS ISSUED FOR AND IS SUBJECT TO AMENDMENT.

EXCEPTIONAL RISKS RELATING TO THE WORKS ASSOCIATED WITH THIS DRAWING ARE IDENTIFIED BELOW.

CONSTRUCTION

MAINTENANCE / OPERATION / DECOMMISSIONING / DEMOLITION

KEY:

- AECOM VE Scheme
- AECOM VE Scheme + 1km Buffer
- National Forest Inventory
- Buildings

Zone of Theoretical Visibility (ZTV)

- Not Visible
- Visible

NOTES

1. THIS DRAWING IS TO BE READ IN CONJUNCTION WITH ALL OTHER RELEVANT DOCUMENTATION.
2. DO NOT SCALE FROM THIS DRAWING, USE ONLY PRINTED DIMENSIONS.
3. ALL DIMENSIONS IN MILLIMETRES, ALL CHAINAGES, LEVELS AND COORDINATES ARE IN METRES UNLESS DEFINED OTHERWISE.
4. THIS DRAWING IS TO BE READ IN CONJUNCTION WITH THE PROJECT HEALTH & SAFETY FILE FOR ANY IDENTIFIED POTENTIAL RISKS.
5. CONTAINS OS DATA © CROWN COPYRIGHT AND DATABASE RIGHT 2017

First Issue	BM / AR	26/10/17	P01
Revision Details	By / Check	Date	Suffix

Purpose of issue
FOR INFORMATION

Client
Highways England
Major Projects
The Cube
199 Wharfside Street
Birmingham
B1 1RN

Working on behalf of highways england

Project Title
A46 COVENTRY
JUNCTION UPGRADE

Drawing Title
ZONE OF THEORETICAL VISIBILITY (ZTV)
12.5M OBSERVER HEIGHTS

Designed	Drawn	Checked	Approved	Date
BM	BM	AR	JA	26/10/2017

Internal Project No.	Suitability
60547444	S0
Scale @ A3	Zone
1:15,000	BINLEY JUNCTION

THIS DOCUMENT HAS BEEN PREPARED PURSUANT TO AND SUBJECT TO THE TERMS OF AECOM'S APPOINTMENT BY ITS CLIENT. AECOM ACCEPTS NO LIABILITY FOR ANY USE OF THIS DOCUMENT OTHER THAN BY ITS ORIGINAL CLIENT OR FOLLOWING AECOM'S EXPRESS AGREEMENT TO SUCH USE, AND ONLY FOR THE PURPOSES FOR WHICH IT WAS PREPARED AND PROVIDED.

Project Office
Royal Court
Basil Close, Chesterfield
Derbyshire. S41 7SL
Tel: (01246) 209221
Fax: (01246) 209229
www.aecom.com

AECOM Infrastructure & Environment UK Limited
Registered in England Registered number: 880328
Registered office: Scott House, Alencon Link, Basingstoke, Hampshire RG21 7PP

Drawing Number	Originator	Volume	Rev
Highways England PIN: HE551486	-ACM	-EGN -	P01
Location: A46_SW_ZZ		-DR -EG -00001	
		Type | Role | Number	

Plot Date: 26 October 2017 10:52:41
File Name: Y:\GIS\Beth Working\02_Jobs\20171023 - A46\171026_ZTV_12.5m.mxd

Figure 7.2 (d) ZTV 12.5m Observer Heights (Extended)



SAFETY, HEALTH AND ENVIRONMENTAL INFORMATION BOX

IT IS ASSUMED THAT ALL WORKS ON THIS DRAWING WILL BE CARRIED OUT BY A COMPETENT CONTRACTOR WORKING, WHERE APPROPRIATE, TO AN APPROPRIATE METHOD STATEMENT.

THIS DRAWING IS TO BE USED ONLY FOR THE PURPOSE OF ISSUE THAT IT WAS ISSUED FOR AND IS SUBJECT TO AMENDMENT.

EXCEPTIONAL RISKS RELATING TO THE WORKS ASSOCIATED WITH THIS DRAWING ARE IDENTIFIED BELOW.

CONSTRUCTION

MAINTENANCE / OPERATION / DECOMMISSIONING / DEMOLITION

KEY:

- AECOM VE Scheme
- AECOM VE Scheme + 1km Buffer
- National Forest Inventory
- Buildings

Zone of Theoretical Visibility (ZTV)

- Not Visible
- Visible

NOTES

1. THIS DRAWING IS TO BE READ IN CONJUNCTION WITH ALL OTHER RELEVANT DOCUMENTATION.
2. DO NOT SCALE FROM THIS DRAWING, USE ONLY PRINTED DIMENSIONS.
3. ALL DIMENSIONS IN MILLIMETRES, ALL CHAINAGES, LEVELS AND COORDINATES ARE IN METRES UNLESS DEFINED OTHERWISE.
4. THIS DRAWING IS TO BE READ IN CONJUNCTION WITH THE PROJECT HEALTH & SAFETY FILE FOR ANY IDENTIFIED POTENTIAL RISKS.
5. CONTAINS OS DATA © CROWN COPYRIGHT AND DATABASE RIGHT 2017

	By	Check	Date	Suffix
First Issue	BM	AR	26/10/17	P01
Revision Details				

Purpose of issue
FOR INFORMATION

Client
Highways England
Major Projects
The Cube
199 Wharfside Street
Birmingham
B1 1RN

Working on behalf of highways england

Project Title
A46 COVENTRY
JUNCTION UPGRADE

Drawing Title
ZONE OF THEORETICAL VISIBILITY (ZTV)
12.5M OBSERVER HEIGHTS

Designed	Drawn	Checked	Approved	Date
BM	BM	AR	JA	01/11/2017

Internal Project No.	Suitability
60547444	S0
Scale @ A3	Zone
1:15,000	BINLEY JUNCTION

THIS DOCUMENT HAS BEEN PREPARED PURSUANT TO AND SUBJECT TO THE TERMS OF AECOM'S APPOINTMENT BY ITS CLIENT. AECOM ACCEPTS NO LIABILITY FOR ANY USE OF THIS DOCUMENT OTHER THAN BY ITS ORIGINAL CLIENT OR FOLLOWING AECOM'S EXPRESS AGREEMENT TO SUCH USE, AND ONLY FOR THE PURPOSES FOR WHICH IT WAS PREPARED AND PROVIDED.

Project Office
Royal Court
Basil Close, Chesterfield
Derbyshire, S41 7SL
Tel: (01246) 209221
Fax: (01246) 209229
www.aecom.com

AECOM
AECOM Infrastructure & Environment UK Limited
Registered in England Registered number: 880328
Registered office: Scott House, Alencon Link, Basingstoke, Hampshire RG21 7PP

Drawing Number Highways England PIN	Originator	Volume			Rev
HE551486	-ACM	-EGN	-		P01
A46_SW_ZZ		-DR	-EG	-00001	
Location		Type	Role	Number	

Plot Date: 01 November 2017 09:54:04
File Name: Y:\GIS\Bath Working\02_Jobs\20171023 - A46MXDs\171026_ZTV_12_5m_Ext.mxd

Figure 7.3 (a)

Viewpoint 1 Cocked Hat Hotel, Binley Industrial Estate

SUMMER



Viewpoint number: 1
Location title: Cocked Hat Hotel, Binley Ind. Estate
Camera model: Canon EOS 6D
Focal length: 50mm
Camera height: 1.6m
Photo taken: 22/09/2017
View at a comfortable arm's length between
30cm and 50cm

WINTER



Viewpoint number: 1
Location title: Cocked Hat Hotel, Binley Ind. Estate
Camera model: Canon EOS 6D
Focal length: 50mm
Camera height: 1.6m
Photo taken: 24/11/2017
View at a comfortable arm's length between
30cm and 50cm

SAFETY, HEALTH AND ENVIRONMENTAL INFORMATION BOX

IT IS ASSUMED THAT ALL WORKS ON THIS DRAWING WILL BE CARRIED OUT BY A COMPETENT CONTRACTOR WORKING, WHERE APPROPRIATE, TO AN APPROPRIATE METHOD STATEMENT.

THIS DRAWING IS TO BE USED ONLY FOR THE PURPOSE OF ISSUE THAT IT WAS ISSUED FOR AND IS SUBJECT TO AMENDMENT.

EXCEPTIONAL RISKS RELATING TO THE WORKS ASSOCIATED WITH THIS DRAWING ARE IDENTIFIED BELOW.

CONSTRUCTION

MAINTENANCE / OPERATION / DECOMMISSIONING / DEMOLITION

First Issue	DM / OP	07/09/17	P01
Revision Details	By / Check	Date	Suffix

Purpose of issue
FOR INFORMATION

Client
Highways England
Major Projects
The Cube
199 Wharfeside Street
Birmingham
B1 1RN

Working on behalf of highways england

Project Title
A46 COVENTRY
JUNCTION UPGRADE

Drawing Title
FIGURE 7-3a
VIEWPOINT 1:
COCKED HAT HOTEL,
BINLEY INDUSTRIAL ESTATE

Designed	Drawn	Checked	Approved	Date
HP	BM	AR	NT	12/12/2017

Internal Project No. 60547444	Suitability S0
Scale @ A3	Zone BINLEY JUNCTION

THIS DOCUMENT HAS BEEN PREPARED PURSUANT TO AND SUBJECT TO THE TERMS OF AECOM'S APPOINTMENT BY ITS CLIENT. AECOM ACCEPTS NO LIABILITY FOR ANY USE OF THIS DOCUMENT OTHER THAN BY ITS ORIGINAL CLIENT OR FOLLOWING AECOM'S EXPRESS AGREEMENT TO SUCH USE, AND ONLY FOR THE PURPOSES FOR WHICH IT WAS PREPARED AND PROVIDED.

Project Office
Royal Court
Basil Close, Chesterfield
Derbyshire. S41 7SL
Tel: (01246) 209221
Fax: (01246) 209229
www.aecom.com

AECOM
AECOM Infrastructure & Environment UK Limited
Registered in England Registered number: 880328
Registered office: Scott House, Alencon Link, Basingstoke, Hampshire RG21 7PP

Drawing Number Highways England PIN	Originator	Volume			Rev
HE551486	-ACM	-EGN -			
A46_SW_ZZ		-DR	-LE	-00002	
Location		Type	Role	Number	

Plot Date: 12 December 2017 13:20:14
File Name: Y:\GIS\Beth Working\02. Jobs\20171023 - A46\MXDs\171109_VP1_Photos_v02.mxd

Figure 7.3 (b)

Viewpoint 2 Premier Inn Hotel

SUMMER



Viewpoint number: 2
Location title: Premier Inn Hotel
Camera model: Canon EOS 6D
Focal length: 50mm
Camera height: 1.6m
Photo taken: 22/09/2017
View at a comfortable arm's length between
30cm and 50cm

WINTER



Viewpoint number: 2
Location title: Premier Inn Hotel
Camera model: Nikon D3100
Focal length: 32mm
Camera height: 1.6m
Photo taken: 31/01/2017
View at a comfortable arm's length between
30cm and 50cm

SAFETY, HEALTH AND ENVIRONMENTAL INFORMATION BOX

IT IS ASSUMED THAT ALL WORKS ON THIS DRAWING WILL BE CARRIED OUT BY A COMPETENT CONTRACTOR WORKING, WHERE APPROPRIATE, TO AN APPROPRIATE METHOD STATEMENT.

THIS DRAWING IS TO BE USED ONLY FOR THE PURPOSE OF ISSUE THAT IT WAS ISSUED FOR AND IS SUBJECT TO AMENDMENT.

EXCEPTIONAL RISKS RELATING TO THE WORKS ASSOCIATED WITH THIS DRAWING ARE IDENTIFIED BELOW.

CONSTRUCTION

MAINTENANCE / OPERATION / DECOMMISSIONING / DEMOLITION

First Issue	DM / OP	07/09/17	P01
Revision Details	By / Check	Date	Suffix

Purpose of issue
FOR INFORMATION

Client
Highways England
Major Projects
The Cube
199 Wharfside Street
Birmingham
B1 1RN

Project Title
A46 COVENTRY
JUNCTION UPGRADE

Drawing Title
FIGURE 7-3b
VIEWPOINT 2:
PREMIER INN HOTEL

Designed	Drawn	Checked	Approved	Date
HP	BM	AR	NT	29/11/2017

Internal Project No.	Suitability
60547444	S0
Scale @ A3	Zone
	BINLEY JUNCTION

THIS DOCUMENT HAS BEEN PREPARED PURSUANT TO AND SUBJECT TO THE TERMS OF AECOM'S APPOINTMENT BY ITS CLIENT. AECOM ACCEPTS NO LIABILITY FOR ANY USE OF THIS DOCUMENT OTHER THAN BY ITS ORIGINAL CLIENT OR FOLLOWING AECOM'S EXPRESS AGREEMENT TO SUCH USE, AND ONLY FOR THE PURPOSES FOR WHICH IT WAS PREPARED AND PROVIDED.

Project Office
Royal Court
Basil Close, Chesterfield
Derbyshire. S41 7SL
Tel: (01246) 209221
Fax: (01246) 209229
www.aecom.com

AECOM Infrastructure & Environment UK Limited
Registered in England Registered number: 880328
Registered office: Scott House, Alencon Link,
Basingstoke, Hampshire RG21 7PP

Drawing Number Highways England PIN	Originator	Volume			Rev
HE551486	-ACM	-EGN -			
A46_SW_ZZ		-DR	-LE	-00002	
Location		Type	Role	Number	

Plot Date: 29 November 2017 16:30:53
File Name: Y:\GIS\Beth Working\02. Jobs\20171023 - A46\MXDs\171109_VP2_Photos_v02.mxd

Figure 7.3 (c)

Viewpoint 3 Broadstreet Rugby Club

SUMMER



Viewpoint number: 3
Location title: Broadstreet Rugby Club
Camera model: Canon EOS 6D
Focal length: 50mm
Camera height: 1.6m
Photo taken: 22/09/2017
View at a comfortable arm's length between 30cm and 50cm

WINTER



Viewpoint number: 3
Location title: Broadstreet Rugby Club
Camera model: Nikon D3100
Focal length: 32mm
Camera height: 1.6m
Photo taken: 31/01/2017
View at a comfortable arm's length between 30cm and 50cm

SAFETY, HEALTH AND ENVIRONMENTAL INFORMATION BOX

IT IS ASSUMED THAT ALL WORKS ON THIS DRAWING WILL BE CARRIED OUT BY A COMPETENT CONTRACTOR WORKING, WHERE APPROPRIATE, TO AN APPROPRIATE METHOD STATEMENT.

THIS DRAWING IS TO BE USED ONLY FOR THE PURPOSE OF ISSUE THAT IT WAS ISSUED FOR AND IS SUBJECT TO AMENDMENT.

EXCEPTIONAL RISKS RELATING TO THE WORKS ASSOCIATED WITH THIS DRAWING ARE IDENTIFIED BELOW.

CONSTRUCTION

MAINTENANCE / OPERATION / DECOMMISSIONING / DEMOLITION

First Issue	DM / OP	07/09/17	P01
Revision Details	By / Check	Date	Suffix

Purpose of issue
FOR INFORMATION

Client
Highways England
Major Projects
The Cube
199 Wharfside Street
Birmingham
B1 1RN

Working on behalf of highways england

Project Title
A46 COVENTRY JUNCTION UPGRADE

Drawing Title
FIGURE 7-3c
VIEWPOINT 3:
BROADSTREET RUGBY CLUB

Designed	Drawn	Checked	Approved	Date
HP	BM	AR	NT	29/11/2017

Internal Project No. 60547444	Suitability S0
Scale @ A3	Zone BINLEY JUNCTION

THIS DOCUMENT HAS BEEN PREPARED PURSUANT TO AND SUBJECT TO THE TERMS OF AECOM'S APPOINTMENT BY ITS CLIENT. AECOM ACCEPTS NO LIABILITY FOR ANY USE OF THIS DOCUMENT OTHER THAN BY ITS ORIGINAL CLIENT OR FOLLOWING AECOM'S EXPRESS AGREEMENT TO SUCH USE, AND ONLY FOR THE PURPOSES FOR WHICH IT WAS PREPARED AND PROVIDED.

Project Office
Royal Court
Basil Close, Chesterfield
Derbyshire. S41 7SL
Tel: (01246) 209221
Fax: (01246) 209229
www.aecom.com

AECOM
AECOM Infrastructure & Environment UK Limited
Registered in England Registered number: 880328
Registered office: Scott House, Alencon Link, Basingstoke, Hampshire RG21 7PP

Drawing Number	Originator	Volume			Rev
Highways England PIN					
HE551486	-ACM	-EGN -			
A46_SW_ZZ		-DR	-LE	-00002	
Location		Type	Role	Number	

Plot Date: 29 November 2017 16:06:26
File Name: Y:\GIS\Beth Working\02. Jobs\20171023 - A46\MXDs\171109_VP3_Photos_v02.mxd

Figure 7.3 (d)

Viewpoint 4 Greens Home and Garden Centre

SUMMER



Viewpoint number: 4
Location title: Greens Home & Garden Centre
Camera model: Canon EOS 6D
Focal length: 50mm
Camera height: 1.6m
Photo taken: 22/09/2017
View at a comfortable arm's length between 30cm and 50cm

WINTER



Viewpoint number: 4
Location title: Greens Home & Garden Centre
Camera model: Canon EOS 6D
Focal length: 50mm
Camera height: 1.6m
Photo taken: 24/11/2017
View at a comfortable arm's length between 30cm and 50cm

SAFETY, HEALTH AND ENVIRONMENTAL INFORMATION BOX

IT IS ASSUMED THAT ALL WORKS ON THIS DRAWING WILL BE CARRIED OUT BY A COMPETENT CONTRACTOR WORKING, WHERE APPROPRIATE, TO AN APPROPRIATE METHOD STATEMENT.

THIS DRAWING IS TO BE USED ONLY FOR THE PURPOSE OF ISSUE THAT IT WAS ISSUED FOR AND IS SUBJECT TO AMENDMENT.

EXCEPTIONAL RISKS RELATING TO THE WORKS ASSOCIATED WITH THIS DRAWING ARE IDENTIFIED BELOW.

CONSTRUCTION

MAINTENANCE / OPERATION / DECOMMISSIONING / DEMOLITION

First Issue	DM / OP	07/09/17	P01
Revision Details	By / Check	Date	Suffix

Purpose of issue
FOR INFORMATION

Client
Highways England
Major Projects
The Cube
199 Wharfside Street
Birmingham
B1 1RN

Project Title
A46 COVENTRY JUNCTION UPGRADE

Drawing Title
FIGURE 7-3d
VIEWPOINT 4:
GREENS HOME &
GARDEN CENTRE

Designed	Drawn	Checked	Approved	Date
HP	BM	AR	NT	12/12/2017

Internal Project No.	Suitability
60547444	S0
Scale @ A3	Zone
	BINLEY JUNCTION

THIS DOCUMENT HAS BEEN PREPARED PURSUANT TO AND SUBJECT TO THE TERMS OF AECOM'S APPOINTMENT BY ITS CLIENT. AECOM ACCEPTS NO LIABILITY FOR ANY USE OF THIS DOCUMENT OTHER THAN BY ITS ORIGINAL CLIENT OR FOLLOWING AECOM'S EXPRESS AGREEMENT TO SUCH USE, AND ONLY FOR THE PURPOSES FOR WHICH IT WAS PREPARED AND PROVIDED.

Project Office
Royal Court
Basil Close, Chesterfield
Derbyshire. S41 7SL
Tel: (01246) 209221
Fax: (01246) 209229
www.aecom.com

AECOM Infrastructure & Environment UK Limited
Registered in England Registered number: 880328
Registered office: Scott House, Alencon Link, Basingstoke, Hampshire RG21 7PP

Drawing Number Highways England PIN	Originator	Volume			Rev
HE551486	-ACM	-EGN -			
A46_SW_ZZ		-DR	-LE	-00002	
Location		Type	Role	Number	

Plot Date: 12 December 2017 13:21:26
File Name: Y:\GIS\Beth Working\02. Jobs\20171023 - A46\MXDs\171109_VP4_Photos_v02.mxd

Figure 7.3 (e)

Viewpoint 5 A428 Rugby Road, Binley Wood

SUMMER



Viewpoint number: 5
Location title: A428 Rugby Road, Binley Wood
Camera model: Canon EOS 6D
Focal length: 50mm
Camera height: 1.6m
Photo taken: 22/09/2017
View at a comfortable arm's length between 30cm and 50cm

WINTER



Viewpoint number: 5
Location title: A428 Rugby Road, Binley Wood
Camera model: Canon EOS 6D
Focal length: 50mm
Camera height: 1.6m
Photo taken: 24/11/2017
View at a comfortable arm's length between 30cm and 50cm

SAFETY, HEALTH AND ENVIRONMENTAL INFORMATION BOX

IT IS ASSUMED THAT ALL WORKS ON THIS DRAWING WILL BE CARRIED OUT BY A COMPETENT CONTRACTOR WORKING, WHERE APPROPRIATE, TO AN APPROPRIATE METHOD STATEMENT.

THIS DRAWING IS TO BE USED ONLY FOR THE PURPOSE OF ISSUE THAT IT WAS ISSUED FOR AND IS SUBJECT TO AMENDMENT.

EXCEPTIONAL RISKS RELATING TO THE WORKS ASSOCIATED WITH THIS DRAWING ARE IDENTIFIED BELOW.

CONSTRUCTION

MAINTENANCE / OPERATION / DECOMMISSIONING / DEMOLITION

First Issue	DM / OP	07/09/17	P01
Revision Details	By / Check	Date	Suffix

Purpose of issue
FOR INFORMATION

Client
Highways England
Major Projects
The Cube
199 Wharfeside Street
Birmingham
B1 1RN

Working on behalf of highways england

Project Title
A46 COVENTRY JUNCTION UPGRADE

Drawing Title
FIGURE 7-3e
VIEWPOINT 5:
A428 RUGBY ROAD
BINLEY WOOD

Designed	Drawn	Checked	Approved	Date
HP	BM	AR	NT	12/12/2017

Internal Project No.	Suitability
60547444	S0
Scale @ A3	Zone
	BINLEY JUNCTION

THIS DOCUMENT HAS BEEN PREPARED PURSUANT TO AND SUBJECT TO THE TERMS OF AECOM'S APPOINTMENT BY ITS CLIENT. AECOM ACCEPTS NO LIABILITY FOR ANY USE OF THIS DOCUMENT OTHER THAN BY ITS ORIGINAL CLIENT OR FOLLOWING AECOM'S EXPRESS AGREEMENT TO SUCH USE, AND ONLY FOR THE PURPOSES FOR WHICH IT WAS PREPARED AND PROVIDED.

Project Office
Royal Court
Basil Close, Chesterfield
Derbyshire. S41 7SL
Tel: (01246) 209221
Fax: (01246) 209229
www.aecom.com

AECOM

AECOM Infrastructure & Environment UK Limited
Registered in England Registered number: 880328
Registered office: Scott House, Alencon Link, Basingstoke, Hampshire RG21 7PP

Drawing Number Highways England PIN	Originator	Volume			Rev
HE551486	-ACM	-EGN	-		
A46_SW_ZZ		-DR	-LE	-00002	
Location		Type	Role	Number	

Plot Date: 12 December 2017 13:22:25
File Name: Y:\GIS\Beth Working\02. Jobs\20171023 - A46\MXDs\171109_VP5_Photos_v02.mxd

Figure 7.3 (f)

Viewpoint 6 Binley Woods

SUMMER



Viewpoint number: 6
Location title: Binley Woods
Camera model: Canon EOS 6D
Focal length: 50mm
Camera height: 1.6m
Photo taken: 22/09/2017
View at a comfortable arm's length between 30cm and 50cm

WINTER



Viewpoint number: 6
Location title: Binley Woods
Camera model: Nikon D3100
Focal length: 32mm
Camera height: 1.6m
Photo taken: 22/01/2017
View at a comfortable arm's length between 30cm and 50cm

SAFETY, HEALTH AND ENVIRONMENTAL INFORMATION BOX

IT IS ASSUMED THAT ALL WORKS ON THIS DRAWING WILL BE CARRIED OUT BY A COMPETENT CONTRACTOR WORKING, WHERE APPROPRIATE, TO AN APPROPRIATE METHOD STATEMENT.

THIS DRAWING IS TO BE USED ONLY FOR THE PURPOSE OF ISSUE THAT IT WAS ISSUED FOR AND IS SUBJECT TO AMENDMENT.

EXCEPTIONAL RISKS RELATING TO THE WORKS ASSOCIATED WITH THIS DRAWING ARE IDENTIFIED BELOW.

CONSTRUCTION

MAINTENANCE / OPERATION / DECOMMISSIONING / DEMOLITION

First Issue	DM / OP	07/09/17	P01
Revision Details	By / Check	Date	Suffix

Purpose of issue
FOR INFORMATION

Client
Highways England
Major Projects
The Cube
199 Wharfside Street
Birmingham
B1 1RN

Working on behalf of highways england

Project Title
A46 COVENTRY JUNCTION UPGRADE

Drawing Title
FIGURE 7-3f
VIEWPOINT 6:
BINLEY WOODS

Designed	Drawn	Checked	Approved	Date
HP	BM	AR	NT	29/11/2017

Internal Project No.	Suitability
60547444	S0
Scale @ A3	Zone
	BINLEY JUNCTION

THIS DOCUMENT HAS BEEN PREPARED PURSUANT TO AND SUBJECT TO THE TERMS OF AECOM'S APPOINTMENT BY ITS CLIENT. AECOM ACCEPTS NO LIABILITY FOR ANY USE OF THIS DOCUMENT OTHER THAN BY ITS ORIGINAL CLIENT OR FOLLOWING AECOM'S EXPRESS AGREEMENT TO SUCH USE, AND ONLY FOR THE PURPOSES FOR WHICH IT WAS PREPARED AND PROVIDED.

Project Office
Royal Court
Basil Close, Chesterfield
Derbyshire. S41 7SL
Tel: (01246) 209221
Fax: (01246) 209229
www.aecom.com

AECOM
AECOM Infrastructure & Environment UK Limited
Registered in England Registered number: 880328
Registered office: Scott House, Alencon Link, Basingstoke, Hampshire RG21 7PP

Drawing Number
Highways England PIN | Originator | Volume | Rev
HE551486 -ACM -EGN -
A46_SW_ZZ -DR -LE -00002
Location | Type | Role | Number

Plot Date: 29 November 2017 16:13:51
File Name: Y:\GIS\Beth Working\02. Jobs\20171023 - A46\MXDs\171109_VP6_Photos_v02.mxd

Figure 7.3 (g)

Viewpoint 7 Footpath of Piles Coppice

SUMMER



Viewpoint number: 7
Location title: Footpath off Piles Coppice
Camera model: Canon EOS 6D
Focal length: 50mm
Camera height: 1.6m
Photo taken: 22/09/2017
View at a comfortable arm's length between 30cm and 50cm

WINTER



Viewpoint number: 7
Location title: Footpath off Piles Coppice
Camera model: Nikon D3100
Focal length: 32mm
Camera height: 1.6m
Photo taken: 31/01/2017
View at a comfortable arm's length between 30cm and 50cm

SAFETY, HEALTH AND ENVIRONMENTAL INFORMATION BOX

IT IS ASSUMED THAT ALL WORKS ON THIS DRAWING WILL BE CARRIED OUT BY A COMPETENT CONTRACTOR WORKING, WHERE APPROPRIATE, TO AN APPROPRIATE METHOD STATEMENT.

THIS DRAWING IS TO BE USED ONLY FOR THE PURPOSE OF ISSUE THAT IT WAS ISSUED FOR AND IS SUBJECT TO AMENDMENT.

EXCEPTIONAL RISKS RELATING TO THE WORKS ASSOCIATED WITH THIS DRAWING ARE IDENTIFIED BELOW.

CONSTRUCTION

MAINTENANCE / OPERATION / DECOMMISSIONING / DEMOLITION

	By	Check	Date	Suffix
First Issue	DM	OP	07/09/17	P01
Revision Details				

Purpose of issue
FOR INFORMATION

Client
Highways England
Major Projects
The Cube
199 Wharfside Street
Birmingham
B1 1RN

Working on behalf of highways england

Project Title
A46 COVENTRY JUNCTION UPGRADE

Drawing Title
FIGURE 7-3g
VIEWPOINT 7:
FOOTPATH OFF PILES COPPICE

Designed	Drawn	Checked	Approved	Date
HP	BM	AR	NT	29/11/2017

Internal Project No.	Suitability
60547444	S0
Scale @ A3	Zone
	BINLEY JUNCTION

THIS DOCUMENT HAS BEEN PREPARED PURSUANT TO AND SUBJECT TO THE TERMS OF AECOM'S APPOINTMENT BY ITS CLIENT. AECOM ACCEPTS NO LIABILITY FOR ANY USE OF THIS DOCUMENT OTHER THAN BY ITS ORIGINAL CLIENT OR FOLLOWING AECOM'S EXPRESS AGREEMENT TO SUCH USE, AND ONLY FOR THE PURPOSES FOR WHICH IT WAS PREPARED AND PROVIDED.

Project Office
Royal Court
Basil Close, Chesterfield
Derbyshire. S41 7SL
Tel: (01246) 209221
Fax: (01246) 209229
www.aecom.com

AECOM
AECOM Infrastructure & Environment UK Limited
Registered in England Registered number: 880328
Registered office: Scott House, Alencon Link, Basingstoke, Hampshire RG21 7PP

Drawing Number Highways England PIN	Originator	Volume			Rev
HE551486	-ACM	-EGN	-		
A46_SW_ZZ		-DR	-LE	-00002	
Location		Type	Role	Number	

Plot Date: 29 November 2017 16:17:31
File Name: Y:\GIS\Beth Working\02. Jobs\20171023 - A46\MXDs\171109_VP7_Photos_v02.mxd

Figure 7.3 (h)

Viewpoint 8 A48 Rugby Road, Binley Industrial Estate

SUMMER



Viewpoint number: 8
Location title: A48 Rugby Road, Binley Ind. Estate
Camera model: Canon EOS 6D
Focal length: 50mm
Camera height: 1.6m
Photo taken: 22/09/2017
View at a comfortable arm's length between
30cm and 50cm

WINTER



Viewpoint number: 8
Location title: A48 Rugby Road, Binley Ind. Estate
Camera model: Nikon D3100
Focal length: 32mm
Camera height: 1.6m
Photo taken: 31/01/2017
View at a comfortable arm's length between
30cm and 50cm

SAFETY, HEALTH AND ENVIRONMENTAL INFORMATION BOX

IT IS ASSUMED THAT ALL WORKS ON THIS DRAWING WILL BE CARRIED OUT BY A COMPETENT CONTRACTOR WORKING, WHERE APPROPRIATE, TO AN APPROPRIATE METHOD STATEMENT.

THIS DRAWING IS TO BE USED ONLY FOR THE PURPOSE OF ISSUE THAT IT WAS ISSUED FOR AND IS SUBJECT TO AMENDMENT.

EXCEPTIONAL RISKS RELATING TO THE WORKS ASSOCIATED WITH THIS DRAWING ARE IDENTIFIED BELOW.

CONSTRUCTION

MAINTENANCE / OPERATION / DECOMMISSIONING / DEMOLITION

First Issue	DM / OP	07/09/17	P01
Revision Details	By / Check	Date	Suffix

Purpose of issue
FOR INFORMATION

Client
Highways England
Major Projects
The Cube
199 Wharfside Street
Birmingham
B1 1RN

Working on behalf of highways england

Project Title
A46 COVENTRY
JUNCTION UPGRADE

Drawing Title
FIGURE 7-3h
VIEWPOINT 8:
A48 RUGBY ROAD,
BINLEY INDUSTRIAL ESTATE

Designed	Drawn	Checked	Approved	Date
HP	BM	AR	NT	29/11/2017

Internal Project No.	Suitability
60547444	S0
Scale @ A3	Zone
	BINLEY JUNCTION

THIS DOCUMENT HAS BEEN PREPARED PURSUANT TO AND SUBJECT TO THE TERMS OF AECOM'S APPOINTMENT BY ITS CLIENT. AECOM ACCEPTS NO LIABILITY FOR ANY USE OF THIS DOCUMENT OTHER THAN BY ITS ORIGINAL CLIENT OR FOLLOWING AECOM'S EXPRESS AGREEMENT TO SUCH USE, AND ONLY FOR THE PURPOSES FOR WHICH IT WAS PREPARED AND PROVIDED.

Project Office
Royal Court
Basil Close, Chesterfield
Derbyshire. S41 7SL
Tel: (01246) 209221
Fax: (01246) 209229
www.aecom.com

AECOM

AECOM Infrastructure & Environment UK Limited
Registered in England Registered number: 880328
Registered office: Scott House, Alencon Link,
Basingstoke, Hampshire RG21 7PP

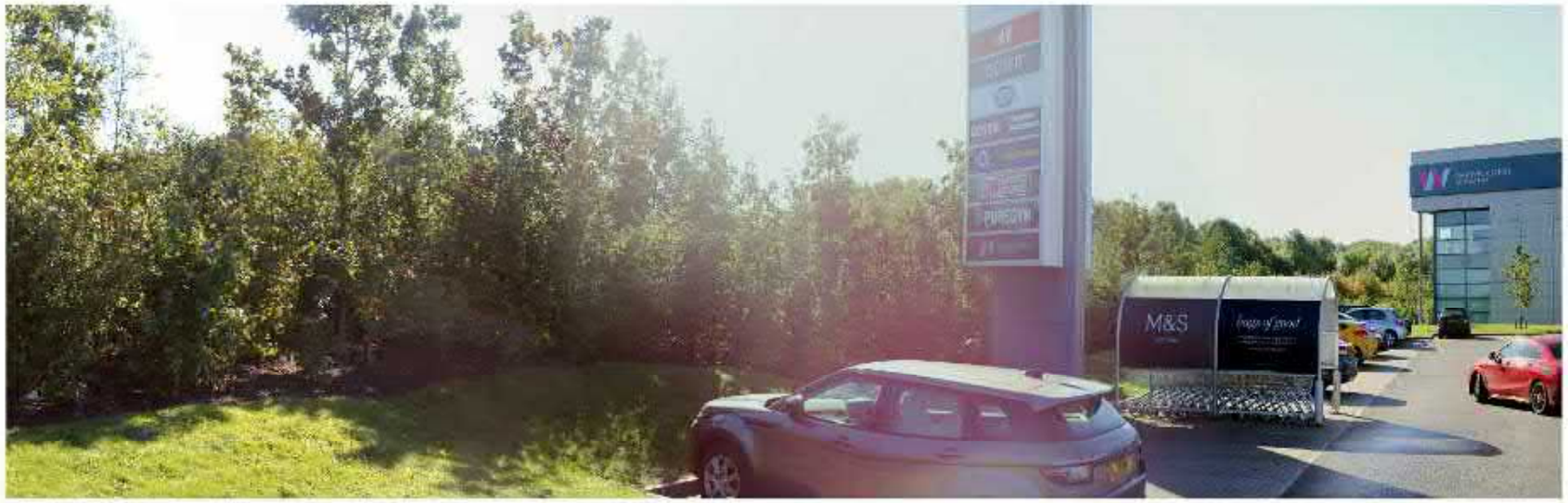
Drawing Number Highways England PIN	Originator	Volume			Rev
HE551486	-ACM	-EGN -			
A46_SW_ZZ		-DR	-LE	-00002	
Location		Type	Role	Number	

Plot Date: 29 November 2017 16:20:35
File Name: Y:\GIS\Beth Working\02. Jobs\20171023 - A46\MXDs\171109_VP8_Photos_v02.mxd

Figure 7.3 (i)

Viewpoint 9 Kings Park Drive

SUMMER



Viewpoint number: 9
Location title: Kings Park Drive
Camera model: Canon EOS 6D
Focal length: 50mm
Camera height: 1.6m
Photo taken: 22/09/2017
View at a comfortable arm's length between 30cm and 50cm

WINTER



Viewpoint number: 9
Location title: Kings Park Drive
Camera model: Nikon D3100
Focal length: 32mm
Camera height: 1.6m
Photo taken: 31/01/2017
View at a comfortable arm's length between 30cm and 50cm

SAFETY, HEALTH AND ENVIRONMENTAL INFORMATION BOX

IT IS ASSUMED THAT ALL WORKS ON THIS DRAWING WILL BE CARRIED OUT BY A COMPETENT CONTRACTOR WORKING, WHERE APPROPRIATE, TO AN APPROPRIATE METHOD STATEMENT.

THIS DRAWING IS TO BE USED ONLY FOR THE PURPOSE OF ISSUE THAT IT WAS ISSUED FOR AND IS SUBJECT TO AMENDMENT.

EXCEPTIONAL RISKS RELATING TO THE WORKS ASSOCIATED WITH THIS DRAWING ARE IDENTIFIED BELOW.

CONSTRUCTION

MAINTENANCE / OPERATION / DECOMMISSIONING / DEMOLITION

First Issue	DM / OP	07/09/17	P01
Revision Details	By / Check	Date	Suffix

Purpose of issue
FOR INFORMATION

Client
Highways England
Major Projects
The Cube
199 Wharfside Street
Birmingham
B1 1RN

Working on behalf of highways england

Project Title
A46 COVENTRY JUNCTION UPGRADE

Drawing Title
FIGURE 7-3i
VIEWPOINT 9:
KINGS PARK DRIVE

Designed	Drawn	Checked	Approved	Date
HP	BM	AR	NT	29/11/2017

Internal Project No.	Suitability
60547444	S0
Scale @ A3	Zone
	BINLEY JUNCTION

THIS DOCUMENT HAS BEEN PREPARED PURSUANT TO AND SUBJECT TO THE TERMS OF AECOM'S APPOINTMENT BY ITS CLIENT. AECOM ACCEPTS NO LIABILITY FOR ANY USE OF THIS DOCUMENT OTHER THAN BY ITS ORIGINAL CLIENT OR FOLLOWING AECOM'S EXPRESS AGREEMENT TO SUCH USE, AND ONLY FOR THE PURPOSES FOR WHICH IT WAS PREPARED AND PROVIDED.

Project Office
Royal Court
Basil Close, Chesterfield
Derbyshire. S41 7SL
Tel: (01246) 209221
Fax: (01246) 209229
www.aecom.com

AECOM

AECOM Infrastructure & Environment UK Limited
Registered in England Registered number: 880328
Registered office: Scott House, Alencon Link, Basingstoke, Hampshire RG21 7PP

Drawing Number Highways England PIN	Originator	Volume			Rev
HE551486	-ACM	-EGN -			
A46_SW_ZZ		-DR	-LE	-00002	
Location		Type	Role	Number	

Plot Date: 29 November 2017 16:23:23
File Name: Y:\GIS\Beth Working\02. Jobs\20171023 - A46\MXDs\171109_VP9_Photos_v02.mxd

Figure 7.3 (j)

Viewpoint 10 Play Area off Hepworth Road

SUMMER



Viewpoint number: 10
Location title: Play area off Hepworth Road
Camera model: Canon EOS 6D
Focal length: 50mm
Camera height: 1.6m
Photo taken: 22/09/2017
View at a comfortable arm's length between 30cm and 50cm

WINTER



Viewpoint number: 10
Location title: Play area off Hepworth Road
Camera model: Nikon D3100
Focal length: 32mm
Camera height: 1.6m
Photo taken: 31/01/2017
View at a comfortable arm's length between 30cm and 50cm

SAFETY, HEALTH AND ENVIRONMENTAL INFORMATION BOX

IT IS ASSUMED THAT ALL WORKS ON THIS DRAWING WILL BE CARRIED OUT BY A COMPETENT CONTRACTOR WORKING, WHERE APPROPRIATE, TO AN APPROPRIATE METHOD STATEMENT.

THIS DRAWING IS TO BE USED ONLY FOR THE PURPOSE OF ISSUE THAT IT WAS ISSUED FOR AND IS SUBJECT TO AMENDMENT.

EXCEPTIONAL RISKS RELATING TO THE WORKS ASSOCIATED WITH THIS DRAWING ARE IDENTIFIED BELOW.

CONSTRUCTION

MAINTENANCE / OPERATION / DECOMMISSIONING / DEMOLITION

First Issue	DM / OP	07/09/17	P01
Revision Details	By / Check	Date	Suffix

Purpose of issue
FOR INFORMATION

Client
Highways England
Major Projects
The Cube
199 Wharfeside Street
Birmingham
B1 1RN

Working on behalf of highways england

Project Title
A46 COVENTRY JUNCTION UPGRADE

Drawing Title
FIGURE 7-3j
VIEWPOINT 10:
PLAY AREA OFF
HEPWORTH ROAD

Designed	Drawn	Checked	Approved	Date
HP	BM	AR	NT	29/11/2017

Internal Project No.	Suitability
60547444	S0
Scale @ A3	Zone
	BINLEY JUNCTION

THIS DOCUMENT HAS BEEN PREPARED PURSUANT TO AND SUBJECT TO THE TERMS OF AECOM'S APPOINTMENT BY ITS CLIENT. AECOM ACCEPTS NO LIABILITY FOR ANY USE OF THIS DOCUMENT OTHER THAN BY ITS ORIGINAL CLIENT OR FOLLOWING AECOM'S EXPRESS AGREEMENT TO SUCH USE, AND ONLY FOR THE PURPOSES FOR WHICH IT WAS PREPARED AND PROVIDED.

Project Office
Royal Court
Basil Close, Chesterfield
Derbyshire. S41 7SL
Tel: (01246) 209221
Fax: (01246) 209229
www.aecom.com

AECOM

AECOM Infrastructure & Environment UK Limited
Registered in England Registered number: 880328
Registered office: Scott House, Alencon Link, Basingstoke, Hampshire RG21 7PP

Drawing Number Highways England PIN	Originator	Volume			Rev
HE551486	-ACM	-EGN -			
A46_SW_ZZ		-DR	-LE	-00002	
Location		Type	Role	Number	

Plot Date: 29 November 2017 16:25:50
File Name: Y:\GIS\Beth Working\02. Jobs\20171023 - A46\MXDs\171109_VP10_Photos_v02.mxd

Figure 7.3 (k)

Viewpoint 11 Binley Woods Recreation Ground

SUMMER



Viewpoint number: 11
Location title: Binley Woods Recreation Ground
Camera model: Canon EOS 6D
Focal length: 50mm
Camera height: 1.6m
Photo taken: 22/09/2017
View at a comfortable arm's length between
30cm and 50cm

WINTER



Viewpoint number: 11
Location title: Binley Woods Recreation Ground
Camera model: Nikon D3100
Focal length: 32mm
Camera height: 1.6m
Photo taken: 31/01/2017
View at a comfortable arm's length between
30cm and 50cm

SAFETY, HEALTH AND ENVIRONMENTAL INFORMATION BOX

IT IS ASSUMED THAT ALL WORKS ON THIS DRAWING WILL BE CARRIED OUT BY A COMPETENT CONTRACTOR WORKING, WHERE APPROPRIATE, TO AN APPROPRIATE METHOD STATEMENT.

THIS DRAWING IS TO BE USED ONLY FOR THE PURPOSE OF ISSUE THAT IT WAS ISSUED FOR AND IS SUBJECT TO AMENDMENT.

EXCEPTIONAL RISKS RELATING TO THE WORKS ASSOCIATED WITH THIS DRAWING ARE IDENTIFIED BELOW.

CONSTRUCTION

MAINTENANCE / OPERATION / DECOMMISSIONING / DEMOLITION

First Issue	DM / OP	07/09/17	P01
Revision Details	By / Check	Date	Suffix

Purpose of issue
FOR INFORMATION

Client
Highways England
Major Projects
The Cube
199 Wharfside Street
Birmingham
B1 1RN

Working on behalf of highways england

Project Title
A46 COVENTRY
JUNCTION UPGRADE

Drawing Title
FIGURE 7-3k
VIEWPOINT 11:
BINLEY WOODS
RECREATION GROUND

Designed	Drawn	Checked	Approved	Date
HP	BM	AR	NT	29/11/2017

Internal Project No.	Suitability
60547444	S0
Scale @ A3	Zone
	BINLEY JUNCTION

THIS DOCUMENT HAS BEEN PREPARED PURSUANT TO AND SUBJECT TO THE TERMS OF AECOM'S APPOINTMENT BY ITS CLIENT. AECOM ACCEPTS NO LIABILITY FOR ANY USE OF THIS DOCUMENT OTHER THAN BY ITS ORIGINAL CLIENT OR FOLLOWING AECOM'S EXPRESS AGREEMENT TO SUCH USE, AND ONLY FOR THE PURPOSES FOR WHICH IT WAS PREPARED AND PROVIDED.

Project Office
Royal Court
Basil Close, Chesterfield
Derbyshire. S41 7SL
Tel: (01246) 209221
Fax: (01246) 209229
www.aecom.com

AECOM

AECOM Infrastructure & Environment UK Limited
Registered in England Registered number: 880328
Registered office: Scott House, Alencon Link,
Basingstoke, Hampshire RG21 7PP

Drawing Number Highways England PIN	Originator	Volume			Rev
HE551486	-ACM	-EGN -			
A46_SW_ZZ		-DR	-LE	-00002	
Location		Type	Role	Number	

Plot Date: 29 November 2017 16:27:57
File Name: Y:\GIS\Beth Working\02. Jobs\20171023 - A46\MXDs\171109_VP11_Photos_v02.mxd

Figure 7.3 (l)

Viewpoint 12 Long Distance Footpath

SUMMER



Viewpoint number: 12
Location title: Long Distance Footpath
Camera model: Canon EOS 6D
Focal length: 50mm
Camera height: 1.6m
Photo taken: 22/09/2017
View at a comfortable arm's length between 30cm and 50cm

WINTER



Viewpoint number: 12
Location title: Long Distance Footpath
Camera model: Canon EOS 6D
Focal length: 50mm
Camera height: 1.6m
Photo taken: 24/11/2017
View at a comfortable arm's length between 30cm and 50cm

SAFETY, HEALTH AND ENVIRONMENTAL INFORMATION BOX

IT IS ASSUMED THAT ALL WORKS ON THIS DRAWING WILL BE CARRIED OUT BY A COMPETENT CONTRACTOR WORKING, WHERE APPROPRIATE, TO AN APPROPRIATE METHOD STATEMENT.

THIS DRAWING IS TO BE USED ONLY FOR THE PURPOSE OF ISSUE THAT IT WAS ISSUED FOR AND IS SUBJECT TO AMENDMENT.

EXCEPTIONAL RISKS RELATING TO THE WORKS ASSOCIATED WITH THIS DRAWING ARE IDENTIFIED BELOW.

CONSTRUCTION

MAINTENANCE / OPERATION / DECOMMISSIONING / DEMOLITION

First Issue	DM / OP	07/09/17	P01
Revision Details	By / Check	Date	Suffix

Purpose of issue
FOR INFORMATION

Client
Highways England
Major Projects
The Cube
199 Wharfside Street
Birmingham
B1 1RN

'Working on behalf of' highways england

Project Title
A46 COVENTRY JUNCTION UPGRADE

Drawing Title
FIGURE 7-3I
VIEWPOINT 12:
LONG DISTANCE FOOTPATH

Designed	Drawn	Checked	Approved	Date
HP	BM	AR	NT	12/12/2017

Internal Project No. 60547444	Suitability S0
Scale @ A3	Zone BINLEY JUNCTION

THIS DOCUMENT HAS BEEN PREPARED PURSUANT TO AND SUBJECT TO THE TERMS OF AECOM'S APPOINTMENT BY ITS CLIENT. AECOM ACCEPTS NO LIABILITY FOR ANY USE OF THIS DOCUMENT OTHER THAN BY ITS ORIGINAL CLIENT OR FOLLOWING AECOM'S EXPRESS AGREEMENT TO SUCH USE, AND ONLY FOR THE PURPOSES FOR WHICH IT WAS PREPARED AND PROVIDED.

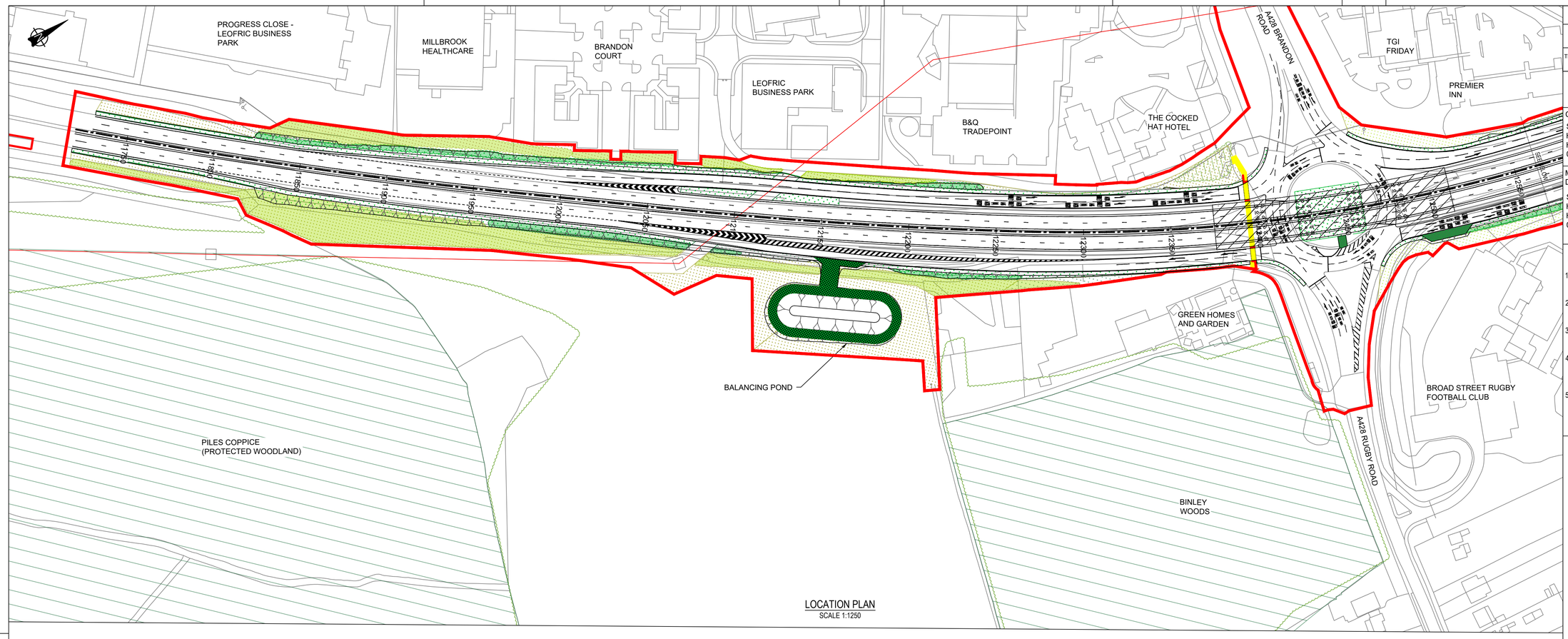
Project Office
Royal Court
Basil Close, Chesterfield
Derbyshire. S41 7SL
Tel: (01246) 209221
Fax: (01246) 209229
www.aecom.com

AECOM
AECOM Infrastructure & Environment UK Limited
Registered in England Registered number: 880328
Registered office: Scott House, Alencon Link, Basingstoke, Hampshire RG21 7PP

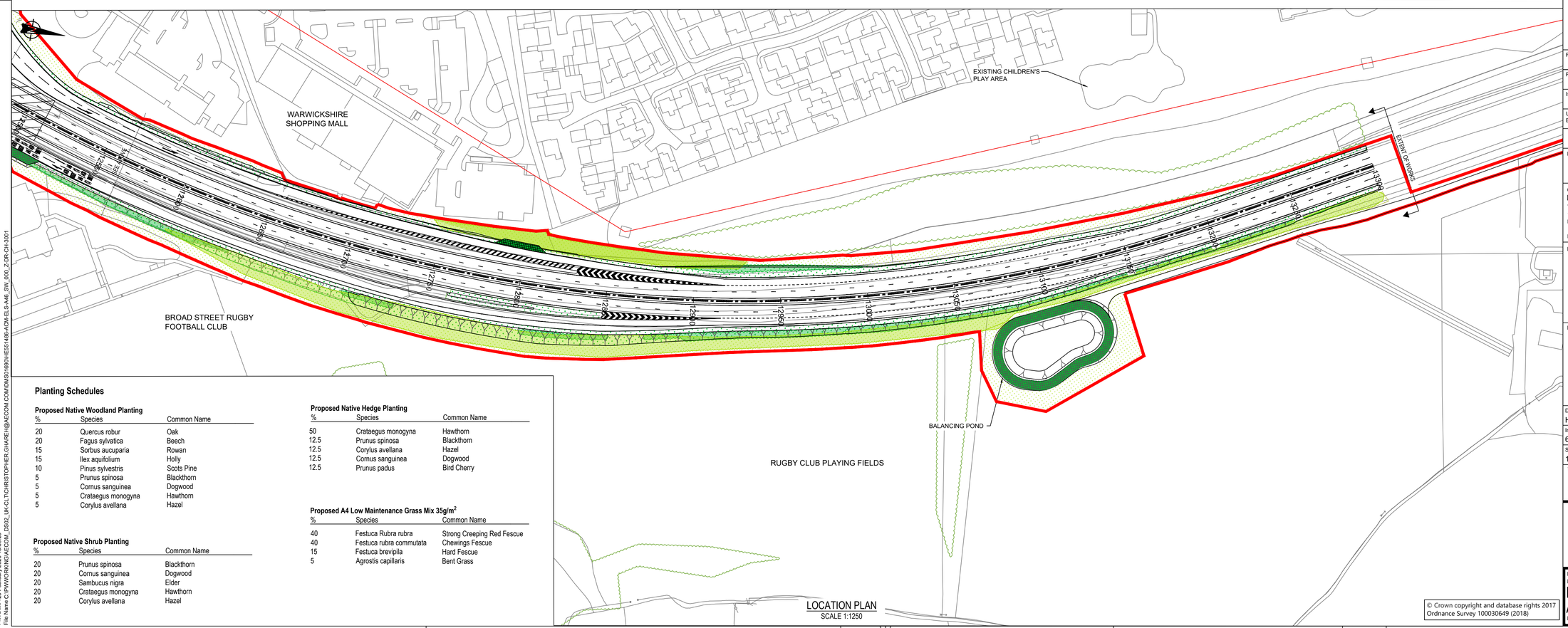
Drawing Number				Rev
Highways England PIN	Originator	Volume		
HE551486	-ACM	-EGN -		
A46_SW_ZZ		-DR	-LE -00002	
Location		Type	Role Number	

Plot Date: 12 December 2017 13:24:11
File Name: Y:\GIS\Beth Working\02. Jobs\20171023 - A46\MXDs\171109_VP12_Photos_v02.mxd

Figure 7.4 Binley Junction Proposed Landscape Mitigation



LOCATION PLAN
SCALE 1:1250



LOCATION PLAN
SCALE 1:1250

Planting Schedules

Proposed Native Woodland Planting

%	Species	Common Name
20	Quercus robur	Oak
20	Fagus sylvatica	Beech
15	Sorbus aucuparia	Rowan
15	Ilex aquifolium	Holly
10	Pinus sylvestris	Scots Pine
5	Prunus spinosa	Blackthorn
5	Cornus sanguinea	Dogwood
5	Crataegus monogyna	Hawthorn
5	Corylus avellana	Hazel

Proposed Native Shrub Planting

%	Species	Common Name
20	Prunus spinosa	Blackthorn
20	Cornus sanguinea	Dogwood
20	Sambucus nigra	Elder
20	Crataegus monogyna	Hawthorn
20	Corylus avellana	Hazel

Proposed Native Hedge Planting

%	Species	Common Name
50	Crataegus monogyna	Hawthorn
12.5	Prunus spinosa	Blackthorn
12.5	Corylus avellana	Hazel
12.5	Cornus sanguinea	Dogwood
12.5	Prunus padus	Bird Cherry

Proposed A4 Low Maintenance Grass Mix 35g/m²

%	Species	Common Name
40	Festuca Rubra rubra	Strong Creeping Red Fescue
40	Festuca rubra commutata	Chewings Fescue
15	Festuca brevipila	Hard Fescue
5	Agrostis capillaris	Bent Grass

SAFETY, HEALTH AND ENVIRONMENTAL INFORMATION BOX

IT IS ASSUMED THAT ALL WORKS ON THIS DRAWING WILL BE CARRIED OUT BY A COMPETENT CONTRACTOR WORKING, WHERE APPROPRIATE, TO AN APPROPRIATE METHOD STATEMENT.

THIS DRAWING IS TO BE USED ONLY FOR THE PURPOSE OF ISSUE THAT IT WAS ISSUED FOR AND IS SUBJECT TO AMENDMENT.

EXCEPTIONAL RISKS RELATING TO THE WORKS ASSOCIATED WITH THIS DRAWING ARE IDENTIFIED BELOW.

HAZARD WARNINGS (SEE BELOW)

CONSTRUCTION

SEE GENERAL ARRANGEMENT DRAWINGS FOR HAZARD IDENTIFICATION HE551486-ACM-HGN-A46_SW_000_Z-DR-CH-0101 TO 0103

MAINTENANCE / OPERATION / DECOMMISSIONING / DEMOLITION

SEE GENERAL ARRANGEMENT DRAWINGS FOR HAZARD IDENTIFICATION HE551486-ACM-HGN-A46_SW_000_Z-DR-CH-0101 TO 0103

NOTES

1. THIS DRAWING IS TO BE READ IN CONJUNCTION WITH ALL OTHER RELEVANT DOCUMENTATION.
2. DO NOT SCALE FROM THIS DRAWING, USE ONLY PRINTED DIMENSIONS.
3. ALL DIMENSIONS, CHAINAGES, LEVELS AND COORDINATES ARE IN METRES UNLESS DEFINED OTHERWISE.
4. THIS DRAWING IS TO BE READ IN CONJUNCTION WITH THE PROJECT HEALTH & SAFETY FILE FOR ANY IDENTIFIED POTENTIAL RISKS.
5. THIS DRAWING SHOULD BE READ IN CONJUNCTION WITH THE PRE-CONSTRUCTION INFORMATION DOCUMENT REF. HE551486-ACM-GHS-A46_SW_000_Z-RP-ZS-0005 AND DHAR ENTRIES APPENDED THEREIN.

KEY

- SITE BOUNDARY
- RETAINED ANCIENT WOODLAND
- RETAINED EXISTING WOODLAND
- PROPOSED NATIVE WOODLAND PLANTING
- PROPOSED NATIVE SHRUB PLANTING
- PROPOSED NATIVE HEDGEROW
- PROPOSED LOW MAINTENANCE GRASSLAND
- REPLACED EXISTING GRASSLAND
- GRASSCRETE (HARDSTANDING / LAYBY)
- OVERHEAD HV POWERLINES

Revision Details	By / Check	Date	Suffix
First Issue	LB / JW	15/03/18	P01
First Issue	LB / JW	27/03/18	P02
Issued for due diligence	LB / DJ	18/07/19	P03
UPDATED FOLLOWING REDLINE BOUNDARY REFINEMENT	/	02/10/19	P04.1

Purpose of issue

INITIAL STATUS OR WIP

Client
Highways England
The Cube
199 Wharfside Street
Birmingham
B1 1RN

Working on behalf of highways england

Project Title

A46 COVENTRY JUNCTIONS UPGRADE

Drawing Title

BINLEY JUNCTION LANDSCAPE MITIGATION

Designed	Drawn	Checked	Approved	Date
HH				

Internal Project No.	Suitability
60547444	S0
Scale @ A1	Zone
1:1250	Landscape

THIS DOCUMENT HAS BEEN PREPARED PURSUANT TO AND SUBJECT TO THE TERMS OF AECOM'S APPOINTMENT BY ITS CLIENT. AECOM ACCEPTS NO LIABILITY FOR ANY USE OF THIS DOCUMENT OTHER THAN BY ITS ORIGINAL CLIENT OR FOLLOWING AECOM'S EXPRESS AGREEMENT TO SUCH USE, AND ONLY FOR THE PURPOSES FOR WHICH IT WAS PREPARED AND PROVIDED.

AECOM
AECOM House
Horne Lane
Bedford, MK40 1TS
Tel:+44 (0)1234 349 641
Fax:
www.aecom.com

AECOM Infrastructure & Environment UK Limited
Registered in England Registered number: 880328
Registered office: Midpoint, Alencon Link, Basingstoke, Hampshire RG21 7PP

Drawing Number
Highways England PIN | Originator | Volume | Location | Type | Role | Number | Rev
HE551486 - ACM - ELS - A46_SW_000_Z - DR - LV - 3001 | P04.1

© Crown copyright and database rights 2017
Ordnance Survey 100030649 (2018)

Plot Date: 09 February 2020 15:39:23
File Name: C:\PW\WORKING\AECOM\J_DS\02_UK-CLT\CHRISTOPHER.GHAREH@AECOM.COM\DMS\0160\HE551486-ACM-ELS-A46_SW_000_Z-DR-CH-3001

Figure 8.1 European Designated Sites within 30km of Proposed Scheme

River Mease

Cannock Extension Canal

Ensor's Pool

Upper Nene Valley Gravel Pits

5 0 5 10 15 20 25 Kilometres

Plot Date: 09 October 2019 17:28:56
File Name: K:\GIS Management\A46_Ecology_Works\GIS\GIS_Working\02_Maps\Ecology\Final\EAR FIGURE 8-1 - EUROPEAN SITES 30KM P04.mxd

SAFETY, HEALTH AND ENVIRONMENTAL INFORMATION BOX

IT IS ASSUMED THAT ALL WORKS ON THIS DRAWING WILL BE CARRIED OUT BY A COMPETENT CONTRACTOR WORKING, WHERE APPROPRIATE, TO AN APPROPRIATE METHOD STATEMENT.

THIS DRAWING IS TO BE USED ONLY FOR THE PURPOSE OF ISSUE THAT IT WAS ISSUED FOR AND IS SUBJECT TO AMENDMENT.

EXCEPTIONAL RISKS RELATING TO THE WORKS ASSOCIATED WITH THIS DRAWING ARE IDENTIFIED BELOW.

CONSTRUCTION

MAINTENANCE / OPERATION / DECOMMISSIONING / DEMOLITION

KEY:

- Site Boundary (Highways Boundary)
- Site Boundary + 30km Buffer
- Special Protection Area (SPA)
- Special Area of Conservation (SAC)
- Ramsar Site

NOTES

1. THIS DRAWING IS TO BE READ IN CONJUNCTION WITH ALL OTHER RELEVANT DOCUMENTATION.
2. DO NOT SCALE FROM THIS DRAWING, USE ONLY PRINTED DIMENSIONS.
3. ALL DIMENSIONS IN MILLIMETRES, ALL CHAINAGES, LEVELS AND COORDINATES ARE IN METRES UNLESS DEFINED OTHERWISE.
4. THIS DRAWING IS TO BE READ IN CONJUNCTION WITH THE PROJECT HEALTH & SAFETY FILE FOR ANY IDENTIFIED POTENTIAL RISKS.
5. CONTAINS OS DATA © CROWN COPYRIGHT AND DATABASE RIGHT 2017

Revision Details	By / Check	Date	Suffix
Ramsar Added	AG / HP	09/10/19	P04

Purpose of issue: ENVIRONMENTAL ASSESSMENT REPORT

Client
Highways England
Major Projects
The Cube
199 Wharfside Street
Birmingham
B1 1RN

Working on behalf of highways england

Project Title

A46 COVENTRY JUNCTION UPGRADE

Drawing Title

FIGURE 8-1
INTERNATIONAL / EUROPEAN DESIGNATED SITES WITHIN 30KM OF THE PROPOSED SHEME

Designed	Drawn	Checked	Approved	Date
HP	GB	AR	NT	09/10/2019

Internal Project No.	Suitability
60547444	S0
Scale @ A3: 1:250,000	Zone: BINLEY JUNCTION

THIS DOCUMENT HAS BEEN PREPARED PURSUANT TO AND SUBJECT TO THE TERMS OF AECOM'S APPOINTMENT BY ITS CLIENT. AECOM ACCEPTS NO LIABILITY FOR ANY USE OF THIS DOCUMENT OTHER THAN BY ITS ORIGINAL CLIENT OR FOLLOWING AECOM'S EXPRESS AGREEMENT TO SUCH USE, AND ONLY FOR THE PURPOSES FOR WHICH IT WAS PREPARED AND PROVIDED.

Project Office
Royal Court
Basil Close, Chesterfield
Derbyshire. S41 7SL
Tel: (01246) 209221
Fax: (01246) 209229
www.aecom.com

AECOM Infrastructure & Environment UK Limited
Registered in England Registered number: 865328
Registered office: Scott House, Alencon Link, Basingstoke, Hampshire RG21 7PP

Drawing Number: Highways England PIN	Originator	Volume	Rev
HE551486	-ACM	-EGN -	P04
A46_SW_ZZ (Location)		-DR -LE -00003 (Type / Role / Number)	

Figure 8.2 Statutory Sites within 2km of Proposed Scheme

Combe Pool
Stoke Floods
Herald Way Marsh
Willenhall Wood
Ryton and Brandon Gravel Pits
Brandon Marsh
COVENTRY
Walsgrave on Sowe
Combe Abbey Country Park
Binley Woods
Brandon Wood
Ryton-on-Dunsmore
Wolston
Brinklow
Bagington
Coventry Airport
Lunt ROMAN FORT (restored)
Air Museum
Business Park
Centenary Way
Coventry Way
Joss Way (ROMAN ROAD)
0 1 2 3 4 5 Kilometres

SAFETY, HEALTH AND ENVIRONMENTAL INFORMATION BOX

IT IS ASSUMED THAT ALL WORKS ON THIS DRAWING WILL BE CARRIED OUT BY A COMPETENT CONTRACTOR WORKING, WHERE APPROPRIATE, TO AN APPROPRIATE METHOD STATEMENT.

THIS DRAWING IS TO BE USED ONLY FOR THE PURPOSE OF ISSUE THAT IT WAS ISSUED FOR AND IS SUBJECT TO AMENDMENT.

EXCEPTIONAL RISKS RELATING TO THE WORKS ASSOCIATED WITH THIS DRAWING ARE IDENTIFIED BELOW.

CONSTRUCTION

MAINTENANCE / OPERATION / DECOMMISSIONING / DEMOLITION

KEY:

- Site Boundary (Highways Boundary)
- Site Boundary + 2km Buffer
- Site of Special Scientific Interest (SSSI)
- Local Nature Reserve (LNR)

NOTES

1. THIS DRAWING IS TO BE READ IN CONJUNCTION WITH ALL OTHER RELEVANT DOCUMENTATION.
2. DO NOT SCALE FROM THIS DRAWING, USE ONLY PRINTED DIMENSIONS.
3. ALL DIMENSIONS IN MILLIMETRES, ALL CHAINAGES, LEVELS AND COORDINATES ARE IN METRES UNLESS DEFINED OTHERWISE.
4. THIS DRAWING IS TO BE READ IN CONJUNCTION WITH THE PROJECT HEALTH & SAFETY FILE FOR ANY IDENTIFIED POTENTIAL RISKS.
5. CONTAINS OS DATA © CROWN COPYRIGHT AND DATABASE RIGHT 2017

Revision Details	By / Check	Date	Suffix
Updated Stat Site Boundaries	AG / HP	09/10/19	P04

Purpose of issue: ENVIRONMENTAL ASSESSMENT REPORT

Client
Highways England
Major Projects
The Cube
199 Wharfside Street
Birmingham
B1 1RN

Working on behalf of highways england

Project Title
A46 COVENTRY JUNCTION UPGRADE

Drawing Title
FIGURE 8-2
STATUTORY SITES WITHIN 2KM OF THE PROPOSED SCHEME

Designed	Drawn	Checked	Approved	Date
HP	GB	AR	NT	09/10/2019

Internal Project No.	Suitability
60547444	S0
Scale @ A3	Zone
1:30,000	BINLEY JUNCTION

THIS DOCUMENT HAS BEEN PREPARED PURSUANT TO AND SUBJECT TO THE TERMS OF AECOM'S APPOINTMENT BY ITS CLIENT. AECOM ACCEPTS NO LIABILITY FOR ANY USE OF THIS DOCUMENT OTHER THAN BY ITS ORIGINAL CLIENT OR FOLLOWING AECOM'S EXPRESS AGREEMENT TO SUCH USE, AND ONLY FOR THE PURPOSES FOR WHICH IT WAS PREPARED AND PROVIDED.

Project Office
Royal Court
Basil Close, Chesterfield
Derbyshire. S41 7SL
Tel: (01246) 209221
Fax: (01246) 209229
www.aecom.com

AECOM
AECOM Infrastructure & Environment UK Limited
Registered in England Registered number: 880328
Registered office: Scott House, Alencon Link, Basingstoke, Hampshire RG21 7PP

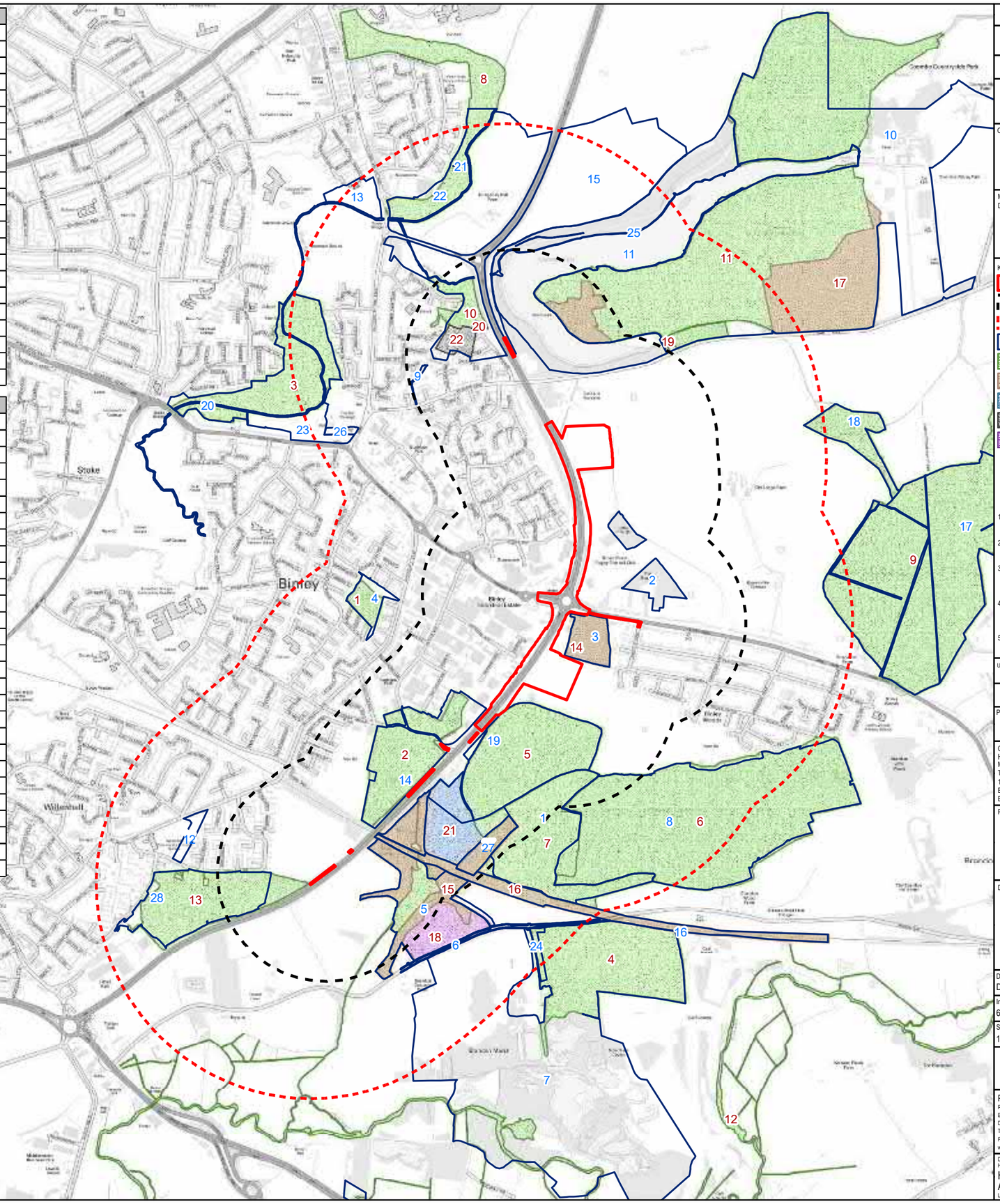
Drawing Number
Highways England PIN: HE551486
Originator: -ACM
Volume: A46_SW_ZZ
Location
Type: -DR
Role: -LE
Number: -00004
Rev: P04

Plot Date: 09 October 2019 17:33:00
File Name: K:\GIS Management\A46_Ecology_Works\GIS\GIS_Working\02_Maps\Ecology\Final\EAR FIGURE 8-2 - STAT SITES 2KM P04.mxd

Figure 8.3 Non-Statutory Sites within 2km of Proposed Scheme

LWS Ref	LWS Site Name	LWS Status	Number
47/37	Binley Little Wood	LWS	1
39/37	Claybrookes Marsh	LWS	2
8/37	Stoke Floods	LWS	3
10/37	Brandon Marsh Sheep Field	LWS	4
17/37	Piles Coppice	LWS	5
01/37	Brandon Wood	LWS	6
92/37	Grassland adjacent to Brandon Wood	LWS	7
45/38Z	Sowe Valley Dorchester Way	LWS	8
15.1/47	New Close and Birchley Wood	LWS	9
226/37	Gainford Rise	LWS	10
02/48	Coombe Abbey	LWS	11
13/37s	River Avon and Tributaries	LWS	12
46/37	Willenhall Wood	LWS	13
42/37	Binley Common Farm Wood	potential site	14
86/37	The Pools, Black Spinney and Long Spinney	potential site	15
91/47Y	Railway Verge	potential site	16
07/37	Coombe Countryside Park West Deer Park	potential site	17
86/37	Grassland	rejected	18
07/37	Coombe Abbey	rejected	19
226/37	Gainford Rise	rejected	20
92/37	Grassland West of Piles Coppice	deferred	21
226/37	Sharman's Tip	destroyed	22

Ecosite	Ecosite Name	Number
92/37	Area between Brandon Wood, Piles Coppice	1
55/37	Big Rough	2
42/37	Binley Common Farm Wood	3
47/37	Binley Little Wood	4
86/37	Black SPinney and Long Spinney	5
16/37	Brandon Lane Verge	6
10/37	Brandon Marsh	7
01/37	Brandon Wood	8
103/37	Brinklow Slag Heap	9
07/37 & 23_47	Coombe Abbey Pool (part SSSI)	10
07/37	Coombe Abbey Pool (Part SSSI)	11
216/37	East of Willenhall Junior School	12
223/37	Field by Caludon Castle School	13
39/37	Herald Way Marsh (part SSSI)	14
226/37	Hungerly Hall Farm	15
91/47Y	London to birmingham Mainline Railway	16
15.1/47	New Close Wood	17
72/47	Old Pools Wood	18
17/37	Piles Coppice	19
40/37U	River Sowe	20
40/37Z	River Sowe	21
45/38Z	River Sowe	22
8/37	River Sowe, Stoke Floods	23
28/37	Ryton and Brandon Gravel Pits	24
95/37	Smite Brook, headwaters and tributaries. Tributary of the River Sowe.	25
221/37	St Bartholomew's Churchyard	26
66/37	The Pools	27
46/37	Willenhall Wood and Meadow	28



SAFETY, HEALTH AND ENVIRONMENTAL INFORMATION BOX

IT IS ASSUMED THAT ALL WORKS ON THIS DRAWING WILL BE CARRIED OUT BY A COMPETENT CONTRACTOR WORKING, WHERE APPROPRIATE, TO AN APPROPRIATE METHOD STATEMENT.

THIS DRAWING IS TO BE USED ONLY FOR THE PURPOSE OF ISSUE THAT IT WAS ISSUED FOR AND IS SUBJECT TO AMENDMENT.

EXCEPTIONAL RISKS RELATING TO THE WORKS ASSOCIATED WITH THIS DRAWING ARE IDENTIFIED BELOW.

CONSTRUCTION

MAINTENANCE / OPERATION / DECOMMISSIONING / DEMOLITION

KEY:

- Site Boundary (Highways Boundary)
- Site Boundary + 0.5km Buffer
- Site Boundary + 1km Buffer
- Ecosite
- Local Wildlife Site (LWS)
- Potential LWS
- Deferred LWS
- Destroyed LWS
- Rejected LWS

NOTES

1. THIS DRAWING IS TO BE READ IN CONJUNCTION WITH ALL OTHER RELEVANT DOCUMENTATION.
2. DO NOT SCALE FROM THIS DRAWING, USE ONLY PRINTED DIMENSIONS.
3. ALL DIMENSIONS IN MILLIMETRES, ALL CHAINAGES, LEVELS AND COORDINATES ARE IN METRES UNLESS DEFINED OTHERWISE.
4. THIS DRAWING IS TO BE READ IN CONJUNCTION WITH THE PROJECT HEALTH & SAFETY FILE FOR ANY IDENTIFIED POTENTIAL RISKS.
5. CONTAINS OS DATA © CROWN COPYRIGHT AND DATABASE RIGHT 2017

Revision Details	By	Check	Date	Suffix
Updated Non-Stat Site Boundaries	AG	HP	09/10/19	P04

Purpose of issue: ENVIRONMENTAL ASSESSMENT REPORT

Client
Highways England
Major Projects
The Cube
199 Wharfeside Street
Birmingham
B1 1RN

Working on behalf of highways england

Project Title

A46 COVENTRY JUNCTION UPGRADE

Drawing Title

FIGURE 8-3 NON-STATUTORY DESIGNATED SITES

Designed	Drawn	Checked	Approved	Date
DM	DM	OP	OP	09/10/2019

Internal Project No.	Suitability
60547444	S0
Scale @ A3: 1:20,000	Zone: BINLEY JUNCTION

THIS DOCUMENT HAS BEEN PREPARED PURSUANT TO AND SUBJECT TO THE TERMS OF AECOM'S APPOINTMENT BY ITS CLIENT. AECOM ACCEPTS NO LIABILITY FOR ANY USE OF THIS DOCUMENT OTHER THAN BY ITS ORIGINAL CLIENT OR FOLLOWING AECOM'S EXPRESS AGREEMENT TO SUCH USE, AND ONLY FOR THE PURPOSES FOR WHICH IT WAS PREPARED AND PROVIDED.

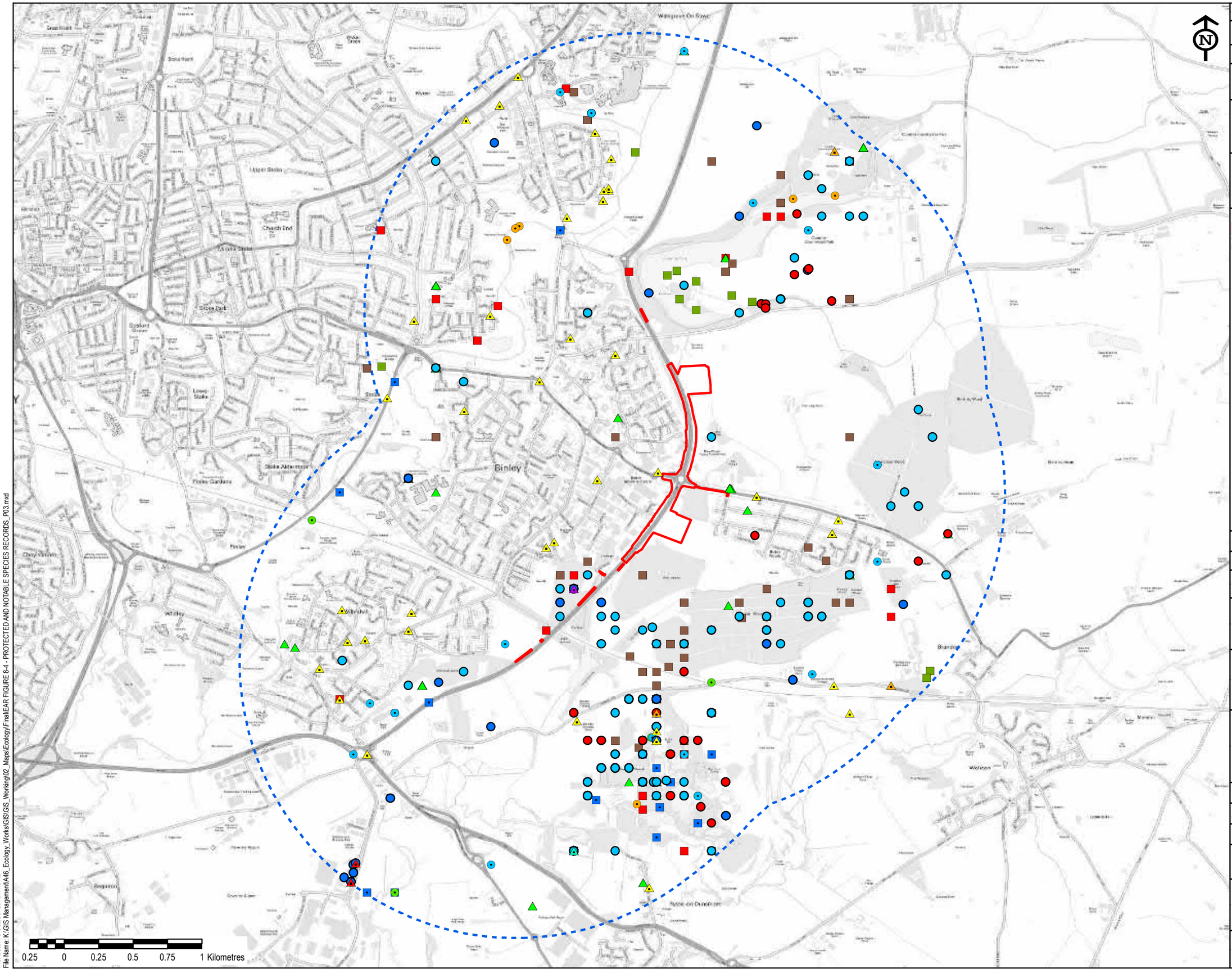
Project Office
Royal Court
Basil Close, Chesterfield
Derbyshire, S41 7SL
Tel: (01246) 209221
Fax: (01246) 209229
www.aecom.com

AECOM Infrastructure & Environment UK Limited
Registered in England Registered number: 8803281
Registered office: Scott House, Alencon Link, Basingstoke, Hampshire RG21 7PP

Drawing Number: Highways England PIN	Originator	Volume	Rev
HE551486	-ACM	-EGN -	P04
A46_SW_ZZ		-DR -EG -00001	
Location		Type Role Number	

Plot Date: 09 October 2019 17:37:52
File Name: K:\GIS Management\A46_Ecology_Works\GIS\GIS_Working\02_Maps\Ecology\Final\EAR FIGURE 8-3 - NON STAT SITES P04.mxd

Figure 8.4 Protected and Notable Species Records within 2km of Proposed Scheme



Plot Date: 15 October 2019 14:07:21
File Name: K:\GIS Management\A46_Ecology_Works\GIS\GIS_Working\02_Maps\Ecology\Final\EAR FIGURE 8-4 - PROTECTED AND NOTABLE SPECIES RECORDS_P03.mxd

SAFETY, HEALTH AND ENVIRONMENTAL INFORMATION BOX

IT IS ASSUMED THAT ALL WORKS ON THIS DRAWING WILL BE CARRIED OUT BY A COMPETENT CONTRACTOR WORKING, WHERE APPROPRIATE, TO AN APPROPRIATE METHOD STATEMENT.

THIS DRAWING IS TO BE USED ONLY FOR THE PURPOSE OF ISSUE THAT IT WAS ISSUED FOR AND IS SUBJECT TO AMENDMENT.

EXCEPTIONAL RISKS RELATING TO THE WORKS ASSOCIATED WITH THIS DRAWING ARE IDENTIFIED BELOW.

CONSTRUCTION

MAINTENANCE / OPERATION / DECOMMISSIONING / DEMOLITION

CONFIDENTIAL

KEY:

- Site Boundary (Highways Boundary)
- Site Boundary + 2km Buffer

Protected and notable species records from Warwickshire Ecological Records Centre:

- Eurasian Water Shrew
- Feral Ferret
- Harvest Mouse
- Polecat
- West European Hedgehog
- Amphibian
- Reptile
- Notable Invertebrates
- Black_Poplar
- Notable Birds
- Barn Owl
- Veteran Trees
- Notable Higher and Lower Plants
- Water Vole
- Otter
- Bats
- Schedule 9 Invasive Species

Revision Details	By / Check	Date	Suffix
Symbolised Notable Mammals	AG / HP	15/10/19	P03

Purpose of issue: ENVIRONMENTAL ASSESSMENT REPORT

Client
Highways England
Major Projects
The Cube
199 Wharfside Street
Birmingham
B1 1RN

Working on behalf of highways england

Project Title

A46 COVENTRY JUNCTION UPGRADE

Drawing Title

FIGURE 8-4 RECENT PROTECTED AND NOTABLE SPECIES RECORDS WITHIN 2KM OF THE SCHEME (I.E. ≤10 YEARS)

Designed	Drawn	Checked	Approved	Date
HP	GB	AR	NT	15/10/2019

Internal Project No.	Suitability
60547444	S0
Scale @ A3	Zone
1:25,000	BINLEY JUNCTION

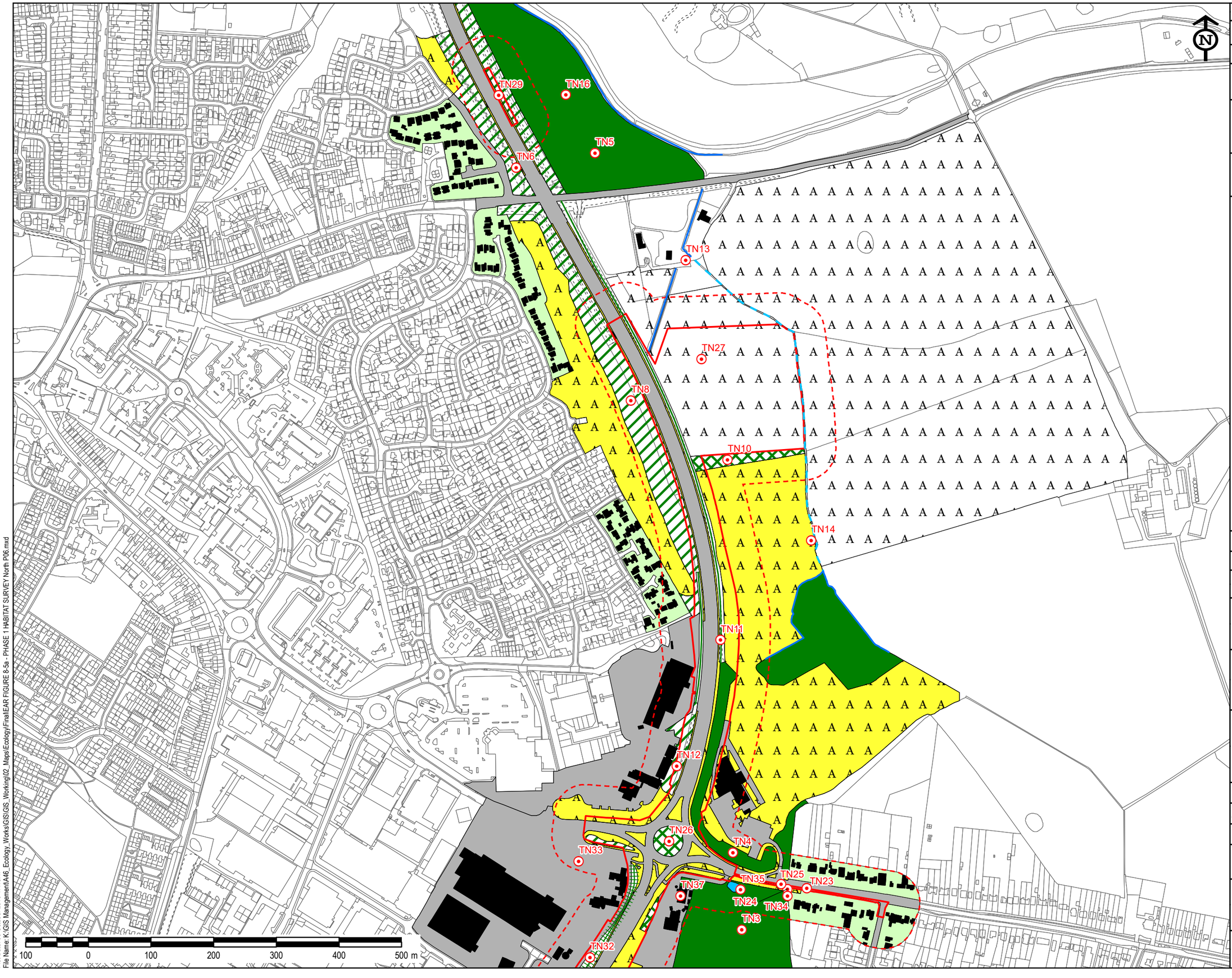
THIS DOCUMENT HAS BEEN PREPARED PURSUANT TO AND SUBJECT TO THE TERMS OF AECOM'S APPOINTMENT BY ITS CLIENT. AECOM ACCEPTS NO LIABILITY FOR ANY USE OF THIS DOCUMENT OTHER THAN BY ITS ORIGINAL CLIENT OR FOLLOWING AECOM'S EXPRESS AGREEMENT TO SUCH USE, AND ONLY FOR THE PURPOSES FOR WHICH IT WAS PREPARED AND PROVIDED.

Project Office
Royal Court
Basil Close, Chesterfield
Derbyshire, S41 7SL
Tel: (01246) 209221
Fax. (01246) 209229
www.aecom.com

AECOM
AECOM Infrastructure & Environment UK Limited
Registered in England Registered number: 880328
Registered office: Scott House, Alencon Link, Basingstoke, Hampshire RG21 7PP

Drawing Number	Originator	Volume			Rev
Highways England PIN					
HE551486	-ACM	-EGN	-		P03
A46_SW_ZZ		-DR	-EG	-0000X	
Location		Type	Role	Number	

Figure 8.5a Phase I Habitat Survey North



SAFETY, HEALTH AND ENVIRONMENTAL INFORMATION BOX

IT IS ASSUMED THAT ALL WORKS ON THIS DRAWING WILL BE CARRIED OUT BY A COMPETENT CONTRACTOR WORKING, WHERE APPROPRIATE, TO AN APPROPRIATE METHOD STATEMENT.

THIS DRAWING IS TO BE USED ONLY FOR THE PURPOSE OF ISSUE THAT IT WAS ISSUED FOR AND IS SUBJECT TO AMENDMENT.

EXCEPTIONAL RISKS RELATING TO THE WORKS ASSOCIATED WITH THIS DRAWING ARE IDENTIFIED BELOW.

CONSTRUCTION

MAINTENANCE / OPERATION / DECOMMISSIONING / DEMOLITION

KEY:

- Site Boundary (Highways Boundary)
- Site Boundary + 50m Buffer
- Target Note
- G2 - Running Water
- J2.1.2 - Intact Hedge - Species-poor
- J2.3.2 - Hedge With Trees - Species-poor
- J2.6 - Dry ditch
- A1.1.1 - Broadleaved Woodland - Semi-natural
- A1.1.2 - Broadleaved Woodland - Plantation
- A2.1 - Scrub - Dense/Continuous
- G1 - Standing Water
- J1.1 - Cultivated/Disturbed Land - Arable
- J1.2 - Cultivated/Disturbed Land - Amenity Grassland
- J3.6 - Buildings
- J5 - Other Habitat - Hard Standing
- J5 - Other habitat - Private Gardens

Revision Details	By / Check	Date	Suffix
Amended Target Notes	AG / HP	09/10/2019	P06

Purpose of issue: ENVIRONMENTAL ASSESSMENT REPORT

Client
Highways England
Major Projects
The Cube
199 Wharfside Street
Birmingham
B1 1RN

Working on behalf of highways england

Project Title

A46 COVENTRY JUNCTION UPGRADE

Drawing Title

FIGURE 8-5A PHASE 1 HABITAT SURVEY NORTH

Designed	Drawn	Checked	Approved	Date
HP	GB	AR	NT	09/10/2019

Internal Project No.	Suitability
60547444	S0
Scale @ A3	Zone
1:5,500	BINLEY JUNCTION

THIS DOCUMENT HAS BEEN PREPARED PURSUANT TO AND SUBJECT TO THE TERMS OF AECOM'S APPOINTMENT BY ITS CLIENT. AECOM ACCEPTS NO LIABILITY FOR ANY USE OF THIS DOCUMENT OTHER THAN BY ITS ORIGINAL CLIENT OR FOLLOWING AECOM'S EXPRESS AGREEMENT TO SUCH USE, AND ONLY FOR THE PURPOSES FOR WHICH IT WAS PREPARED AND PROVIDED.

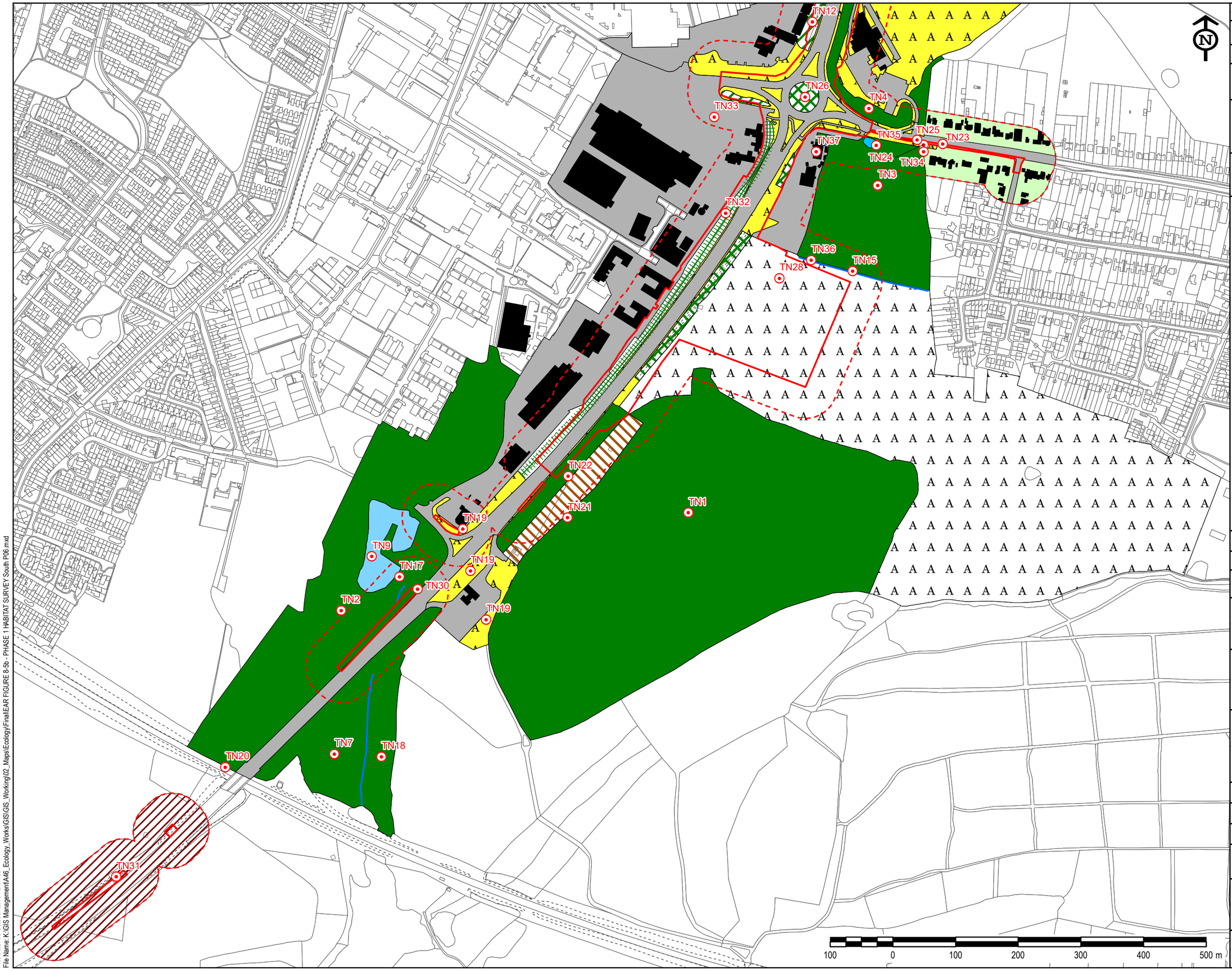
Project Office
Royal Court
Basil Close, Chesterfield
Derbyshire. S41 7SL
Tel: (01246) 209221
Fax: (01246) 209229
www.aecom.com

AECOM
AECOM Infrastructure & Environment UK Limited
Registered in England Registered number: 880328
Registered office: Scott House, Alencon Link, Basingstoke, Hampshire RG21 7PP

Drawing Number	Originator	Volume			Rev
Highways England PIN					
HE551486	-ACM	-EGN	-		P06
A46_SW_ZZ		-DR	-EG	-00001	
Location		Type	Role	Number	

Plot Date: 09 October 2019 17:48:47
File Name: K:\GIS Management\A46_Ecology_Works\GIS\GIS_Working\02_Maps\Ecology\Final\EAR FIGURE 8-5a - PHASE 1 HABITAT SURVEY North P06.mxd

Figure 8.5b Phase I Habitat Survey South



SAFETY, HEALTH AND ENVIRONMENTAL INFORMATION BOX

IT IS ASSUMED THAT ALL WORKS ON THIS DRAWING WILL BE CARRIED OUT BY A COMPETENT CONTRACTOR WORKING, WHERE APPROPRIATE, TO AN APPROPRIATE METHOD STATEMENT.

THIS DRAWING IS TO BE USED ONLY FOR THE PURPOSE OF ISSUE THAT IT WAS ISSUED FOR AND IS SUBJECT TO AMENDMENT.

EXCEPTIONAL RISKS RELATING TO THE WORKS ASSOCIATED WITH THIS DRAWING ARE IDENTIFIED BELOW.

CONSTRUCTION

MAINTENANCE / OPERATION / DECOMMISSIONING / DEMOLITION

KEY:

- Site Boundary (Highways Boundary)
- Site Boundary + 50m Buffer
- Target Note
- G2 - Running Water
- J2.3.2 - Hedge With Trees - Species-poor
- A1.1.1 - Broadleaved Woodland - Semi-natural
- A1.1.2 - Broadleaved Woodland - Plantation
- A2.1 - Scrub - Dense/Continuous
- C3.1 - Other Tall Hherb and Fern - Ruderal
- F1 - Swamp
- G1 - Standing Water
- J1.1 - Cultivated/Disturbed Land - Arable
- J1.2 - Cultivated/Disturbed Land - Amenity Grassland
- J3.6 - Buildings
- J5 - Other Habitat - Hard Standing
- J5 - Other habitat - Private Gardens
- Not Accessed Land

Revision Details	By	Check	Date	Suffix
Amended Target Notes	AG	HP	09/10/2019	P06

Purpose of issue: ENVIRONMENTAL ASSESSMENT REPORT

Client
Highways England
Major Projects
The Cube
199 Wharfside Street
Birmingham
B1 1RN

Working on behalf of highways england

Project Title

A46 COVENTRY JUNCTION UPGRADE

Drawing Title

FIGURE 8-5B
PHASE 1 HABITAT SURVEY SOUTH

Designed	Drawn	Checked	Approved	Date
HP	GB	AR	NT	09/10/2019

Internal Project No.	Suitability
60547444	S0
Scale @ A3	Zone
1:5,500	BINLEY JUNCTION

THIS DOCUMENT HAS BEEN PREPARED PURSUANT TO AND SUBJECT TO THE TERMS OF AECOM'S APPOINTMENT BY ITS CLIENT. AECOM ACCEPTS NO LIABILITY FOR ANY USE OF THIS DOCUMENT OTHER THAN BY ITS ORIGINAL CLIENT OR FOLLOWING AECOM'S EXPRESS AGREEMENT TO SUCH USE, AND ONLY FOR THE PURPOSES FOR WHICH IT WAS PREPARED AND PROVIDED.

Project Office
Royal Court
Basil Close, Chesterfield
Derbyshire, S41 7SL
Tel: (01246) 209221
Fax: (01246) 209229
www.aecom.com

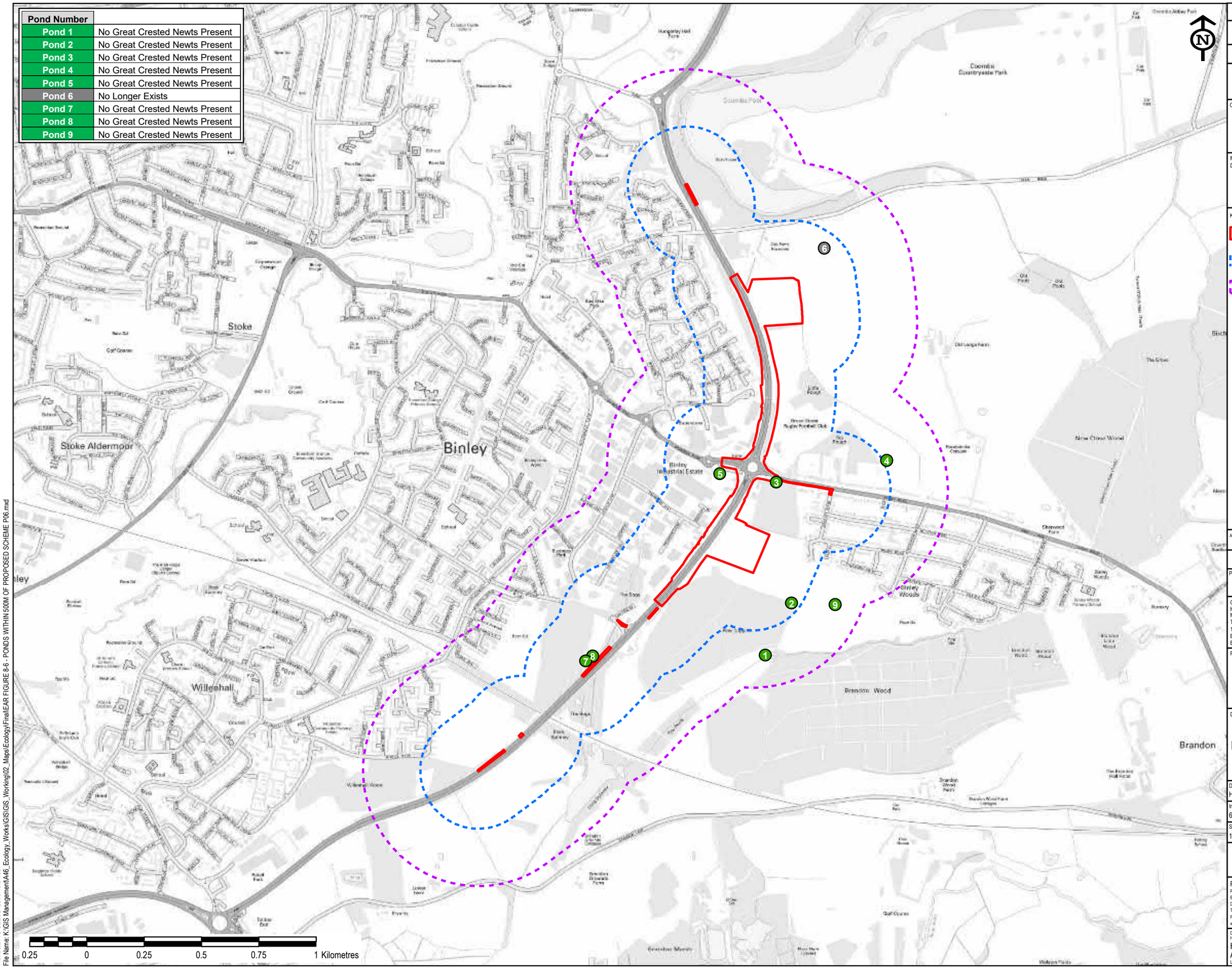
AECOM Infrastructure & Environment UK Limited
Registered in England Registered number: 868328
Registered office: Scott House, Alencom Link, Basingstoke, Hampshire RG21 7PP

Drawing Number	Originator	Volume	Rev
Highways England PIN: HE551486 A46_SW_ZZ	-ACM	-EGN - -DR -EG -00001	P06
Location		Type Role Number	

Plot Date: 09 October 2019 12:31:58
File Name: K:\GIS Management\A46_Ecology_Works\GIS\GIS_Working\02_Maps\Ecology\Final\EAR FIGURE 8-5b - PHASE 1 HABITAT SURVEY South P06.mxd

Figure 8.6 Ponds within 500m of Proposed Scheme

Pond Number	
Pond 1	No Great Crested Newts Present
Pond 2	No Great Crested Newts Present
Pond 3	No Great Crested Newts Present
Pond 4	No Great Crested Newts Present
Pond 5	No Great Crested Newts Present
Pond 6	No Longer Exists
Pond 7	No Great Crested Newts Present
Pond 8	No Great Crested Newts Present
Pond 9	No Great Crested Newts Present



SAFETY, HEALTH AND ENVIRONMENTAL INFORMATION BOX

IT IS ASSUMED THAT ALL WORKS ON THIS DRAWING WILL BE CARRIED OUT BY A COMPETENT CONTRACTOR WORKING, WHERE APPROPRIATE, TO AN APPROPRIATE METHOD STATEMENT.

THIS DRAWING IS TO BE USED ONLY FOR THE PURPOSE OF ISSUE THAT IT WAS ISSUED FOR AND IS SUBJECT TO AMENDMENT.

EXCEPTIONAL RISKS RELATING TO THE WORKS ASSOCIATED WITH THIS DRAWING ARE IDENTIFIED BELOW.

CONSTRUCTION

MAINTENANCE / OPERATION / DECOMMISSIONING / DEMOLITION

KEY:

- Site Boundary (Highways Boundary)
- Site Boundary + 250m Buffer
- Site Boundary + 500m Buffer
- Pond - Negative eDNA Result
- Pond Confirmed To No Longer Exist

Revision Details	By / Check	Date	Suffix
Amended table text	AG / HP	15/10/19	P06

Purpose of issue: ENVIRONMENTAL ASSESSMENT REPORT

Client
Highways England
Major Projects
The Cube
199 Wharfside Street
Birmingham
B1 1RN

Working on behalf of highways england

Project Title
A46 COVENTRY JUNCTION UPGRADE

Drawing Title
FIGURE 8-6
PONDS WITHIN 500M OF THE PROPOSED SCHEME AND GREAT CRESTED NEWT SURVEY INFORMATION

Designed	Drawn	Checked	Approved	Date
HP	GB	AR	NT	15/10/2019

Internal Project No.	Suitability
60547444	S0
Scale @ A3	Zone
1:15,000	BINLEY JUNCTION

THIS DOCUMENT HAS BEEN PREPARED PURSUANT TO AND SUBJECT TO THE TERMS OF AECOM'S APPOINTMENT BY ITS CLIENT. AECOM ACCEPTS NO LIABILITY FOR ANY USE OF THIS DOCUMENT OTHER THAN BY ITS ORIGINAL CLIENT OR FOLLOWING AECOM'S EXPRESS AGREEMENT TO SUCH USE, AND ONLY FOR THE PURPOSES FOR WHICH IT WAS PREPARED AND PROVIDED.

Project Office
Royal Court
Basil Close, Chesterfield
Derbyshire. S41 7SL
Tel: (01246) 209221
Fax: (01246) 209229
www.aecom.com

AECOM
AECOM Infrastructure & Environment UK Limited
Registered in England Registered number: 880328
Registered office: Scott House, Alencon Link, Basingstoke, Hampshire RG21 7PP

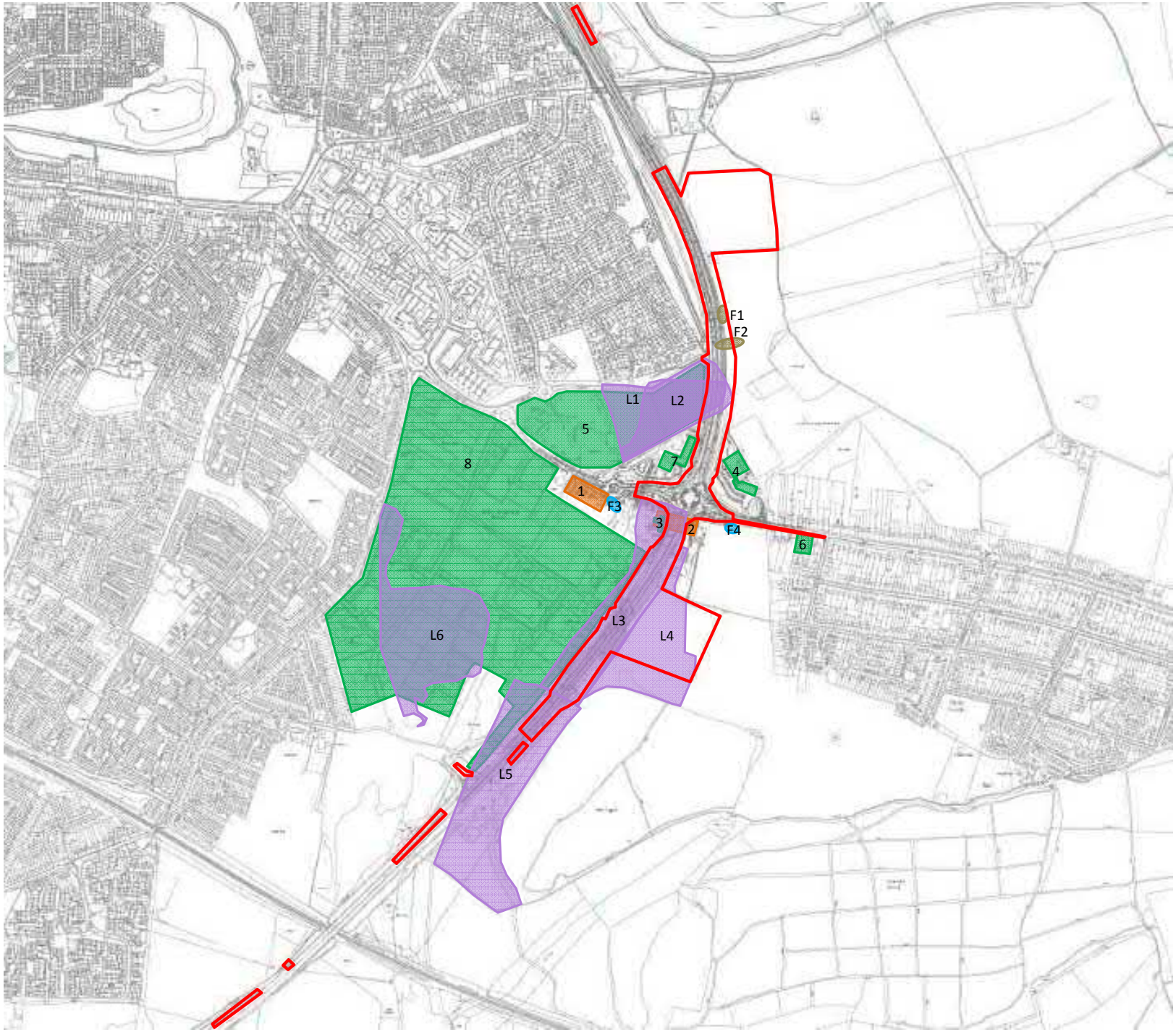
Drawing Number Highways England PIN	Originator	Volume			Rev
HE551486	-ACM	-EGN	-		P06
A46_SW_ZZ		-DR	-EG	-00001	
Location		Type	Role	Number	

Plot Date: 15 October 2019 15:51:30
File Name: K:\GIS Management\A46_Ecology_Works\GIS\GIS_Working\02_Maps\Ecology\Final\EAR FIGURE 8-6 - PONDS WITHIN 500M OF PROPOSED SCHEME P06.mxd

Figure 9.1 Factual Report Map


Key
Borehole
Rotary Core
T/44 Pit
Dynamic Sample Borehole
Binley Industrial Estate
Broad Street Rugby Football Club
Little Rough
Big Rough
Binley Woods
Superstore
Foresite House
Speymill House
Brandon Court
Stanley Court
Laurino Court
The Cocked Hat Hotel
Old Lodge
Ford
Pond
Tank
Tank
Tank

Figure 9.2 CSM Redline



KEY

- Historic Structure / Feature
- Current Structure / Feature
- Infilled Area (Historic Landfill)
- Infilled Areas
- Current Natural Features
- Site Boundary

Descriptions

1. Equipment Depot
2. Binley Common Farm
3. Public House
4. Rugby Club (hotel/restaurant)
5. Retail Development
6. Binley Woods Service Centre
7. Hotel
8. Binley Industrial Estate

L1. Borrow Pit North A428
L2. Borrow Pit North A428 (EA record)
L3. A428 Borrow Pit, Binley
L4. A428 Borrow Pit Brandon Road
L5. Fosseway Sand and Gravel Co Ltd
L6. Former Colliery (Disused Refuse Tip)

F1. Former Pond
F2. Former Pond
F3. Existing Pond (walled and fenced)
F4. Existing Pond

THIS DRAWING MAY BE USED ONLY FOR THE PURPOSE INTENDED AND ONLY WRITTEN DIMENSIONS SHALL BE USED

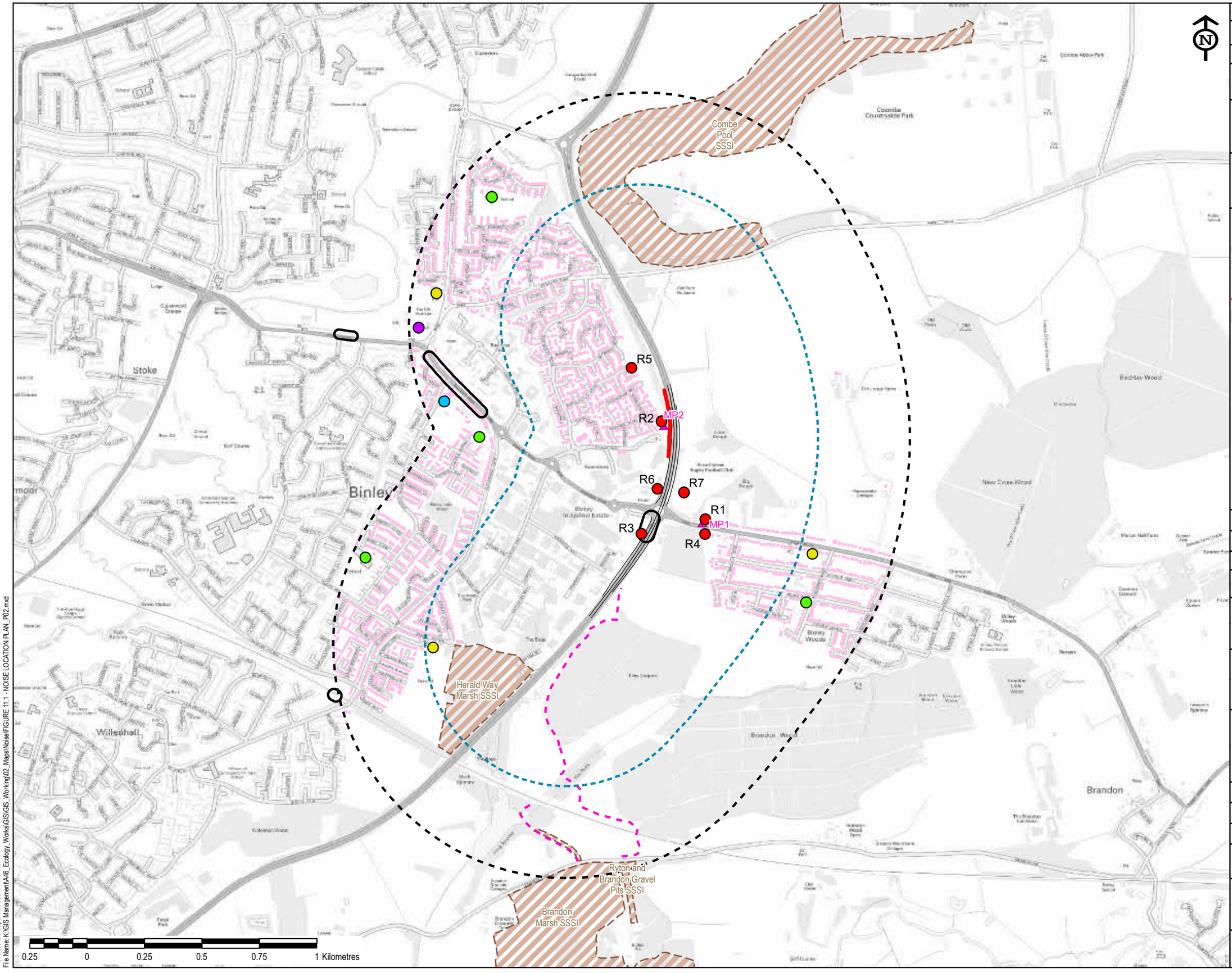
Project
A46 Coventry Junction Upgrade

Drawing title
Potential Sources of Contamination

Scale at A4: NTS		
Drw RE	App LB	Rev
Chk LB	Date Jan 2018	Date

AECOM
Aecom
Bridgewater House
Whitworth Street
Manchester
M1 6LT
www.urs-global.com

Figure 11.1 Noise Location Plan



SAFETY, HEALTH AND ENVIRONMENTAL INFORMATION BOX

IT IS ASSUMED THAT ALL WORKS ON THIS DRAWING WILL BE CARRIED OUT BY A COMPETENT CONTRACTOR WORKING, WHERE APPROPRIATE, TO AN APPROPRIATE METHOD STATEMENT.

THIS DRAWING IS TO BE USED ONLY FOR THE PURPOSE OF ISSUE THAT IT WAS ISSUED FOR AND IS SUBJECT TO AMENDMENT.

EXCEPTIONAL RISKS RELATING TO THE WORKS ASSOCIATED WITH THIS DRAWING ARE IDENTIFIED BELOW.

CONSTRUCTION

MAINTENANCE / OPERATION / DECOMMISSIONING / DEMOLITION

KEY:

- Proposed Scheme Links
- 1km Noise Study
- 600m Calculation
- Noise Monitoring Location$_2$
- Noise barrier
- Noise Important Area
- Public Right of Way
- Construction Noise Assessment Location
- Place of Worship
- Medical Facility
- Educational Facility
- Community Facility
- Residential
- Site of Special Scientific Interest

Revision Details	By / Check	Date	Suffix
Noise Important Area updated	AG / PL	26.09.19	P02
FIRST ISSUE	GB / PL	26.01.18	P01

Purpose of issue: FOR INFORMATION

Client
Highways England
Major Projects
The Cube
199 Wharfside Street
Birmingham
B1 1RN

Working on behalf of highways england

Project Title
A46 COVENTRY JUNCTION UPGRADE

Drawing Title
FIGURE 11-1
NOISE LOCATION PLAN

Designed	Drawn	Checked	Approved	Date
PL	GB	PL	NT	26/09/2019

Internal Project No.	Suitability
60547444	S0
Scale @ A3	Zone
1:15,000	BINLEY JUNCTION

THIS DOCUMENT HAS BEEN PREPARED PURSUANT TO AND SUBJECT TO THE TERMS OF AECOM'S APPOINTMENT BY ITS CLIENT. AECOM ACCEPTS NO LIABILITY FOR ANY USE OF THIS DOCUMENT OTHER THAN BY ITS ORIGINAL CLIENT OR FOLLOWING AECOM'S EXPRESS AGREEMENT TO SUCH USE, AND ONLY FOR THE PURPOSES FOR WHICH IT WAS PREPARED AND PROVIDED.

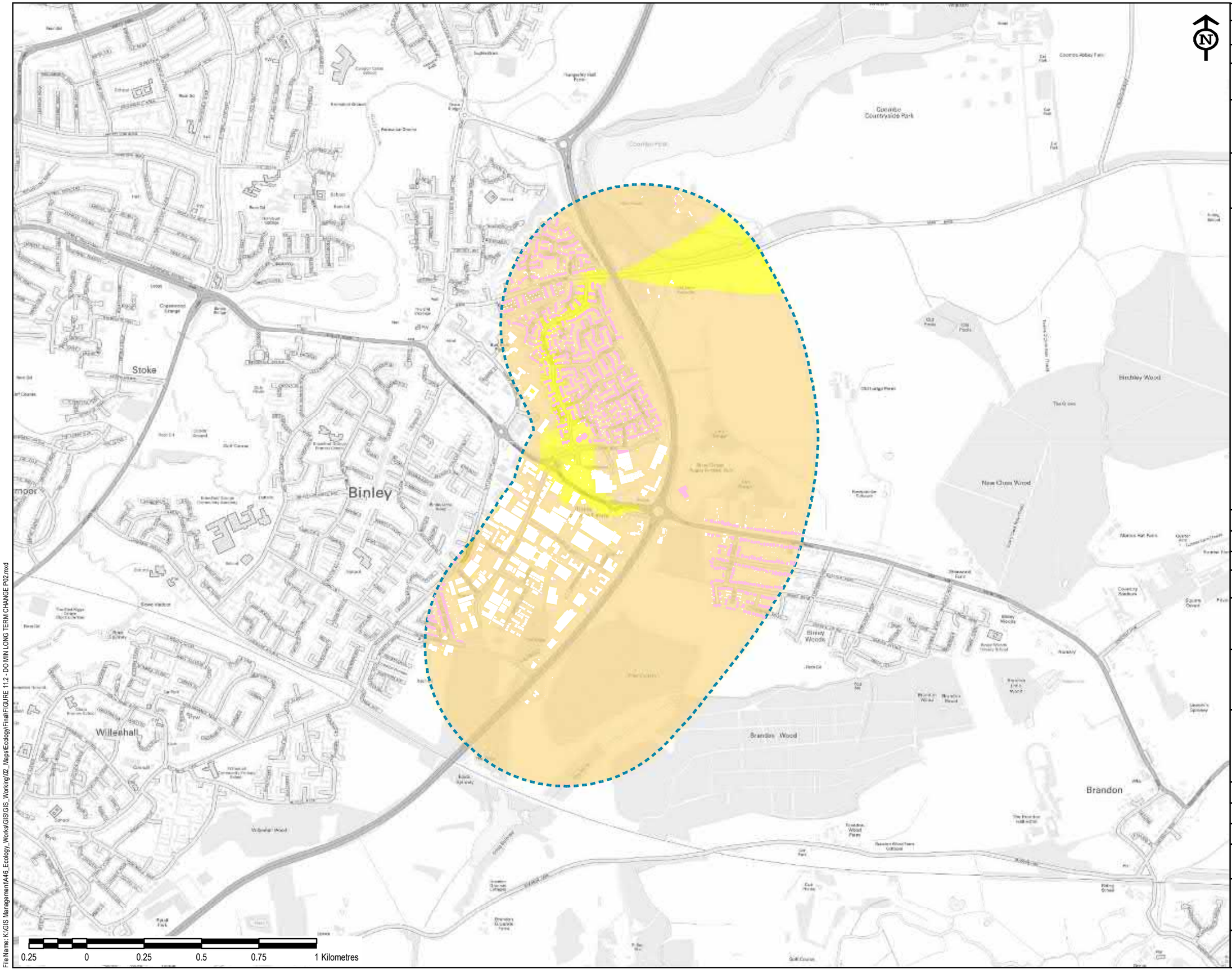
Project Office
Royal Court
Basil Close, Chesterfield
Derbyshire, S41 7SL
Tel: (01246) 209221
Fax: (01246) 209229
www.aecom.com

AECOM Infrastructure & Environment UK Limited
Registered in England Registered number: 880328
Registered office: Scott House, Alencon Link, Basingstoke, Hampshire RG21 7PP

Drawing Number
Highways England PIN | Originator | Volume | Location | Type | Role | Number | Rev
HE551486 | -ACM | -EGN | - | A46_SW_ZZ | -DR | -EG | -00006 | P02

Plot Date: 26 September 2019 11:07:26
File Name: K:\GIS Management\A46_Ecology_Works\GIS\GIS_Working\02_Maps\Noise\FIGURE 11-1 - NOISE LOCATION PLAN_P02.mxd

Figure 11.2 Long Term Traffic Noise Change 2021 Do-Minimum to 2036 Do-Minimum



SAFETY, HEALTH AND ENVIRONMENTAL INFORMATION BOX

IT IS ASSUMED THAT ALL WORKS ON THIS DRAWING WILL BE CARRIED OUT BY A COMPETENT CONTRACTOR WORKING, WHERE APPROPRIATE, TO AN APPROPRIATE METHOD STATEMENT.

THIS DRAWING IS TO BE USED ONLY FOR THE PURPOSE OF ISSUE THAT IT WAS ISSUED FOR AND IS SUBJECT TO AMENDMENT.

EXCEPTIONAL RISKS RELATING TO THE WORKS ASSOCIATED WITH THIS DRAWING ARE IDENTIFIED BELOW.

CONSTRUCTION

MAINTENANCE / OPERATION / DECOMMISSIONING / DEMOLITION

KEY:

600m Calculation Area

Change in LA10, 18hr at 4m (free field)

- < -9.9
- -9.9 <= -4.9
- -4.9 <= -2.9
- -2.9 <= -0.0
- 0.0 <= 3.0
- 3.0 <= 5.0
- 5.0 <= 10.0
- <= 10

Revision Details	By	Check	Date	Suffix
Minor edit	GB	PL	22.03.18	P02
FIRST ISSUE	GB	PL	26.01.18	P01

Purpose of issue: FOR INFORMATION

Client: Highways England, Major Projects, The Cube, 199 Wharfside Street, Birmingham, B1 1RN

Working on behalf of: highways england

Project Title: A46 COVENTRY JUNCTION UPGRADE

Drawing Title: FIGURE 11-2 LONG TERM TRAFFIC NOISE CHANGE 2021 DO-MINIMUM TO 2036 DO-MINIMUM

Designed	Drawn	Checked	Approved	Date
PL	GB	PL	NT	23/03/2018

Internal Project No.	Suitability
60547444	S0
Scale @ A3: 1:15,000	Zone: BINLEY JUNCTION

THIS DOCUMENT HAS BEEN PREPARED PURSUANT TO AND SUBJECT TO THE TERMS OF AECOMS APPOINTMENT BY ITS CLIENT. AECOM ACCEPTS NO LIABILITY FOR ANY USE OF THIS DOCUMENT OTHER THAN BY ITS ORIGINAL CLIENT OR FOLLOWING AECOM'S EXPRESS AGREEMENT TO SUCH USE, AND ONLY FOR THE PURPOSES FOR WHICH IT WAS PREPARED AND PROVIDED.

Project Office
Royal Court
Basil Close, Chesterfield
Derbyshire. S41 7SL
Tel: (01246) 209221
Fax: (01246) 209229
www.aecom.com

AECOM Infrastructure & Environment UK Limited
Registered in England Registered number: 880328
Registered office: Scott House, Alencon Link, Basingstoke, Hampshire RG21 7PP

Drawing Number: Highways England PIN | Originator | Volume | Location | Type | Role | Number — HE551486 -ACM -EGN - A46_SW_ZZ -DR -EG -00006 — Rev: P02

Plot Date: 23 March 2018 07:59:42
File Name: K:\GIS Management\A46_Ecology_Works\GIS\GIS_Working\02_Maps\Ecology\Final FIGURE 11.2 - DO MIN LONG TERM CHANGE P02.mxd

Figure 11.3 Short Term Traffic Noise Change 2021 Do-Minimum to 2021 Do-Something



SAFETY, HEALTH AND ENVIRONMENTAL INFORMATION BOX

IT IS ASSUMED THAT ALL WORKS ON THIS DRAWING WILL BE CARRIED OUT BY A COMPETENT CONTRACTOR WORKING, WHERE APPROPRIATE, TO AN APPROPRIATE METHOD STATEMENT.

THIS DRAWING IS TO BE USED ONLY FOR THE PURPOSE OF ISSUE THAT IT WAS ISSUED FOR AND IS SUBJECT TO AMENDMENT.

EXCEPTIONAL RISKS RELATING TO THE WORKS ASSOCIATED WITH THIS DRAWING ARE IDENTIFIED BELOW.

CONSTRUCTION

MAINTENANCE / OPERATION / DECOMMISSIONING / DEMOLITION

KEY:

- Proposed Scheme Links
- 600m Calculation Area
- Noise barrier

Change in LA10, 18hr at 4m (free field)

- < -4.9
- -2.9 <= -4.9
- -0.9 <= -2.9
- -0.9 <= -0.0
- 0.0 <= 1.0
- 1.0 <= 3.0
- 3.0 <= 5.0
- <= 5

Minor edit	GB / PL	22.03.18	P02
FIRST ISSUE	GB / PL	26.01.18	P01
Revision Details	By / Check	Date	Suffix

Purpose of issue: FOR INFORMATION

Client
Highways England
Major Projects
The Cube
199 Wharfside Street
Birmingham
B1 1RN

Working on behalf of: highways england

Project Title
A46 COVENTRY JUNCTION UPGRADE

Drawing Title
FIGURE 11-3
SHORT TERM TRAFFIC NOISE CHANGE 2021 DO-MINIMUM TO 2021 DO-SOMETHING

Designed	Drawn	Checked	Approved	Date
PL	GB	PL	NT	23/03/2018

Internal Project No.	Suitability
60547444	S0
Scale @ A3: 1:15,000	Zone: BINLEY JUNCTION

THIS DOCUMENT HAS BEEN PREPARED PURSUANT TO AND SUBJECT TO THE TERMS OF AECOM'S APPOINTMENT BY ITS CLIENT. AECOM ACCEPTS NO LIABILITY FOR ANY USE OF THIS DOCUMENT OTHER THAN BY ITS ORIGINAL CLIENT OR FOLLOWING AECOM'S EXPRESS AGREEMENT TO SUCH USE, AND ONLY FOR THE PURPOSES FOR WHICH IT WAS PREPARED AND PROVIDED.

Project Office
Royal Court
Basil Close, Chesterfield
Derbyshire. S41 7SL
Tel: (01246) 209221
Fax: (01246) 209229
www.aecom.com

AECOM
AECOM Infrastructure & Environment UK Limited
Registered in England Registered number: 880328
Registered office: Scott House, Alencon Link, Basingstoke, Hampshire RG21 7PP

Drawing Number	Originator	Volume	Rev
Highways England PIN: HE551486	-ACM	-EGN -	P02
Location: A46_SW_ZZ		-DR -EG -00006	
		Type | Role | Number	

Plot Date: 23 March 2018 08:03:50
File Name: K:\GIS Management\A46_Ecology_Works\GIS\GIS_Working\02_Maps\Ecology\Final\FIGURE 11.3 - DO SOMTHING SHORT TERM CHANGE P02.mxd

Figure 11.4 Long Term Traffic Noise Change 2021 Do-Minimum to 2036 Do-Something



SAFETY, HEALTH AND ENVIRONMENTAL INFORMATION BOX

IT IS ASSUMED THAT ALL WORKS ON THIS DRAWING WILL BE CARRIED OUT BY A COMPETENT CONTRACTOR WORKING, WHERE APPROPRIATE, TO AN APPROPRIATE METHOD STATEMENT.

THIS DRAWING IS TO BE USED ONLY FOR THE PURPOSE OF ISSUE THAT IT WAS ISSUED FOR AND IS SUBJECT TO AMENDMENT.

EXCEPTIONAL RISKS RELATING TO THE WORKS ASSOCIATED WITH THIS DRAWING ARE IDENTIFIED BELOW.

CONSTRUCTION

MAINTENANCE / OPERATION / DECOMMISSIONING / DEMOLITION

KEY:

- Proposed Scheme Links
- 600m Calculation Area
- Noise barrier

Change in LA10, 18hr at 4m (free field)

- < -9.9
- -9.9 <= -4.9
- -4.9 <= -2.9
- -2.9 <= -0.0
- 0.0 <= 3.0
- 3.0 <= 5.0
- 5.0 <= 10.0
- <= 10

Minor edit	GB / PL	22.03.18	P02
FIRST ISSUE	GB / PL	26.01.18	P01
Revision Details	By / Check	Date	Suffix

Purpose of issue: FOR INFORMATION

Client: Highways England, Major Projects, The Cube, 199 Wharfside Street, Birmingham, B1 1RN

Working on behalf of highways england

Project Title: A46 COVENTRY JUNCTION UPGRADE

Drawing Title: FIGURE 11-4 LONG TERM TRAFFIC NOISE CHANGE 2021 DO-MINIMUM TO 2036 DO-SOMETHING

Designed	Drawn	Checked	Approved	Date
PL	GB	PL	NT	23/03/2018

Internal Project No. 60547444	Suitability S0
Scale @ A3 1:15,000	Zone BINLEY JUNCTION

THIS DOCUMENT HAS BEEN PREPARED PURSUANT TO AND SUBJECT TO THE TERMS OF AECOM'S APPOINTMENT BY ITS CLIENT. AECOM ACCEPTS NO LIABILITY FOR ANY USE OF THIS DOCUMENT OTHER THAN BY ITS ORIGINAL CLIENT OR FOLLOWING AECOM'S EXPRESS AGREEMENT TO SUCH USE, AND ONLY FOR THE PURPOSES FOR WHICH IT WAS PREPARED AND PROVIDED.

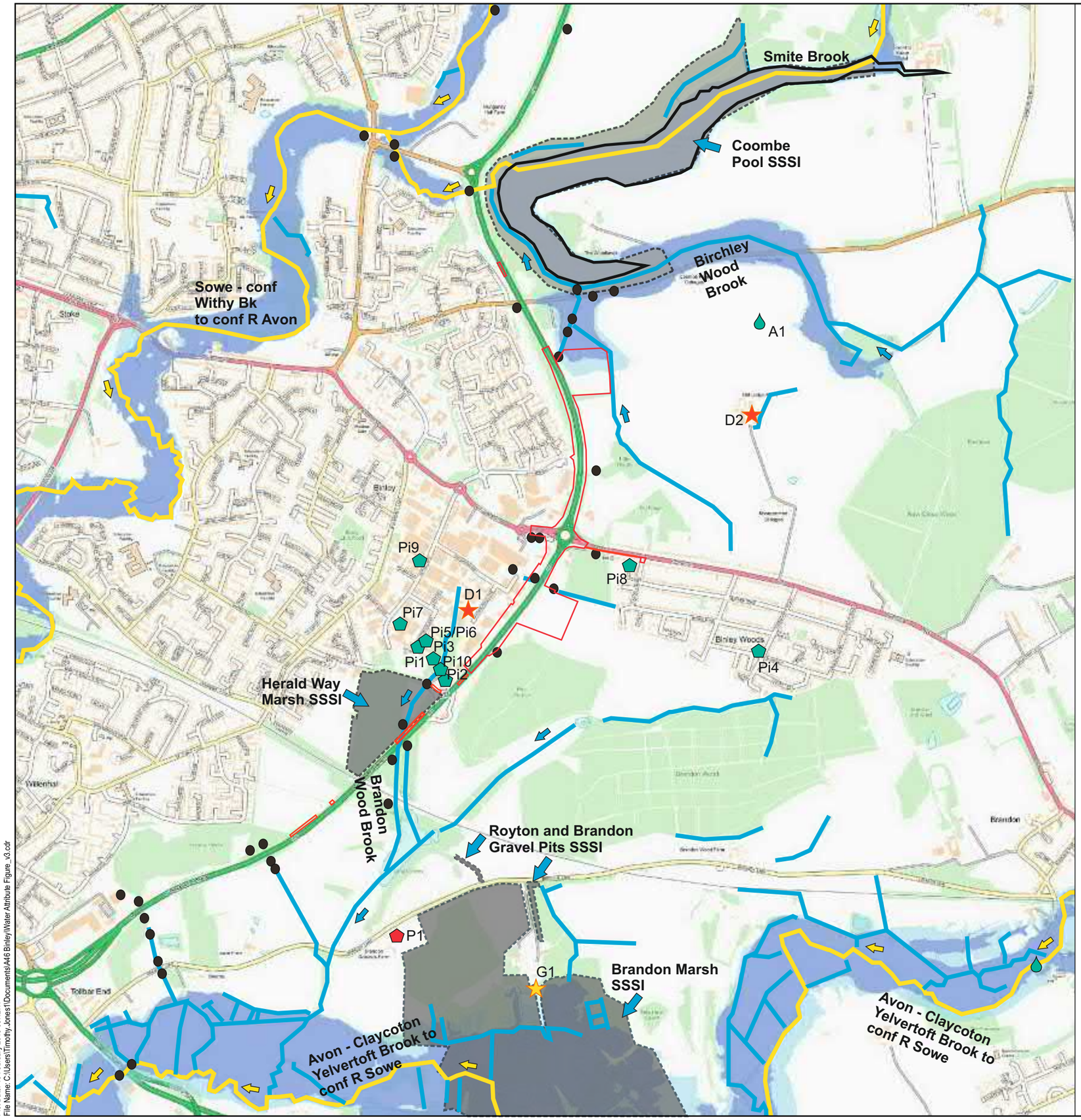
Project Office
Royal Court
Basil Close, Chesterfield
Derbyshire. S41 7SL
Tel: (01246) 209221
Fax: (01246) 209229
www.aecom.com

AECOM
AECOM Infrastructure & Environment UK Limited
Registered in England Registered number: 880328
Registered office: Scott House, Alencon Link, Basingstoke, Hampshire RG21 7PP

Drawing Number: Highways England PIN HE551486 | Originator -ACM | Volume -EGN - | Location A46_SW_ZZ | Type -DR | Role -EG | Number -00006 | Rev P02

Plot Date: 23 March 2018 08:05:13
File Name: K:\GIS Management\A46_Ecology_Works\GIS\GIS_Working\02_Maps\Ecology\Final\FIGURE 11-4 - DO SOMTHING LONG TERM CHANGE P02.mxd

Figure 13.1 Information on Water Supplies



KEY

- Red Line Boundary
- Ordinary Watercourse (when not a WFD Reporting Reach)
- WFD Watercourse - Moderate Ecological Status
- Site of Special Scientific Interest
- Approximate active water activity permit location
- Approximate consented groundwater abstraction location
- Approximate consented surface water abstraction location
- Flood Zone 2
- Flood Zone 3
- Existing Highways Outfalls as shown on HADDMS
- Private Water Supply (P)
- Pollution Incidents (Pi)

SAFETY, HEALTH AND ENVIRONMENTAL INFORMATION BOX

IT IS ASSUMED THAT ALL WORKS ON THIS DRAWING WILL BE CARRIED OUT BY A COMPETENT CONTRACTOR WORKING, WHERE APPROPRIATE, TO AN APPROPRIATE METHOD STATEMENT.

THIS DRAWING IS TO BE USED ONLY FOR THE PURPOSE OF ISSUE THAT IT WAS ISSUED FOR AND IS SUBJECT TO AMENDMENT.

EXCEPTIONAL RISKS RELATING TO THE WORKS ASSOCIATED WITH THIS DRAWING ARE IDENTIFIED BELOW.

CONSTRUCTION

MAINTENANCE / OPERATION / DECOMMISSIONING / DEMOLITION

NOTES

1. THIS DRAWING IS TO BE READ IN CONJUNCTION WITH ALL OTHER RELEVANT DOCUMENTATION.
2. DO NOT SCALE FROM THIS DRAWING, USE ONLY PRINTED DIMENSIONS.
3. CONTAINS OS DATA © CROWN COPYRIGHT AND DATABASE RIGHT 2017

First Issue	DM / TJ	03/01/18	P01
Revision Details	By / Check	Date	Suffix

Purpose of issue: ENVIRONMENTAL ASSESSMENT REPORT

Client
Highways England
Major Projects
The Cube
199 Wharfside Street
Birmingham
B1 1RN

Working on behalf of highways england

Project Title

A46 COVENTRY JUNCTION UPGRADE

Drawing Title

FIGURE 13.1
WATER RESOURCES FEATURES AND ATTRIBUTES

Designed	Drawn	Checked	Approved	Date
TJ	TJ	OT	OT	24/09/2019

Internal Project No.	Suitability
60547444	S0
Scale @ A3	Zone
1:10,000	BINLEY JUNCTION

THIS DOCUMENT HAS BEEN PREPARED PURSUANT TO AND SUBJECT TO THE TERMS OF AECOM'S APPOINTMENT BY ITS CLIENT. AECOM ACCEPTS NO LIABILITY FOR ANY USE OF THIS DOCUMENT OTHER THAN BY ITS ORIGINAL CLIENT OR FOLLOWING AECOM'S EXPRESS AGREEMENT TO SUCH USE, AND ONLY FOR THE PURPOSES FOR WHICH IT WAS PREPARED AND PROVIDED.

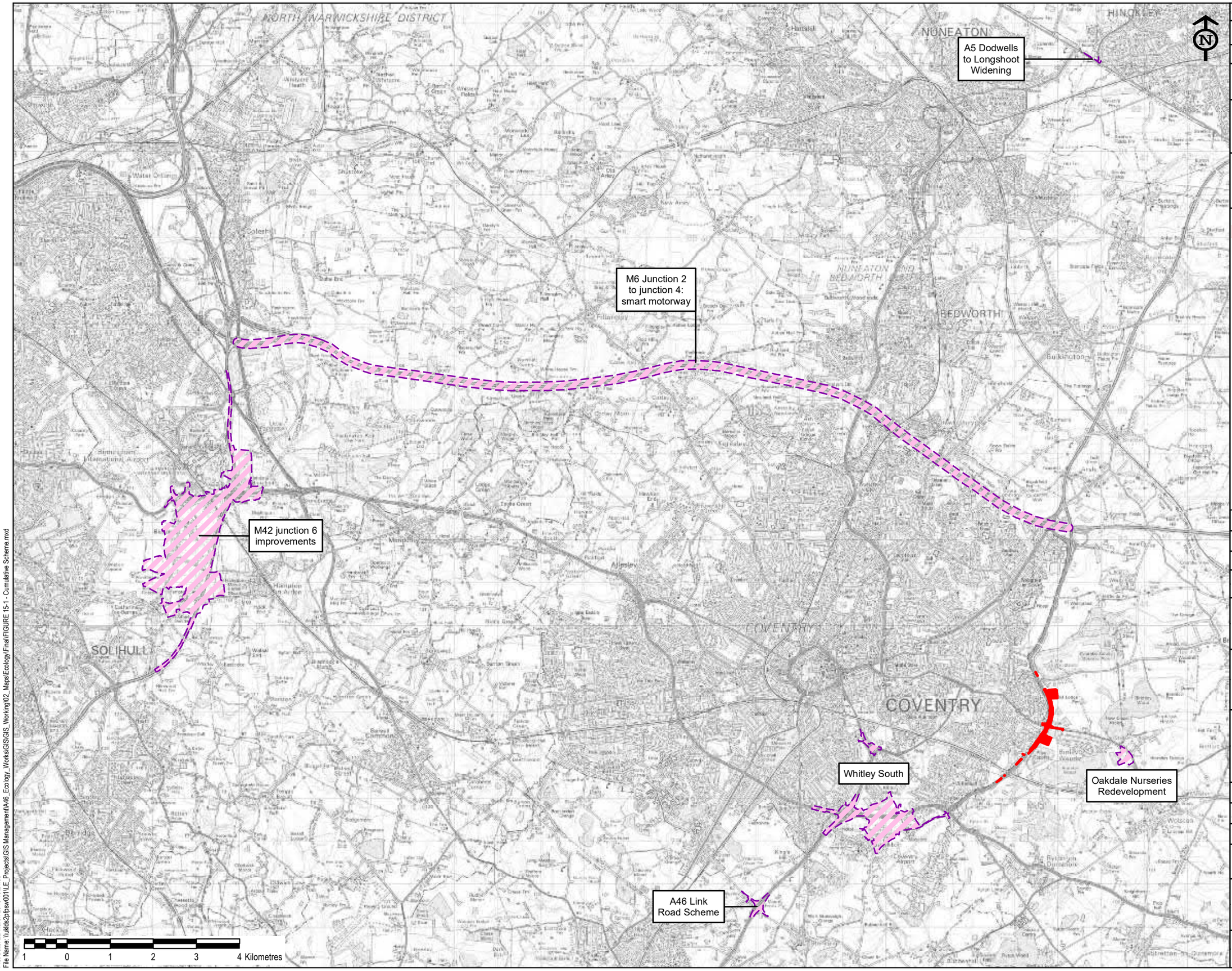
Project Office
Royal Court
Basil Close, Chesterfield
Derbyshire. S41 7SL
Tel: (01246) 209221
Fax: (01246) 209229
www.aecom.com

AECOM
AECOM Infrastructure & Environment UK Limited
Registered in England Registered number: 880328
Registered office: Scott House, Alencon Link, Basingstoke, Hampshire RG21 7PP

Drawing Number	Originator	Volume			Rev
Highways England PIN					
He551486	-TDJ	-EGN	-		P01
A46_SW_ZZ		-DR	-EG	-0000X	
Location		Type	Role	Number	

Plot Date: 16 February 2018 08:42:11
File Name: C:\Users\Timothy.Jones1\Documents\A46 Binley\Water Attribute Figure_v3.cdr

Figure 15.1 Cumulative schemes



SAFETY, HEALTH AND ENVIRONMENTAL INFORMATION BOX

IT IS ASSUMED THAT ALL WORKS ON THIS DRAWING WILL BE CARRIED OUT BY A COMPETENT CONTRACTOR WORKING, WHERE APPROPRIATE, TO AN APPROPRIATE METHOD STATEMENT.

THIS DRAWING IS TO BE USED ONLY FOR THE PURPOSE OF ISSUE THAT IT WAS ISSUED FOR AND IS SUBJECT TO AMENDMENT.

EXCEPTIONAL RISKS RELATING TO THE WORKS ASSOCIATED WITH THIS DRAWING ARE IDENTIFIED BELOW.

CONSTRUCTION

MAINTENANCE / OPERATION / DECOMMISSIONING / DEMOLITION

KEY:

A46 Coventry Junction Upgrade

The cumulative schemes considered within the assessment

NOTES

1. THIS DRAWING IS TO BE READ IN CONJUNCTION WITH ALL OTHER RELEVANT DOCUMENTATION.
2. DO NOT SCALE FROM THIS DRAWING, USE ONLY PRINTED DIMENSIONS.
3. ALL DIMENSIONS IN MILLIMETRES, ALL CHAINAGES, LEVELS AND COORDINATES ARE IN METRES UNLESS DEFINED OTHERWISE.
4. THIS DRAWING IS TO BE READ IN CONJUNCTION WITH THE PROJECT HEALTH & SAFETY FILE FOR ANY IDENTIFIED POTENTIAL RISKS.
5. CONTAINS OS DATA © CROWN COPYRIGHT AND DATABASE RIGHT 2017

Revision Details	By / Check	Date	Suffix
Site boundary revised	DM / NT	22/03/18	P02
First Issue	DM / OP	07/09/17	P01

Purpose of issue
ENVIRONMENTAL ASSESSMENT REPORT

Client
Highways England
Major Projects
The Cube
199 Wharfside Street
Birmingham
B1 1RN

Working on behalf of highways england

Project Title
A46 COVENTRY JUNCTION UPGRADE

Drawing Title
FIGURE 15-1
THE CUMULATIVE SCHEMES CONSIDERED WITHIN THE ASSESSMENT

Designed	Drawn	Checked	Approved	Date
NT	GB	AR	NT	22/03/2018

Internal Project No.	Suitability
60547444	S0
Scale @ A3	Zone
1:80,000	BINLEY JUNCTION

THIS DOCUMENT HAS BEEN PREPARED PURSUANT TO AND SUBJECT TO THE TERMS OF AECOM'S APPOINTMENT BY ITS CLIENT. AECOM ACCEPTS NO LIABILITY FOR ANY USE OF THIS DOCUMENT OTHER THAN BY ITS ORIGINAL CLIENT OR FOLLOWING AECOM'S EXPRESS AGREEMENT TO SUCH USE, AND ONLY FOR THE PURPOSES FOR WHICH IT WAS PREPARED AND PROVIDED.

Project Office
Royal Court
Basil Close, Chesterfield
Derbyshire, S41 7SL
Tel: (01246) 209221
Fax. (01246) 209229
www.aecom.com

AECOM

AECOM Infrastructure & Environment UK Limited
Registered in England Registered number: 880328
Registered office: Scott House, Alencon Link, Basingstoke, Hampshire RG21 7PP

Drawing Number	Originator	Volume			Rev
Highways England PIN					
HE551486	-ACM	-EGN	-		P02
A46_SW_ZZ		-DR	-EG	-00006	
Location		Type	Role	Number	

Plot Date: 22 March 2018 16:21:05
File Name: \\ukds2pfsw001\LE_Projects\GIS Management\A46_Ecology_Works\GIS\GIS_Working\02_Maps\Ecology\Final\FIGURE 15-1 - Cumulative Scheme.mxd

APPENDICES

Appendix 5

Appendix 5-1: Local Planning Policy

The local planning policy for the local authorities affected by the proposed scheme is described below.

Coventry City Council

The *Coventry Local Plan* (Ref. A5-1) which was adopted in December 2017 identifies the need to improve air quality across the city and combat climate change.

Policy EM7 (Air Quality) of the Local Plan stipulates that: "*major development schemes should promote a shift to the use of sustainable low emission transport (electric vehicles and vehicles that use biofuels) to minimise the impact of vehicle emissions on air quality… All major development proposals should be suitably planned to design out any adverse impact on air quality and be in accordance with the West Midlands Transport Emissions Framework and associated policies."*

Air Quality Policy EM7 requires an air quality assessment to be submitted for major development proposals, focussing on effects on human health, local amenity, and the natural environment. This should include consideration for existing background levels of air quality and the feasibility of any mitigation measures that would prevent air quality objectives being exceeded, or would reduce the extent of the air quality deterioration.

Coventry City Council is a partner of the Low Emissions Towns and Cities programme and is working with its West Midlands neighbours to improve air quality and reduce emissions from road transport by promoting the uptake of low emission fuels and technologies and sharing best practice policies.

Rugby Borough Council

The Rugby Borough Council *Local Plan 2011-2031* (Ref. A5-2) published in 2016 contains the following policies related to air quality:

Policy HS5 - Traffic Generation and Air Quality: Any development that results in significant negative impacts on health and wellbeing of people in the area as a result of pollution, noise or vibration caused by traffic generation will not be permitted unless effective mitigation can be achieved. Any development that results in significant negative impacts on air quality within identified Air Quality Management Areas (AQMAs) or on the health and wellbeing of people in the area as a result of pollution should be supported by an air quality assessment and, where necessary a mitigation plan to demonstrate practical and effective measures to be taken to avoid the adverse impacts.

Policy D1 - Transport: Development will be permitted where sustainable modes of transport are prioritised and measures designed to mitigate transport impacts arising from either individual development proposals or cumulative impacts caused by a number of proposals are provided.

Other Affected Local Authorities

Blaby District Council

The *Blaby Local Plan* (published in 2013 includes the *Core Strategy* (Ref. A5-3) which was published in 2011 includes the following policy related to air quality):

Policy CS10 – Transport Infrastructure: The District Council is committed to ensuring that no additional AQMAs are designated. The *Core Strategy* states it will do this by, *"Considering the location of development in relation to the AQMAs, and seek to optimise the more sustainable transport modes of walking, cycling and public transport."*

The *Core Strategy – Sustainability Appraisal* (Ref. A5-4) for Blaby District Council includes the following policies which relate to air quality:

Policy 1 - Location of New Development: To improve air quality particularly through reducing transport related pollutants. This will be implemented by, *"Ensuring provision of frequent, efficient and high quality public transport linkages and incorporate well-lit footpaths, cycle ways and cycle storage on new developments to encourage travel by these methods."*

Policy 10 - Transport Infrastructure: To improve air quality particularly through reducing transport related pollutants. This will be implemented by, "*Ensuring easy accessibility to public transport, walking and cycling for all members of the community (e.g. provision of public transport that can be used easily by elderly/disabled people). And to encourage contributions that will help fund the provision of a frequent, efficient and high quality public transport system and improve the provision of pedestrian and cycle routes*."

Policy 18 - Countryside: To improve air quality particularly through reducing transport related pollutants. This will be implemented by, *"Ensuring air quality assessments are carried out where proposals could affect air quality."*

Policy 23 - Waste: Securing waste management facilities close to new areas of development may help to reduce transport of waste and thus minimise emissions associated with this. However, waste management facilities could also have effects upon air quality.

Hinckley and Bosworth Borough Council

The Hinckley and Bosworth Borough Council *Core Strategy* (Ref. A5-5) includes the following objective related to air quality:

The Environment – Spatial Objective 12 – Climate Change and Resource Efficiency: "*To minimise the impacts of climate change by promoting the prudent use of resources through sustainable patterns of development, investment in green infrastructure, minimising the use of resources and energy, increasing reuse and recycling of natural resources increasing the use of renewable energy technologies and minimising pollution, including greenhouse gas emissions*."

Warwick District Council

The *Local Plan 2011-2029* (Ref. A5-6) for Warwick District Council was published in 2017 and includes the following objectives and policies related to air quality.

Objective B: Providing well-designed new developments that are in the right location and address climate change: This will be met by fulfilling the following commitments:

- *"Make sure that new developments are in places that will reduce the need for people to use their cars. This will minimise air pollution, help address climate change by reducing road congestion and carbon emissions, and encourage people to live more healthy lifestyles by facilitating walking and cycling.*
- *Make sure that new developments are located, designed and built so that they can deal with the expected effects of climate change, particularly flooding.*
- *Make sure new developments are appropriately distributed across the district and are designed and located to maintain and improve the quality of the built and natural environments, particularly around historic areas and buildings, sensitive wildlife habitats and areas of high landscape value. In addition, new developments should respect the integrity of existing settlements.*
- *Make sure new developments are built to a high standard in terms of design, and provide inclusive, lively and attractive places where people feel safe and want to live, work or visit.*
- *Make sure new developments provide public and private open spaces where there is a choice of areas of shade, shelter, recreation and access to sports facilities that will benefit people and wildlife and provide flood storage and carbon management.*

- *Protect and enhance high-quality landscapes and important heritage and natural assets, ensuring that where adaptation is needed, this is done in a way that is sensitive to their significance."*

Policy TR2 Traffic Generation: Any development that results in significant negative impacts on air quality within identified AQMAs or on the health and wellbeing of people in the area as a result of pollution should be supported by an air quality assessment and, where necessary, a mitigation plan to demonstrate practical and effective measures to be taken to avoid the adverse impacts.

Policy NE5 Protection of Natural Resources: Development proposals will be permitted provided that they ensure that the district's natural resources remain safe, protected and prudently used. Development proposals will be expected to demonstrate that they do not give rise to soil contamination, or air, noise, radiation, light or water pollution where the level of discharge, emissions or contamination could cause harm to sensitive receptors. Ensure that where contamination exists, the land is made fit for its intended purpose and does not pose an unacceptable risk to sensitive receptors.

Appendix 5-2: Baseline Air Quality within the Study Area

Air Quality Management Areas

Coventry City Council AQMA

Coventry City Council has declared a city wide AQMA for exceedances of the annual NO_2 objective according to its AQMA Order (Ref. A5-7).

Roads in the affected road network are within this AQMA.

Rugby Borough Council AQMAs

Rugby Borough Council has declared a borough wide AQMA for exceedances of the annual NO_2 objective according to its *2016 Annual Status Report* (Ref. A5-8). The area covers the whole urban area of Rugby bounded by the southern boundary with Daventry District Council, A5, M6, minor roads to the west of Long Lawford, A45 and M45.

Roads in the affected road network are within this AQMA.

Other Affected Local Authorities

Blaby District Council (BDC) AQMAs

BDC has four AQMAs for exceedances of annual nitrogen dioxide (NO_2) objective according to its *2016 Annual Status Report* (Ref. A5-9)*;* these are:

- AQMA 1: Narborough Road South and Fosse Park in Leicester
- AQMA 2: The M1 corridor in Enderby and Narborough south of J21
- AQMA 3: The M1 corridor (north of J21 up to just north of J21a) between Thorpe Astley and Kirby Muxloe including the extension areas along the A47 Hinckley Road
- AQMA 4b: B582 Enderby Road, Whetstone

None of the roads in the affected road network are within these AQMAs.

Hinckley and Bosworth District Council

There are no AQMAs within this district.

Warwick District Council AQMAs

Warwick District Council has declared five AQMAs according to its *2016 Annual Status Report (*Ref. A5-10*)*, for exceedances of the annual NO_2 objective with one also declared for the hourly objective:

- Leamington Spa AQMA: An area of South Town, Leamington Spa, centred on High Street, Clemens Street and Bath Street
- Warwick AQMA: An area in the centre of Warwick, encompassing properties along High Street, Jury Street, Bowling Green Street, Theatre Street, Northgate, The Butts, Smith Street, Church Street and part of Saltisford, and also including a number of nearby properties. This AQMA is declared for both annual and hourly mean NO_2 objectives
- Warwick Road (Kenilworth) AQMA: An area encompassing all properties along Warwick Road, Kenilworth between the junctions with Station Road and Waverley Road
- Warwick Coventry Road AQMA: The area covers the east side of Coventry Road from the junction with St. Johns / Coten End, incorporating 2-4 Coventry Road and Montgomery Court, properties fronting on to Coventry Road only
- New Street Kenilworth AQMA: An area encompassing all properties fronting New Street, Kenilworth from the junction with Bridge Street/Fieldgate Lane up to and including No. 17 New Street.

None of the roads in the affected road network are within these AQMAs.

Air Quality Monitoring

Monitoring data from across each of the local authority areas that have roads within the affected road network is discussed in this section. Monitoring sites that are close to the affected road network are shown on Section 18 Figure 5-2 and are identified in the tables by an asterisk.

Blaby District Council Monitoring

Blaby District Council measures air quality through a combination of automatic monitoring stations and passive NO_2 diffusion tubes. The most recent monitoring data available is from 2015, published in their *2016 Air Quality Annual Status Report*.

The council operates four automatic monitors at roadside sites which measure NO_2 and PM_{10}. Concentrations of NO_2 were within the annual mean objective (40µg/m^3) at all of the sites, with the exception of CM4 – Hinckley Road which exceeded the objective and limit value in 2015. All sites measured hourly NO_2 concentrations within the objective and limit value. PM_{10} concentrations were well within the annual mean and daily objectives and limit values at all monitoring sites.

The local authority also currently undertakes non-automatic monitoring of NO_2 using a network of passive diffusion tubes at 46 monitoring locations. The annual mean objective and limit value for NO_2 was exceeded at one monitoring location (DT 4) from 2014-2015 but this site is not near the affected road network; all others were within the objective and limit value in 2015.

Coventry City Council Monitoring

Coventry City Council measures air quality through a combination of automatic monitoring stations and passive NO_2 diffusion tubes. The most recent monitoring data collected is from 2014, published in their *2015 Updating and Screening Assessment* (Ref. A5-11). The council operates three automatic monitoring stations. Ball Hill monitoring site exceeded the NO_2 annual objective and limit value in 2014 whilst the other two sites had concentrations within the criteria. PM_{10} concentrations were within the objectives and limit values at all three sites.

The council also currently undertakes non-automatic monitoring of NO_2 using a network of passive diffusion tubes at 53 monitoring locations with just under half of the sites exceeding the annual objective and limit value. All monitoring sites near the affected road network had concentrations within the objective and limit value.

Hinckley and Bosworth Council Monitoring

Hinckley and Bosworth Council measures air quality using passive NO_2 diffusion tubes at 16 locations. The most recent monitoring data collected by Hinckley and Bosworth Council is from 2016, published in their *2017 Air Quality Annual Status Report* (Ref. A5-12). The annual mean objective and limit value for NO_2 was not exceeded at any of the monitoring sites.

Rugby Borough Council Monitoring

Rugby Borough Council measures air quality through a combination of automatic monitoring stations and passive NO_2 diffusion tubes. The most recent monitoring data is published in their *2017 Air Quality Annual Status Report*. The council operates one automatic monitoring site which measures PM_{10}, concentrations were well within the objectives and limit values.

The council currently undertakes non-automatic monitoring of NO_2 using a network of passive diffusion tubes at 58 monitoring locations. The annual mean objective and limit value for NO_2 was exceeded at five monitoring locations (S10, S24, W1, W2 and AD1) from 2014 - 2016 but these sites are not near the affected road network.

Warwick District Council Monitoring

Warwick District Council has no recent published information.

Highways England Monitoring

Highways England conducted a NO_2 survey using diffusion tubes within the study area. The monitoring was carried out over a six month period. All of the monitoring sites were at roadside locations apart from Site A46Cov_018 which was an urban background site. The results from the survey were annualised and bias adjusted in accordance with *Defra's Technical Guidance LAQM.TG16* (Ref. A5-13). All of the measured concentrations were within the annual mean objective, with annual mean concentrations ranging from 17 – 38µg/m^3 in 2016 (Ref. A5-14).

Table 5-2A: Measured Concentrations at Blaby District Council Automatic Monitors

Automatic Monitor	OS Grid Reference		Annual Mean NO_2 (µg/m^3)			Annual Mean PM_{10} (µg/m^3)		
			2014	2015	2016	2014	2015	2016
Blaby 1 (Packhorse Drive)	454482	298573	26.4 (0)	38.1 (0)	**42** (0)	14.2 (1)	15.8 (3)	-
Blaby 2 (Sharnford)	447875	291617	16.3 (0)	24.6 (0)	30 (0)	19.6 (5)	15.1 (1)	-
Blaby 3 (Hinckley Road, LFE)	453185	303310	31.9 (0)	26.8 (0)	16 (0)	-	-	-
Blaby 4 (Hinckley Road, LFE)	453492	303315	29.1 (0)	**47.9** (0)	33 (0)	-	-	-

Note: Exceedances of an objective or limit value are shown in **bold**.
Exceedances of the NO_2 1 hour mean (200µg/m^3) and PM_{10} 24 hour mean (50µg/m^3) standards are shown in brackets.
*Monitoring site near the affected road network.

Table 5-2B: Measured Concentrations at Coventry City Council Automatic Monitors

Automatic Monitor	OS Grid Reference		Annual Mean NO_2 (µg/m^3)			Annual Mean PM_{10} (µg/m^3)		
	X	Y	2014	2015	2016	2014	2015	2016
Queensland Avenue	431572	279022	38 (7)	-	-	23 (8)	-	-
Foleshill Road	434251	281512	33 (0)	-	-	19 (2)	-	-
Ball Hill	435129	279282	**49** (12)	-	-	19 (8)	-	-

Note: Exceedances of an objective or limit value are shown in **bold**.
Exceedances of the NO_2 1 hour mean (200µg/m^3) and PM_{10} 24 hour mean (50µg/m^3) standards are shown in brackets.

Table 5-2C: Measured Concentrations at Rugby Borough Council Automatic Monitor

Automatic	OS Grid Reference	Annual Mean NO_2	Annual Mean PM_{10}

Monitor			(µg/m^3)			(µg/m^3)		
	X	Y	2014	2015	2016	2014	2015	2016
OSR1	449029	276315	-	-	-	-	12.8 (3)	15.5 (1)

Note: Exceedances of an objective or limit value are shown in **bold**.
Exceedances of the PM_{10} 24 hour mean (50µg/m^3) standard are shown in brackets.
*Monitoring site near the affected road network.

Table 5-2D: Measured NO_2 Concentrations using Diffusion Tubes

Site ID		OS Grid Reference		Annual Mean NO_2 (µg/m^3)		
		X	Y	2014	2015	2016
Blaby	DT1	455970	301146	27	25	**-**
Blaby	DT2	456434	301783	25	24	-
Blaby	DT3	456365	301762	22	20	-
Blaby	DT4	453606	299557	**47**	**44**	-
Blaby	DT5	457014	299629	20	17	-
Blaby	DT6	453570	303383	35	31	-
Blaby	DT7	454300	302229	21	18	-
Blaby	DT8	454521	298151	32	29	-
Blaby	DT9	453735	307234	24	19	**-**
Blaby	DT10	455030	302917	19	16	-
Blaby	DT11	454482	298573	22	19	-
Blaby	DT12	454482	298573	23	20	-
Blaby	DT13	454482	298573	22	19	-
Blaby	DT14	454507	298338	23	21	-
Blaby	DT15	456786	298547	19	14	-
Blaby	DT16	453220	304273	31	29	-
Blaby	DT17	453137	303321	22	20	-
Blaby	DT18	453488	303637	29	28	-
Blaby	DT19	454968	298825	25	23	-
Blaby	DT20	455819	297954	24	21	-
Blaby	DT21	456148	297833	22	19	-
Blaby	DT22	448004	291660	23	20	-
Blaby	DT23	448259	291852	20	18	-
Blaby	DT24	453905	307144	20	18	-
Blaby	DT25	456470	301903	24	22	-

Site ID		OS Grid Reference		Annual Mean NO_2 ($\mu g/m^3$)		
		X	Y	2014	2015	2016
Blaby	DT26	455817	297937	32	28	**-**
Blaby	DT27	454217	297549	20	17	-
Blaby	DT28	453967	297409	28	24	**-**
Blaby	DT29	454988	298619	21	16	**-**
Blaby	DT30	448516	293547	18	13	**-**
Blaby	DT31	448895	293443	14	13	-
Blaby	DT32	454554	294803	15	15	-
Blaby	DT33	454497	294854	20	17	-
Blaby	DT34	456561	301876	-	18	-
Blaby	DT35	456521	301896	-	22	-
Blaby	DT36	456522	302032	-	21	-
Blaby	DT37	447931	291620	-	13	-
Blaby	DT38	447870	291224	-	14	-
Blaby	DT39	448849	293465	-	13	-
Blaby	DT40	453468	299737	-	23	-
Blaby	DT41	453439	299740	-	24	-
Blaby	DT42	453789	299334	-	24	-
Blaby	DT43	453780	299360	-	22	-
Blaby	DT44	453706	299455	-	23	-
Blaby	DT45	454147	297493	-	20	-
Blaby	DT46	454056	297426		20	
Coventry	CCO1/1N	432105	279578	39.3	-	-
Coventry	HR1	432683	279240	**63.1**	-	-
Coventry	BH1	434966	279204	39	-	-
Coventry	BH2a	435126	279286	**48.9**	-	-
Coventry	BH4	435331	279358	**47**	-	-
Coventry	BH6i	435184	279298	**42.3**	-	-
Coventry	BH10	435189	279281	**42.3**		-
Coventry	BH13	435508	279387	37.4	-	-
Coventry	BH14	435658	279357	36.7	-	-
Coventry	FS1	433569	279234	**44.2**	**-**	-
Coventry	CS1	433204	279234	38.1	-	-

Site ID		OS Grid Reference		Annual Mean NO_2 ($\mu g/m^3$)		
		X	Y	2014	2015	2016
Coventry	CS2	433322	279500	38	-	-
Coventry	HS2	433420	279236	35.6	-	-
Coventry	LON12	434075	278450	**43.9**	-	-
Coventry	SE1	432084	279042	36.1	-	-
Coventry	SE3	432303	279028	**41.4**	-	-
Coventry	QAV01	431595	278991	35	-	-
Coventry	QAV8	431573	279020	29.6	-	-
Coventry	QAV12	431704	278680	38.5	-	-
Coventry	QAV13	431763	278657	**43.3**	-	-
Coventry	R1	434250	281513	31.2	-	-
Coventry	R4	434233	281526	39.6	-	-
Coventry	R5	433716	280503	**44.9**	-	-
Coventry	R6	433617	280276	**52.9**	-	-
Coventry	R8	433992	281008	38.9	-	-
Coventry	R9	434059	281105	**41.2**	-	-
Coventry	LR1	434836	283030	**44**	-	-
Coventry	LR2	434880	283077	**43.4**	-	-
Coventry	LR3	435016	283515	**44.6**	-	-
Coventry	BRN2	433605	281965	39.1	-	-
Coventry	BA1	432531	280769	38.3	-	-
Coventry	SS1	434062	280082	36.8	-	-
Coventry	SS2	433994	279969	38.1	-	-
Coventry	SS3	434842	281272	39.1	-	-
Coventry	SS5	433847	279814	**49.2**	-	-
Coventry	EH1	431978	278050	35.7	-	-
Coventry	BELL1	435849	282211	**40.2**	-	-
Coventry	BELL2	435826	282158	38.9	-	-
Coventry	FGS1	434330	278973	**41.7**	-	-
Coventry	FGS2	434450	279001	38.9	-	-
Coventry	FGS3	434530	279026	**42.7**	-	-
Coventry	GR1	434678	278922	36.5	-	-
Coventry	Grange2	435765	284246	**42.9**	-	-

Site ID		OS Grid Reference		Annual Mean NO_2 ($\mu g/m^3$)		
		X	Y	2014	2015	2016
Coventry	Grange 3	435790	284285	**43**	-	-
Coventry	AGR1	436262	283893			
Coventry	AGR2	436286	283860	30.4	-	-
Coventry	SW1	434898	279587	30.5	-	-
Coventry	SW2	434897	279484	32	-	-
Coventry	GS1	433899	278845	**44.5**	-	-
Coventry	GF1	433407	278882	37.8	-	-
Coventry	TS3	433492	279239	**47.9**	-	-
Coventry	QV1	433029	278798	39.8	-	-
Coventry	JL1	436092	276296	27.6		-
Hinckley and Bosworth	1	442417	293808	25.2	25.9	25
Hinckley and Bosworth	2	442903	291349	28.5	27.3	28.3
Hinckley and Bosworth	3	440106	293080	25.5	25.3	24.7
Hinckley and Bosworth	4	439714	292984	26.8	25.9	23.8
Hinckley and Bosworth	5	440166	292984	24.2	23.4	22.6
Hinckley and Bosworth	6	442592	292938	24.1	23.3	22.6
Hinckley and Bosworth	7	443624	293829	25.6	25.3	24.4
Hinckley and Bosworth	8	446696	296771	18.1	17.4	17.9
Hinckley and Bosworth	9	446320	297756	22.3	22.8	23.9
Hinckley and Bosworth	10	447113	311660	38.7	38.5	39.4
Hinckley and Bosworth	11	451376	308147	22.2	24.4	25.4
Hinckley and Bosworth	12	447113	311660	36.5	37.1	40
Hinckley and Bosworth	13	447086	311657	32.7	29.8	31

Site ID		OS Grid Reference		Annual Mean NO_2 ($\mu g/m^3$)		
		X	Y	2014	2015	2016
Hinckley and Bosworth	14	447113	311660	37.2	37	38.3
Hinckley and Bosworth	15	442291	293579	-	-	35.9
Hinckley and Bosworth	16	442328	293264	-	-	26.3
Rugby	S1	449000	277178	19.5	20.4	18.8
Rugby	S2	440830	269008	18.4	16.3	16.5
Rugby	S3	447316	276162	15.5	15.6	15.5
Rugby	*S4	441131	275648	13.5	13.7	14
Rugby	S5	438642	274418	29.6	27.9	28.5
Rugby	S6	449671	274795	15.7	17.3	16.3
Rugby	S7	448863	272786	13.1	12.7	13.2
Rugby	S8	450138	275557	33.5	38.2	33.6
Rugby	S9	451187	275334	18.9	18.8	23.3
Rugby	S10	450069	275040	**40.9**	**41.6**	**41**
Rugby	S11	449787	275224	25.2	25.6	24.3
Rugby	S12	451445	277245	21.7	23.9	25.8
Rugby	S13	450088	276229	33.4	38.3	39.5
Rugby	*S14	439450	277523	17.9	19	18.2
Rugby	S15	449168	275411	28.9	30.9	28.3
Rugby	*S16	436867	275275	22.1	21.3	22.8
Rugby	S17	431271	266404	20.5	20.2	21.4
Rugby	S18	431271	266404	21.3	20.2	20.7
Rugby	S19	431271	266404	20.7	20.5	20.4
Rugby	S20	450137	275849	32.6	30.9	32.4
Rugby	S21	451698	273273	24.7	24.2	24.2
Rugby	S22	452403	273567	22.9	23.2	24.4
Rugby	S23	452672	273633	24.2	23.1	25.1
Rugby	S24	448496	271244	**46.4**	**48.9**	**47.1**
Rugby	S25	448414	271175	31.5	33.8	34.5
Rugby	S26	448999	275505	21	20.3	22.4
Rugby	S27	449435	275543	-	-	27.5

Site ID		OS Grid Reference		Annual Mean NO_2 ($\mu g/m^3$)		
		X	Y	2014	2015	2016
Rugby	S28	449011	276329	19.7	20.9	19.7
Rugby	S29	449575	276540	23	24.9	21.7
Rugby	S30	451107	275838	36.1	36.6	36.4
Rugby	S31	450848	275849	31.6	32.1	29.7
Rugby	S32	450750	275547	29.7	32.6	30.4
Rugby	S33	450510	275355	25.4	25.6	25.4
Rugby	S34	450405	275329	26.9	33.9	27.8
Rugby	S35	450444	275236	34	34.8	32.3
Rugby	S36	450870	275043	34	34.7	35.3
Rugby	S37	450897	275059	29.9	31.6	30.1
Rugby	S38	451868	275501	27.9	27.8	29.9
Rugby	S39	450852	275116	30	31.9	30
Rugby	S40	450181	275029	30.1	32.8	34.7
Rugby	S41	450010	274998	25.4	27	27.4
Rugby	S42	448855	274352	26.4	23.7	24.2
Rugby	S43	450162	274898	27.7	28.7	31.1
Rugby	S44	453394	273633	-	-	29.8
Rugby	S45	442963	277071	28.3	27.7	26.7
Rugby	*S46	437555	274561	39.5	38.1	39.3
Rugby	S47	450445	275495	33	33.9	35.2
Rugby	S48	450304	275314	36.6	34.5	37.5
Rugby	S49	450864	274896	39.9	39.1	36.6
Rugby	S50	448169	273625	24.8	25.1	25.3
Rugby	S51	443433	279208	32.3	33.6	32.4
Rugby	S52	448537	271195	23	24.9	24
Rugby	S53	448361	271334	-	-	24.6
Rugby	W1	450226	275008	-	**46.6**	**47.4**
Rugby	W2	450269	274998	-	**46.5**	**45.5**
Rugby	W3	451162	276772	-	32.8	30.9
Rugby	AD1	440416	284401	-	-	**47.1**
Rugby	AD2	445004	281330	-	-	25.3
HE	A46Cov_001 (Grove Rd)	439322	283508	-	-	24

Site ID		OS Grid Reference		Annual Mean NO_2 ($\mu g/m^3$)		
		X	Y	2014	2015	2016
HE	A46Cov_002 (Grove Rd)	439373	283521	-	-	22
HE	*A46Cov_003 (Farber Rd)	438588	280764	-	-	22
HE	*A46Cov_004 (Abbotsbury Cl)	438302	279887	-	-	19
HE	*A46Cov_005 (Valencia Rd)	438410	278903	-	-	25
HE	*A46Cov_006 (The Stoop)	438758	278123	-	-	23
HE	*A46Cov_009 (Rugby Rd)	438963	277640	-	-	30
HE	*A46Cov_010 (Grange Ave)	437916	277125	-	-	17
HE	*A46Cov_011(Middle Ride)	437341	276436	-	-	21
HE	A46Cov_012 (Montgomery Cl)	436459	275858	-	-	32
HE	A46Cov_013 (London Rd)	436536	275675	-	-	38
HE	A46Cov_014 (Selsey Cl)	436078	275873	-	-	26
HE	*A46Cov_015 (Fenside Ave)	433949	275767	-	-	24
HE	*A46Cov_016 (Mylgrove)	433747	275429	-	-	24
HE	*A46Cov_017(Mill Hill)	433833	275283	-	-	25
HE	*A46Cov_018 (Bracadale Close)	438201	279004	-	-	23
HE	A46Cov_020 (Woodway Lane)	437673	282807	-	-	34
HE	A46Cov_019 (Rugby Rd AURN)	431271	266404	-	-	19
HE	A46Cov_021 (Rugby Rd AURN)	431271	266404	-	-	19
HE	A46Cov_023 (Rugby Road AURN)	431271	266404	-	-	22

Note: Exceedances of the NO_2 annual mean objective of 40$\mu g/m^3$ are shown in **bold**.
*Monitoring site near the affected road network.

Appendix 5-3: Additional Local Air Quality Methodology

Detailed Model Inputs

To undertake the assessment of road traffic emissions during the operational phases of the proposed scheme, ADMS Roads Extra v4.1.1.0 was used to quantify pollution levels at selected receptors. ADMS Roads is a modern dispersion model that has an extensive published track record of use in the UK for the assessment of local air quality impacts, including model validation and verification studies.

Table 5-3A outlines the key model inputs utilised in the ADMS-Roads modelling local air quality assessment.

Table 5-3A: Model Input Parameters

Variables	Model Input
Minimum Monin-Obukhov length for stable conditions	10m
Terrain types	Flat
Receptor location	x,y coordinates determined by GIS z height of 1.5m for receptors.
Emissions	NO_X, PM_{10}
Emission factors	As per IAN 185/15 (speed banding)*
Meteorological data	1 year (2016) hourly sequential data from Coventry Meteorology Station
Emission profiles	Emission profiles have been used with AM peak (07.00-10.00 hrs, inter-peak (10.00 -16.00 hrs), PM peak (16.00-19.00 hrs) and off-peak (19.00-07.00 hrs).
Receptors	Selected receptors
Model output	Long-term annual mean NO_X concentrations (µg/m^3) Long-term annual mean PM_{10} concentrations (µg/m^3)

* updated IAN 185/15 emissions tool issued by Highways England based on EFT v7

Meteorological Data

Meteorological data from Coventry Airport for 2016 has been used in the assessment. This meteorological site is located approximately 1.9 miles (3km) south-west of the proposed scheme.

Background Concentrations

Annual average background concentrations were taken from Defra's 1,000x1,000m background maps (2013 based maps) and adjusted to remove the in square major road contribution. *Defra's NO_2 Adjustment for NOx Sector Removal Tool (version 5.1)* was used to update the NO_2 concentrations once the NO_x major road contribution had been removed.

Traffic Data

The air quality assessment has utilised Annual Average Daily Traffic (AADT) data with 4 periods modelled: AM peak (07.00-10.00 hrs, inter-peak (10.00 -16.00 hrs), PM peak (16.00-19.00 hrs) and off-peak (19.00-07.00 hrs).

Model Post Processing

A *NO_X to NO_2 converter (version 5.1)* accompanies the publication of Defra's guidance document *LAQM TG(16)*, and has been used to calculate the road NO_2 contribution from modelled road NOx contributions. The tool comes in the form of an MS Excel spreadsheet and uses local authority specific data to calculate annual mean concentrations of NOx. This tool was used to calculate the total NO_2 concentrations at receptors from the modelled road NOx contribution and associated background concentration. Due to the location of the proposed scheme, the *All other urban UK traffic* setting was selected.

Model Verification

The model predictions presented have been verified against monitoring data. The verification factor used to adjust raw model outputs are presented in Table 5-3B.

Table 5-3B: Verification Details

Description of Area Applied	Adjustment Factor	Root Mean Square Error (RMSE)	Fractional Bias
Across study area	2.5	0.09	0.0

The above factor was applied to the predicted road NO_x concentrations prior to the conversion of road NO_x to road NO_2 and addition of NO_2 background concentrations to provide predicted total NO_2 concentrations at the receptors.

The factor was also applied to the predicted road PM_{10} concentrations in the absence of any monitoring data within the study area with which to calculate specific verification factors for PM_{10}.

Table 5-3C contains details of the all monitoring sites used within the verification. These are also displayed on Section 18 Figure 5-2. After adjustment, all of the monitoring sites had predicted concentrations within 15% of the measurements and nine out of the eleven were within 10% of the measurements.

Table 5-3C: Monitoring Data Used in Model Verification

Site ID*	X	Y	Monitored Total NO_2 ($\mu g/m^3$)	Monitored Road NO_x ($\mu g/m^3$)	Modelled Road NO_x ($\mu g/m^3$)	Modelled Total NO_2 Before Adjustment ($\mu g/m^3$)	Modelled Total NO_2 After Adjustment ($\mu g/m^3$)	% Difference Modelled/ Monitored
A46Cov_005_0116	438410	278903	22.4	14.0	3.7	17.2	20.0	-11
A46Cov_006_0116	438758	278123	20.0	9.3	3.7	17.1	20.0	0
A46Cov_009_0116	438963	277640	26.3	20.1	8.3	20.5	26.6	1
A46Cov_010_0116	437916	277125	15.5	0.0	1.0	15.9	16.7	8
A46Cov_011_0116	437341	276436	18.3	7.1	1.7	15.4	16.7	-9
S14	439450	277523	18.2	9.4	2.9	14.9	17.2	-6
A46Cov_015_0116	433949	275767	20.9	10.2	6.1	18.8	23.4	12
A46Cov_016_0116	433747	275429	21.4	11.2	5.7	18.6	23.0	7
A46Cov_017_0116	433833	275283	21.9	12.2	6.0	18.8	23.3	6
S16	436867	275275	22.8	15.9	5.1	17.2	21.1	-7
S46	437555	274561	39.3	59.1	23.2	23.3	38.7	-1

* See Section 18 Figure 5-2 for the location of the monitoring sites.

Appendix 5-4: Air Quality Modelling Results for all Receptors

The results for all modelled receptors for annual average NO_2 and PM_{10} concentrations and also the number of days exceedance of the 24-hour average PM_{10} air quality objective and limit value are presented in Table 5-4A, Table 5-4B and Table 5-4C respectively. Receptor numbers beginning with S represent areas where there are likely to be facilities used by children such as schools, nurseries and playgrounds, receptor numbers beginning with H represent facilities such as hospitals and care homes, and receptor numbers beginning with R represent residential or commercial buildings.

Table 5-4A: Modelled Annual Mean NO_2 Concentrations (µg/m^3)

Receptor Number	Base	Do-Minimum	Do-Something	Change	Magnitude of Change
R01	24.3	20.9	21.0	0.2	Imperceptible
R02	23.3	20.1	20.3	0.2	Imperceptible
R03	30.9	27.2	27.5	0.3	Imperceptible
R04	20.6	17.6	17.7	0.1	Imperceptible
R05	22.0	18.9	19.1	0.2	Imperceptible
R06	21.6	18.5	18.6	0.1	Imperceptible
R07	24.5	20.8	21.0	0.1	Imperceptible
R08	16.8	14.2	14.2	0.1	Imperceptible
R09	17.0	14.4	14.4	0.1	Imperceptible
R10	29.1	25.0	25.2	0.2	Imperceptible
R11	20.0	17.1	17.3	0.2	Imperceptible
R12	25.2	21.7	21.7	0.0	Imperceptible
R13	25.4	22.7	22.8	0.1	Imperceptible
R14	24.4	21.5	21.6	0.1	Imperceptible
R15	21.5	18.2	18.2	0.0	Imperceptible
R16	23.0	19.9	20.0	0.1	Imperceptible
R17	18.8	15.7	15.7	0.0	Imperceptible
R18	17.7	14.4	14.4	0.0	Imperceptible
R19	19.2	16.0	16.0	0.0	Imperceptible
R20	17.1	14.0	14.0	0.0	Imperceptible
R21	24.4	20.1	20.0	-0.1	Imperceptible
R22	40.3	32.8	32.1	-0.7	Small improvement
R23	27.6	22.7	22.5	-0.2	Imperceptible

Receptor Number	Base	Do-Minimum	Do-Something	Change	Magnitude of Change
R24	17.0	14.0	13.9	0.0	Imperceptible
R25	19.8	16.3	16.2	-0.1	Imperceptible
R26	23.4	19.6	19.5	-0.1	Imperceptible
H01	22.5	18.5	18.4	-0.1	Imperceptible
R27	17.5	14.7	14.9	0.3	Imperceptible
R28	28.1	25.6	26.3	0.7	Small deterioration
R29	25.8	22.5	22.3	-0.3	Imperceptible
R30	22.0	18.7	18.8	0.1	Imperceptible
R31	15.5	12.7	13.0	0.2	Imperceptible
R32	12.8	10.5	10.7	0.2	Imperceptible
R33	17.4	14.0	14.5	0.5	Small deterioration
R34	26.0	20.8	21.9	1.0	Small deterioration
S01	10.3	8.5	8.5	0.1	Imperceptible
S02	20.1	17.4	17.5	0.2	Imperceptible
S03	13.7	11.2	11.3	0.1	Imperceptible
S04	9.6	7.9	7.9	0.0	Imperceptible
S05	18.3	15.5	15.6	0.1	Imperceptible
S06	11.8	9.6	9.8	0.1	Imperceptible
S07	11.0	9.0	9.0	0.0	Imperceptible
R35	24.2	20.6	20.3	-0.3	Imperceptible
R36	22.4	18.9	18.7	-0.3	Imperceptible
R37	24.1	20.2	19.7	-0.5	Small improvement
R38	22.8	19.1	18.6	-0.5	Small improvement
R39	27.5	23.4	22.8	-0.5	Small improvement
R40	30.3	26.2	25.7	-0.5	Small improvement
R41	20.6	17.5	17.6	0.1	Imperceptible
R42	21.9	18.6	18.8	0.2	Imperceptible

Receptor Number	Base	Do-Minimum	Do-Something	Change	Magnitude of Change
R43	24.5	21.0	21.2	0.2	Imperceptible
R44	21.5	17.7	17.9	0.1	Imperceptible
R45	27.1	21.3	21.5	0.2	Imperceptible
R46	22.8	18.3	18.3	0.0	Imperceptible
R47	25.2	20.2	20.0	-0.3	Imperceptible
R48	26.9	21.7	21.3	-0.3	Imperceptible
R49	25.2	20.3	20.3	-0.1	Imperceptible
S08	17.5	14.5	14.4	-0.1	Imperceptible
S09	21.5	17.5	17.4	-0.1	Imperceptible
H02	20.1	16.5	16.5	0.0	Imperceptible
S10	18.5	15.1	15.1	0.0	Imperceptible
S11	18.8	15.4	15.4	0.1	Imperceptible
H03	21.4	17.4	17.4	0.0	Imperceptible
S12	17.4	14.4	14.3	-0.1	Imperceptible
S13	20.7	17.0	16.9	0.0	Imperceptible
S14	17.9	14.6	14.6	0.0	Imperceptible
S15	16.8	13.7	13.7	0.0	Imperceptible
S16	19.2	15.9	15.7	-0.1	Imperceptible
S17	21.1	17.6	17.5	-0.1	Imperceptible
R50	23.9	20.6	20.1	-0.5	Small improvement
R51	27.9	24.3	22.7	-1.6	Small improvement
R52	28.0	24.5	23.0	-1.5	Small improvement
R53	21.8	18.7	18.1	-0.6	Small improvement
R54	22.5	19.2	19.4	0.2	Imperceptible
R55	22.8	19.3	19.3	0.0	Imperceptible
R56	22.0	18.5	18.5	0.0	Imperceptible
R57	19.1	16.5	16.7	0.2	Imperceptible
R58	21.4	18.0	18.2	0.2	Imperceptible
R59	23.7	19.7	19.9	0.2	Imperceptible

Table 5-4B: Modelled Annual Mean PM_{10} Concentrations (µg/m^3)

Receptor Number	Base	Do-Minimum	Do-Something	Change	Magnitude of Change
R01	16.8	16.1	16.2	0.0	Imperceptible
R02	16.9	16.3	16.4	0.0	Imperceptible
R03	17.9	17.2	17.3	0.0	Imperceptible
R04	16.7	16.1	16.1	0.0	Imperceptible
R05	17.3	16.7	16.7	0.0	Imperceptible
R06	17.3	16.7	16.7	0.0	Imperceptible
R07	16.5	15.8	15.9	0.0	Imperceptible
R08	15.8	15.2	15.2	0.0	Imperceptible
R09	15.5	14.9	14.9	0.0	Imperceptible
R10	17.8	17.0	17.0	0.0	Imperceptible
R11	16.9	16.4	16.5	0.0	Imperceptible
R12	16.3	15.9	16.0	0.0	Imperceptible
R13	16.3	16.1	16.2	0.0	Imperceptible
R14	16.2	16.0	16.0	0.0	Imperceptible
R15	14.9	14.4	14.4	0.0	Imperceptible
R16	15.9	15.5	15.6	0.0	Imperceptible
R17	13.9	13.4	13.4	0.0	Imperceptible
R18	14.1	13.5	13.5	0.0	Imperceptible
R19	13.9	13.4	13.4	0.0	Imperceptible
R20	14.0	13.5	13.5	0.0	Imperceptible
R21	15.6	15.0	15.0	0.0	Imperceptible
R22	18.3	17.5	17.3	-0.1	Imperceptible
R23	15.8	15.1	15.1	-0.1	Imperceptible
R24	13.7	13.2	13.1	0.0	Imperceptible
R25	14.3	13.7	13.7	0.0	Imperceptible
R26	15.4	14.9	14.9	0.0	Imperceptible
H01	14.8	14.2	14.2	0.0	Imperceptible
R27	15.3	14.8	14.9	0.1	Imperceptible
R28	16.8	16.6	16.8	0.2	Imperceptible
R29	16.6	16.1	16.1	0.0	Imperceptible
R30	15.8	15.3	15.3	0.0	Imperceptible

Receptor Number	Base	Do-Minimum	Do-Something	Change	Magnitude of Change
R31	14.1	13.6	13.6	0.0	Imperceptible
R32	13.3	12.7	12.8	0.0	Imperceptible
R33	14.0	13.3	13.4	0.1	Imperceptible
R34	16.2	15.3	15.5	0.3	Imperceptible
S01	12.7	12.2	12.2	0.0	Imperceptible
S02	15.5	15.1	15.1	0.1	Imperceptible
S03	13.7	13.2	13.2	0.0	Imperceptible
S04	12.6	12.1	12.1	0.0	Imperceptible
S05	15.1	14.6	14.7	0.0	Imperceptible
S06	13.4	12.8	12.9	0.0	Imperceptible
S07	12.8	12.3	12.3	0.0	Imperceptible
R35	15.2	14.7	14.6	-0.1	Imperceptible
R36	14.9	14.3	14.3	-0.1	Imperceptible
R37	15.5	14.9	14.8	-0.1	Imperceptible
R38	15.3	14.8	14.6	-0.1	Imperceptible
R39	16.0	15.5	15.3	-0.1	Imperceptible
R40	16.4	16.0	15.9	-0.1	Imperceptible
R41	14.5	14.0	14.0	0.0	Imperceptible
R42	14.7	14.2	14.2	0.0	Imperceptible
R43	15.1	14.6	14.7	0.1	Imperceptible
R44	14.8	14.2	14.3	0.0	Imperceptible
R45	15.8	15.1	15.1	0.0	Imperceptible
R46	15.1	14.4	14.4	0.0	Imperceptible
R47	15.7	14.9	14.8	0.0	Imperceptible
R48	16.0	15.2	15.1	-0.1	Imperceptible
R49	15.6	14.8	14.8	0.0	Imperceptible
S08	13.9	13.4	13.4	0.0	Imperceptible
S09	14.9	14.2	14.2	0.0	Imperceptible
H02	14.6	14.0	14.0	0.0	Imperceptible
S10	14.3	13.8	13.8	0.0	Imperceptible
S11	15.0	14.4	14.4	0.0	Imperceptible
H03	14.8	14.2	14.2	0.0	Imperceptible

Receptor Number	Base	Do-Minimum	Do-Something	Change	Magnitude of Change
S12	13.9	13.4	13.4	0.0	Imperceptible
S13	14.7	14.1	14.1	0.0	Imperceptible
S14	14.2	13.7	13.7	0.0	Imperceptible
S15	14.6	14.1	14.1	0.0	Imperceptible
S16	14.5	14.0	14.0	0.0	Imperceptible
S17	15.0	14.4	14.4	0.0	Imperceptible
R50	16.9	16.5	16.3	-0.2	Imperceptible
R51	17.7	17.3	16.8	-0.5	Small improvement
R52	17.8	17.4	16.9	-0.5	Small improvement
R53	16.5	16.0	15.8	-0.2	Imperceptible
R54	16.6	16.1	16.2	0.1	Imperceptible
R55	16.6	16.1	16.1	0.0	Imperceptible
R56	16.4	15.9	15.9	0.0	Imperceptible
R57	16.0	15.5	15.6	0.1	Imperceptible
R58	16.4	15.9	16.0	0.1	Imperceptible
R59	16.9	16.3	16.3	0.0	Imperceptible

Table 5-4C: Number of Days with PM_{10} Concentrations Exceeding 50µg/m^3

Receptor Number	Base	Do-Minimum	Do-Something	Change	Magnitude of Change
R01	0.6	0.4	0.4	0.0	Imperceptible
R02	0.7	0.4	0.4	0.0	Imperceptible
R03	1.3	0.9	0.9	0.0	Imperceptible
R04	0.6	0.3	0.4	0.0	Imperceptible
R05	0.9	0.6	0.6	0.0	Imperceptible
R06	0.9	0.6	0.6	0.0	Imperceptible
R07	0.5	0.3	0.3	0.0	Imperceptible
R08	0.3	0.1	0.1	0.0	Imperceptible
R09	0.2	0.1	0.1	0.0	Imperceptible
R10	1.2	0.8	0.8	0.0	Imperceptible

Receptor Number	Base	Do-Minimum	Do-Something	Change	Magnitude of Change
R11	0.7	0.5	0.5	0.0	Imperceptible
R12	0.4	0.3	0.3	0.0	Imperceptible
R13	0.4	0.4	0.4	0.0	Imperceptible
R14	0.4	0.3	0.3	0.0	Imperceptible
R15	0.1	0.1	0.1	0.0	Imperceptible
R16	0.3	0.2	0.2	0.0	Imperceptible
R17	0.2	0.4	0.4	0.0	Imperceptible
R18	0.2	0.3	0.3	0.0	Imperceptible
R19	0.2	0.4	0.4	0.0	Imperceptible
R20	0.2	0.3	0.3	0.0	Imperceptible
R21	0.2	0.1	0.1	0.0	Imperceptible
R22	1.7	1.0	0.9	-0.1	Imperceptible
R23	0.3	0.1	0.1	0.0	Imperceptible
R24	0.3	0.5	0.5	0.0	Imperceptible
R25	0.1	0.3	0.3	0.0	Imperceptible
R26	0.2	0.1	0.1	0.0	Imperceptible
H01	0.1	0.2	0.2	0.0	Imperceptible
R27	0.2	0.1	0.1	0.0	Imperceptible
R28	0.6	0.6	0.7	0.1	Imperceptible
R29	0.6	0.3	0.3	0.0	Imperceptible
R30	0.3	0.2	0.2	0.0	Imperceptible
R31	0.2	0.3	0.3	0.0	Imperceptible
R32	0.4	0.7	0.6	0.0	Imperceptible
R33	0.2	0.4	0.4	0.0	Imperceptible
R34	0.4	0.2	0.2	0.0	Imperceptible
S01	0.7	1.0	1.0	0.0	Imperceptible
S02	0.2	0.1	0.1	0.0	Imperceptible
S03	0.3	0.5	0.4	0.0	Imperceptible
S04	0.7	1.1	1.1	0.0	Imperceptible
S05	0.1	0.1	0.1	0.0	Imperceptible
S06	0.4	0.6	0.6	0.0	Imperceptible
S07	0.6	1.0	1.0	0.0	Imperceptible

Receptor Number	Base	Do-Minimum	Do-Something	Change	Magnitude of Change
R35	0.1	0.1	0.1	0.0	Imperceptible
R36	0.1	0.1	0.1	0.0	Imperceptible
R37	0.2	0.1	0.1	0.0	Imperceptible
R38	0.2	0.1	0.1	0.0	Imperceptible
R39	0.3	0.2	0.2	0.0	Imperceptible
R40	0.5	0.3	0.3	0.0	Imperceptible
R41	0.1	0.2	0.2	0.0	Imperceptible
R42	0.1	0.2	0.2	0.0	Imperceptible
R43	0.1	0.1	0.1	0.0	Imperceptible
R44	0.1	0.2	0.2	0.0	Imperceptible
R45	0.3	0.1	0.1	0.0	Imperceptible
R46	0.1	0.1	0.1	0.0	Imperceptible
R47	0.2	0.1	0.1	0.0	Imperceptible
R48	0.3	0.1	0.1	0.0	Imperceptible
R49	0.2	0.1	0.1	0.0	Imperceptible
S08	0.2	0.4	0.4	0.0	Imperceptible
S09	0.1	0.2	0.2	0.0	Imperceptible
H02	0.1	0.2	0.2	0.0	Imperceptible
S10	0.1	0.3	0.2	0.0	Imperceptible
S11	0.1	0.1	0.1	0.0	Imperceptible
H03	0.1	0.2	0.2	0.0	Imperceptible
S12	0.2	0.4	0.4	0.0	Imperceptible
S13	0.1	0.2	0.2	0.0	Imperceptible
S14	0.2	0.3	0.3	0.0	Imperceptible
S15	0.1	0.2	0.2	0.0	Imperceptible
S16	0.1	0.2	0.2	0.0	Imperceptible
S17	0.1	0.1	0.1	0.0	Imperceptible
R50	0.7	0.5	0.4	-0.1	Imperceptible
R51	1.2	0.9	0.7	-0.3	Imperceptible
R52	1.3	1.0	0.7	-0.3	Imperceptible
R53	0.5	0.3	0.3	-0.1	Imperceptible
R54	0.5	0.3	0.4	0.0	Imperceptible

Receptor Number	Base	Do-Minimum	Do-Something	Change	Magnitude of Change
R55	0.5	0.3	0.4	0.0	Imperceptible
R56	0.5	0.3	0.3	0.0	Imperceptible
R57	0.3	0.2	0.2	0.0	Imperceptible
R58	0.5	0.3	0.3	0.0	Imperceptible
R59	0.7	0.4	0.4	0.0	Imperceptible

Table 5-4D: Compliance Risk Assessment

Inputs				Defra PCM Model and Compliance Information			HA Receptor Result			
Scheme	Defra's PCM Data			Total NO_2 Opening Year ($\mu g/m^3$)	Compliance Info		Annual Mean NO_2 concentration ($\mu g/m^3$) (Nearest Receptor to Defra Link)			
HA* link ID	Defra Link Census ID	Zone / Agglomeration Ref No	Is it a Compliant Zone?	PCM *NO2 in 2021	Maximum modelled Conc in Zone 2015	Projected Compliance Year	DoMinimum	Do Something	Change (DS*-DM*)	Equivalent PCM DS (µg/m3)
5588_2500037	81233	17	No	27.0	53.7	2022	21.5	21.6	0.1	27.1
5588_2100110960	81233	17	No	27.0	53.7	2022	22.7	22.8	0.1	27.1
5564_2100110960	81233	17	No	27.0	53.7	2022	22.7	22.8	0.1	27.1
5487_2100112313	81233	17	No	27.0	53.7	2022	18.2	18.2	0.0	27.0
5564_2100112314	81233	17	No	27.0	53.7	2022	22.7	22.8	0.1	27.1
5712_2500065	7103	35	No	30.6	57.9	2023	22.7	22.5	-0.2	30.4
5712_2500052	7103	35	No	30.6	57.9	2023	32.8	32.1	-0.7	29.9
2500055_2500052	7103	35	No	30.6	57.9	2023	32.8	32.1	-0.7	29.9

2500062_99900145	6491	35	No	34.5	57.9	2023	20.1	20.0	-0.1	34.4
2500069_2500065	7103	35	No	30.6	57.9	2023	22.7	22.5	-0.2	30.4
2500074_2500075	7103	35	No	30.6	57.9	2023	22.7	22.5	-0.2	30.4
2500075_2500076	7103	35	No	30.6	57.9	2023	22.7	22.5	-0.2	30.4
2500076_2500069	7103	35	No	30.6	57.9	2023	22.7	22.5	-0.2	30.4
99900145_2500053	6491	35	No	34.5	57.9	2023	20.1	20.0	-0.1	34.4
2500038_2100110962	6491	35	No	34.5	57.9	2023	19.6	19.5	-0.1	34.5
2100110962_2100112711	6491	35	No	34.5	57.9	2023	19.6	19.5	-0.1	34.5
5789_5807	18006	35	No	24.8	57.9	2023	16.3	16.2	-0.1	24.6
2100112146_2100112303	7118	17	No	26.9	53.7	2022	18.0	18.2	0.2	27.1
2100112310_2100112303	7118	17	No	26.9	53.7	2022	19.7	19.9	0.2	27.1
2100112308_2100112310	7118	17	No	26.9	53.7	2022	19.7	19.9	0.2	27.1
5863_2100112645	36504	17	No	28.7	53.7	2022	21.7	21.3	-0.3	28.4
2500269_2100112645	36504	17	No	28.7	53.7	2022	20.2	20.0	-0.3	28.5
8000208_2100111698	73318	35	No	35.5	57.9	2023	17.1	17.3	0.2	35.7

*HA: Highways Agency, PCM: Pollution Climate Mapping, DS: Do Something, DM: Do Minimim

Table 5-4D: Compliance Risk Assessment (Continued)

Scheme	Compliance Descriptors						Outcome	
HA link ID	A - increase greater than 1% of EU LV	B - Does the Scheme cause a compliant zone to become non-compliant	C - Delay Defra compliance	D - Does the Scheme Increase Change in Road Length that	E - Does the scheme worsen air quality overall	If the answer to A,B, C or D is Yes, Proceed to AQAP	AQAP effective?	Compliance Risk Rating (High / Neutral / Low)
5588_2500037	No	No	No	No	No	N/A	N/A	Low
5588_2100110960	No	No	No	No	No	N/A	N/A	Low
5564_2100110960	No	No	No	No	No	N/A	N/A	Low
5487_2100112313	No	No	No	No	No	N/A	N/A	Low
5564_2100112314	No	No	No	No	No	N/A	N/A	Low
5712_2500065	No	No	No	No	No	N/A	N/A	Low
5712_2500052	No	No	No	No	No	N/A	N/A	Low
2500055_2500052	No	No	No	No	No	N/A	N/A	Low
2500062_99900145	No	No	No	No	No	N/A	N/A	Low
2500069_2500065	No	No	No	No	No	N/A	N/A	Low
2500074_2500075	No	No	No	No	No	N/A	N/A	Low

2500075_2500076	No	No	No	No	No	N/A	N/A	Low
2500076_2500069	No	No	No	No	No	N/A	N/A	Low
99900145_2500053	No	No	No	No	No	N/A	N/A	Low
2500038_2100110962	No	No	No	No	No	N/A	N/A	Low
2100110962_2100112711	No	No	No	No	No	N/A	N/A	Low
5789_5807	No	No	No	No	No	N/A	N/A	Low
2100112146_2100112303	No	No	No	No	No	N/A	N/A	Low
2100112310_2100112303	No	No	No	No	No	N/A	N/A	Low
2100112308_2100112310	No	No	No	No	No	N/A	N/A	Low
5863_2100112645	No	No	No	No	No	N/A	N/A	Low
2500269_2100112645	No	No	No	No	No	N/A	N/A	Low
8000208_2100111698	No	No	No	No	No	N/A	N/A	Low

Appendix 5-5: Air Quality Assessment of Nationally Designated Sites for Ecology

The nationally designated sites that are within 0.12 miles (0.2km) of the affected road network are:

- Coombe Pool Site of Special Scientific Interest (SSSI) located approximately 0.62 miles (1km) directly to the north of the A46 Junction and is adjacent to the A46. The habitat available for the listed species is potentially sensitive to nitrogen deposition and NO_x concentrations but no critical levels have been assigned.
- Herald Way Marsh is a SSSI located approximately 0.56 miles (0.9km) to the south-west of the A46 junction and adjacent to the A46. The habitat available for the listed invertebrate assemblage is potentially sensitive to nitrogen deposition and NO_x concentrations but no critical levels have been assigned.

Predictions at the designated sites have been made for the base year (2016) and opening year (2021) with the proposed scheme (Do-Something) and without the proposed scheme (Do-Minimum) and are presented in Tables 5-5A and 5-5B for Coombe Pool SSSI and Tables 5-5C and 5-5D for Herald Way Marsh SSSI. Predictions have been made at 25m intervals in transects perpendicular to the A46 commencing at the SSSI site boundary. The transects are shown in Section 18 Figure 5-3. Predictions have been made in two transects for Coombe Pool SSSI and one transect for Herald Way Marsh SSSI.

Concentrations and deposition rates are predicted to be lower in the opening year (2021) with the proposed scheme than in the base year (2016) due to improvements in vehicle emissions.

Table 5-5A: Predicted NOx Concentrations in Two Transect across Coombe Pool SSSI

Receptor Number	2016 Base (µg/m^3)	2021 Do-Minimum (µg/m^3)	2021 Do-Something (µg/m^3)	Change (µg/m^3)
Transect 1				
CP1_1	38.5	32.0	33.0	1.0
CP1_2	32.7	26.7	27.4	0.7
CP1_3	29.6	24.0	24.6	0.6
CP1_4	27.7	22.3	22.7	0.5
CP1_5	26.4	21.1	21.5	0.4
CP1_6	25.5	20.3	20.6	0.4
CP1_7	24.7	19.6	19.9	0.3
CP1_8	24.2	19.1	19.4	0.3
CP1_9	23.7	18.7	19.0	0.3
CP1_10	23.4	18.4	18.7	0.2
CP1_11	23.1	18.2	18.4	0.2
Transect 2				

Receptor Number	2016 Base (µg/m^3)	2021 Do-Minimum (µg/m^3)	2021 Do-Something (µg/m^3)	Change (µg/m^3)
CP2_1	41.5	34.7	36.4	1.7
CP2_2	33.3	27.3	28.3	1.0
CP2_3	29.7	24.0	24.7	0.7
CP2_4	27.6	22.2	22.7	0.6
CP2_5	26.3	21.0	21.4	0.5
CP2_6	25.3	20.1	20.5	0.4
CP2_7	24.6	19.5	19.8	0.3
CP2_8	24.1	19.0	19.3	0.3

Table 5-5B: Predicted Nitrogen Deposition in Two Transect across Coombe Pool SSSI

Receptor Number	2016 Base (kg N /ha /yr)	2021 Do-Minimum (kg N /ha /yr)	2021 Do-Something (kg N /ha /yr)	Change (kg N /ha /yr)
Transect 1				
CP1_1	23.1	22.8	22.8	0.1
CP1_2	22.8	22.5	22.5	0.0
CP1_3	22.6	22.4	22.4	0.0
CP1_4	22.5	22.3	22.3	0.0
CP1_5	22.5	22.2	22.2	0.0
CP1_6	22.4	22.2	22.2	0.0
CP1_7	22.4	22.1	22.1	0.0
CP1_8	22.4	22.1	22.1	0.0
CP1_9	22.3	22.1	22.1	0.0
CP1_10	22.3	22.1	22.1	0.0
CP1_11	22.3	22.0	22.1	0.0
Transect 2				
CP2_1	23.2	22.9	23.0	0.1
CP2_2	22.8	22.5	22.6	0.1
CP2_3	22.6	22.4	22.4	0.0
CP2_4	22.5	22.3	22.3	0.0
CP2_5	22.5	22.2	22.2	0.0

Receptor Number	2016 Base (kg N /ha /yr)	2021 Do-Minimum (kg N /ha /yr)	2021 Do-Something (kg N /ha /yr)	Change (kg N /ha /yr)
CP2_6	22.4	22.1	22.2	0.0
CP2_7	22.4	22.1	22.1	0.0
CP2_8	22.3	22.1	22.1	0.0

Table 5-5C: Predicted Annual Mean NO_x Concentrations (µg/m^3) in a Transect across Herald Way Marsh SSSI

Receptor Number	2016 Base (µg/m^3)	2021 Do-Minimum (µg/m^3)	2021 Do-Something (µg/m^3)	Change
HWM_1	48.2	41.4	44.4	3.0
HWM_2	35.5	29.3	30.8	1.4
HWM_3	31.0	25.2	26.1	0.9
HWM_4	28.8	23.1	23.7	0.7
HWM_5	27.4	21.8	22.3	0.5
HWM_6	26.5	20.9	21.3	0.4
HWM_7	25.8	20.3	20.6	0.4
HWM_8	25.3	19.8	20.1	0.3
HWM_9	24.9	19.5	19.7	0.3
HWM_10	24.6	19.2	19.4	0.2
HWM_11	24.3	18.9	19.1	0.2
HWM_12	24.1	18.7	18.9	0.2
HWM_13	23.9	18.6	18.7	0.2

Table 5-5D: Predicted Nitrogen Deposition in a Transect Across Herald Way Marsh SSSI

Receptor Number	2016 Base (kg N /ha /yr)	2021 Do-Minimum (kg N /ha /yr)	2021 Do-Something (kg N /ha /yr)	Change
HWM_1	15.6	15.3	15.5	0.1
HWM_2	15.0	14.7	14.8	0.1
HWM_3	14.7	14.5	14.5	0.0

Receptor Number	2016 Base (kg N /ha /yr)	2021 Do-Minimum (kg N /ha /yr)	2021 Do-Something (kg N /ha /yr)	Change
HWM_4	14.6	14.3	14.4	0.0
HWM_5	14.6	14.3	14.3	0.0
HWM_6	14.5	14.2	14.2	0.0
HWM_7	14.5	14.2	14.2	0.0
HWM_8	14.4	14.2	14.2	0.0
HWM_9	14.4	14.1	14.2	0.0
HWM_10	14.4	14.1	14.1	0.0
HWM_11	14.4	14.1	14.1	0.0
HWM_12	14.4	14.1	14.1	0.0
HWM_13	14.4	14.1	14.1	0.0

References

Ref A5-1: Coventry City Council (2016), Coventry Local Plan 2016

Ref. A5-2: Rugby Borough Council (2016), Local Plan 2011-2031 Publication Draft

Ref. A5-3: Blaby District Council (2013), Local Plan (Core Strategy) Development Plan Document

Ref. A5-4: Blaby District Council (2011), Submission Core Strategy Sustainability Appraisal Report

Ref. A5-5: Hinckley and Bosworth (2009), LDF Core Strategy

Ref A5-6: Warwick District Council (2017), Local Plan 2011-2029

Ref.A5-7: Coventry City Council (2009), AQMA Order

Ref. A5-8: Rugby Borough Council (2017), Annual Status Report 2017

Ref A5-9: Blaby District Council (2016), Annual Status Report 2016

Ref. A5-10: Warwick District Council (2016), Annual Status Report 2016

Ref. A5-11: Coventry City Council (2015), 2015 Updating and Screening Assessment

Ref. A5-12: Hinckley and Bosworth (2017), Annual Status Report 2017

Ref. A5-13: Defra (2016), Local Air Quality Management, Technical Guidance 2016 (LAQM.TG(16)), OGL

Ref. A5-14: Highways England (2017), Personal Communication

Appendix 6-1: Archaeological Assets and Events

Table 6-1A: Designated Assets

Reference	Grid Reference	Period	Description	Status
1226789 (MCT79)	SP 3840 7950	Post-medieval	An 18th century, red brick barn north of Hungerley Hall Farmhouse.	Grade II
1265638 (MCT80)	SP 3839 7949	Post-medieval	A range of 18th century outbuildings at Hungerley Hall farm. Includes a granary, cowshed and stable.	Grade II
(1265694) MCT112	SP 3842 7947	Post-medieval	Hungerley Hall Farmhouse, a late 17th – early 18th century two storey red brick building.	Grade II
1365086 (MCT732)	SP 3869 7763	Post-medieval	The Cocked Hat Restaurant and Hotel, a late 17th century farmhouse with 19th and late 20th century additions.	Grade II

Table 6-1B: Non-designated Assets

Reference	Grid Reference	Period	Description
MCT205	SP 3850 7730	Roman	Possible Roman occupation site, 2nd century AD pottery sherds and seven loom weights were recovered.
MCT16604 MWA8279	SP 38503 77213	Roman	A linear gully, a small pit and a linear feature of Roman date were discovered during a watching brief.
MWA8763	SP 38610 76940	Early Medieval	Piles Coppice, a Medieval managed woodland. The woodland is comprised of: wood banks, a deer park bank and evidence of ancient coppicing.
MWA8764	SP 38874 77509	Early Medieval	Binley Common Wood, a former grazed common wood. Wood includes: woodbanks, possible medieval trench, ridge and furrow area and evidence of ancient coppicing.
MCT80	SP 3839 7949	Post-medieval	A range of 18th century outbuildings at Hungerley Hall farm. Includes a granary, cowshed and stable. Grade II listed.
MCT112	SP 3842 7947	Post-medieval	Hungerley Hall Farmhouse, a late 17th – early 18th century two storey red brick building. Grade

Appendix 6

			II listed.
MCT732	SP 3869 7763	Post-medieval	The Cocked Hat Restaurant and Hotel, a late 17th century farmhouse with 19th and late 20th century additions. Grade II listed.
MCT15261	SP 36987 78516	Post-medieval	A Victorian road, shown on the 1888 OS map
MCT15363	SP 38706 77628	Post-medieval	A farmstead on the 1888 OS map
MCT15374	SP 38674 77690	Post-medieval	A Victorian road on the 1888 OS map.
MCT16533 MWA7563	SP 36086 77406	Post-medieval	The London and North Western Railway line, which opened in 1838.
MWA2846	SP 3867 7761	Post-medieval	A public house, dating to the late 17th century, formerly known as Binley Common House. A two storey, brick building.
MWA2848	SP 3853 7795	Post-medieval	The site of a brickworks marked on the OS map of 1886. Pits and hollows associated with the kiln are visible.
MWA3732	SP 3894 7863	Post-medieval	The site of a brickworks marked on an estate map of 1823. No surface evidence remains.
MWA3733	SP 3881 7909	Post-medieval	The site of a gravel pit, located inside Coombe Abbey Deer Park. Marked on an estate map of 1823.
MWA3740	SP 3840 7910	Post-medieval	Coombe Abbey park landscaped in the 18th century incorporating a deer park, woods and field system. With possible medieval fishponds, one of which survives. Registered Park or Garden (II*).
DWA1256	SP 38741 79092	Post-medieval	A wall to the north of the woodlands, Coombe Abbey and attached farm buildings. Grade II listed.
MWA4788	SP 4356 7949	Post-medieval	Turnpike road, a toll road running from Coventry to Market Harborough.
MWA6853	SP 3846 7850	Post-medieval	The site of a fishpond, noted on the OS map of 1886.
MWA8765	SP 39186 77761	Post-medieval	Big Rough wood. The wood contains semi-natural and possibly ancient coppiced tree communities.
MWA7071	SP 4012 7935	Post-medieval/ Modern	A landscape park associated with Coombe Abbey. It is a c.200ha 20th century park, incorporating 17th, 18th and 19th century features.
MWA8193	SP 3882 7901	Post-medieval/	The site of a menagerie or zoo associated with

		Modern	the Coombe Abbey estate.
MCT16483	SP 38877 78160	Modern	A 20th century building.
MWA7179	SP 3858 7712	Unknown	An enclosure is visible as an earthwork.
MWA12053	SP 3769 7632	Unknown	A group of ditches seen on aerial photography. The southern-most may be the remains of a field boundary, while the others could be post-medieval drainage ditches.
MCT16484	SP 38814 78350	Unknown	An undated charcoal deposit.

Table 6-1C: Events

Reference	Grid Reference	Period	Description
ECT682	SP 3759 7655	-	Archaeological desk based assessment of the land at Willenhall carried out in 2013.
ECT630	SP 3708 7631	-	Field walking undertaken at Willenhall Wood. Associated landscape (MCT222).
ECT93	SP 3870 8060	-	Watching brief (1993-4), uncovered earthworks (MCT16479), three ridge and furrows (MCT16480, 16481, 16482), a building (MCT16483) and a charcoal deposit (MCT16484).
ECT13	SP 3850 7730	-	Part excavation following field walking 1987-8, associated monument (MCT205).
ECT294	SP 3851 7732	-	Watching brief in 1987.
ECT294	SP 3851 7732	-	Watching brief carried out in 1987, at Coventry Eastern Bypass. Associated monument (MCT205).
ECT323	SP 3831 7678	-	One of three watching briefs at outer ring main pipeline, 2002. No features of archaeological significance were recorded.
ECT324	SP 3859 7731	-	One of three watching briefs at outer ring main pipeline in 2002. No features of archaeological significance were recorded.
ECT327	SP 3781 7652	-	Desk based assessment at Coventry outer ring main in 2001.
ECT75	SP 3850 7730	-	Field walking survey carried out at Eastern by-pass site 2 in 1987.
EWA9321	SP 3858 7710	-	A digital survey of the earthwork at Piles Coppice. Associated monument MWA7179.

EWA9498	SP 3855 7732	-	A watching brief at Coventry outer ring main pipeline area 1 in 2002. Associated monument is the Roman gulley (MWA8279).
EWA9620	SP 4012 7959	-	A site visit was carried out to Coombe Abbey in 1996-7. Associated monument is Coombe Abbey Park (MWA3740).
EWA9683	SP 4012 7958	-	Coombe Abbey Country Park Management Plan 2001-2011 assessing the historic landscape of the park was carried out.
EWA7562	SP 37941 75931	-	A desk based assessment and walkover survey for proposed new pipeline. A few previously unknown earthworks were identified.

Table 6-1D: Built Heritage Assets

Asset ID	Description	Grade
	Coombe Abbey Conservation Area	
NHLE 1000408	Coombe Abbey Registered Park and Garden	Grade II*
NHLE 1226789	Barn approx. 50m north of Hungerley Hall Farmhouse	Grade II
NHLE 1265694	Hungerley Hall Farmhouse	Grade II
NHLE 1265638	Granary, Cowshed and Stable Range approx. 15 m north-west of Hungerley Hall Farmhouse	Grade II
NHLE 1076631	1 and 2, Brinklow Road	Grade II
NHLE 1076632	6, Brinklow Road	Grade II
NHLE 1076633	8, Brinklow Road	Grade II
NHLE 1076634	10 and 12, Brinklow Road	Grade II
NHLE 1076630	The Vicarage	Grade II
NHLE 1076629	Church of St Bartholomew	Grade I
NHLE 1342904	22, Brandon Road	Grade II

NHLE 1342922	34, Brandon Road	Grade II
NHLE 1365086	The Cocked Hat Restaurant and Hotel, Binley Common House	Grade II
NHLE 1422601	Church of St John the Divine, The Church Hall and Bell Tower	Grade II
NHLE 1276492	Boat House on south side of the pool, Coombe Abbey	Grade II
NHLE 1233532	West Lodge	Grade II*
NHLE 1233663	Menagerie Farm buildings to north-west of the Woodlands	Grade II
NHLE 1276493	Wall to north of the Woodlands, Coombe Abbey and attached farm buildings	Grade II
NHLE 1233533	The Woodlands	Grade II*
NHLE 1233703	Wall to south of the Woodlands Coombe Abbey	Grade II
NHLE 1034896	Old Lodge Farmhouse	Grade II
NHLE 1034897	Old Lodge Farm, Barn approx. 10m south of Farmhouse	Grade II
Outside the study area but within Coombe Abbey RPG		
NHLE 1005765	Mound S of Coombe Abbey	Scheduled Monument
NHLE 1233485	Coombe Abbey and Bridge over Moat attached to south	Grade I
NHLE 1233487	Coombe Abbey, Garden wall extending from 40m north west of front to garden steps	Grade II
NHLE 1276598	Coombe Abbey, 2 Cottages and Outbuilding approximately 30m from north front	Grade II
NHLE 1233658	Tennis Court at Coombe Abbey	Grade II*
NHLE 1276600	Coombe Abbey, Stableblock approximately 40m north east of Abbey	Grade II
NHLE 1276491	Garden Wall to south and west of Stableblock	Grade II
NHLE 1389393	Kitchen Garden and associated Bothies and Gardeners cottage 130m north east of Coombe Abbey	Grade II

1276599	Coombe Abbey, West Gatepier approximately a quarter of a mile south	Grade II
1233488	Coombe Abbey, East Gatepier, approximately a quarter of a mile south	Grade II
1233489	East Lodge	Grade II

Appendix 7

Appendix 7-1: Viewpoint Assessment

VIEWPOINT 1: Cocked Hat Restaurant and Hotel

Receptors	Existing Outlook and Susceptibility	Construction Phase	Winter Year of Year 1 (2021)	Summer of Year 15 (2036)
Listed Public House Recreational Value of view: Low Susceptibility construction: Medium Susceptibility Operation: Low Sensitivity Construction: Low Sensitivity operation: Low	This location affords short range, open views west to the Binley Junction with a high level of visual intrusion arising from the existing A46 corridor Beyond the mature roadside vegetation, the junction, with its associated lighting, signage and traffic movement can be clearly seen. Trees and vegetation to the west of the junction constrain further views into the distance. The susceptibility of the view varies from Medium in construction to Low in operation to the dominance of existing highway infrastructure that	From this viewpoint there would be a significant change in the view during construction phases. The construction works associated with the proposed development are likely to be considerably more intrusive than the completed scheme due to the following elements: - Localised demolition, material stockpiles and earthworks; - Site signage, traffic control (pedestrian, vehicular and plant), fencing, hoarding and overhead gantries; - Construction traffic and working machinery; - Site huts, storage units and stored materials; - Cranes; and - Scaffolding, hoardings and partly completed structures **The magnitude of change is likely to be Major adverse resulting in Slight/Moderate adverse effects.**	From this viewpoint there would be a significant change in the view. The elevated nature of the flyover will increase the relative height and footprint associated with the proposed scheme and lead to an increased awareness of the road and associated traffic. As a result visual effects are likely to occur to this location The loss of the existing screening vegetation would further open up views of traffic on the A46 and on the junction itself. In general the view would be changed by the proximity of the proposed works and the elevated nature of the scheme, however the urban nature of the view as a would not change significantly **The magnitude of change is likely to be Moderate adverse resulting in Slight adverse effects.**	mitigation planting would include reinstatement of planting along new verges on the A46 corridor. Planting would restore any removed vegetation within the view. The elevated nature of the proposed scheme would not be able to be screened at this close distance therefore at design year overall there would be some noticeable alterations to the view. however the urban nature of the view as a would not change significantly **The magnitude of change is likely to be Moderate adverse resulting in Slight adverse in the design year**.

Receptors	Existing Outlook and Susceptibility	Construction Phase	Winter Year of Year 1 (2021)	Summer of Year 15 (2036)
	has degraded the view from the listed building.			

VIEWPOINT 2: Premier Inn

Receptors	Existing Outlook and Susceptibility	Construction	Winter Year of Year 1	Summer of Year15
Users of Hotel Value of view: Low Susceptibility construction: Medium Susceptibility Operation: Low Sensitivity Construction: Low Sensitivity operation: Low	This location affords short range open views west towards the Binley Junction with a level of high visual intrusion arising from the existing A46 corridor and Binley Junction. Car parking and maintained planting forms the foreground of the view, beyond which is clear views of the junction, with its associated lighting, signage and traffic movement. Trees and vegetation to the west of the junction constrain further views into the distance. The susceptibility of the view varies from	From this viewpoint there would be a significant change in the view during construction phases. The construction works associated with the proposed development are likely to be considerably more intrusive than the completed scheme due to the following elements: - Localised demolition, material stockpiles and earthworks; - Site signage, traffic control (pedestrian, vehicular and plant), fencing, hoarding and overhead gantries; - Construction traffic and working machinery; - Site huts, storage units and stored materials; - Cranes; and - Scaffolding, hoardings and	From this viewpoint there would be a significant change to the view. The elevated nature of the flyover will increase the relative height and footprint associated with the proposed scheme and lead to an increased awareness of the road and associated traffic. The new flyover would dominate the view with partial views of traffic movements. As a result visual effects are likely to occur to this location. The loss of the existing screening vegetation would further open up views of traffic on the A46 and on the junction itself. Overall there would be some noticeable alterations to the view. However the urban nature of the view would not change significantly. **The magnitude of change is likely to be Moderate adverse resulting in Slight adverse effects.**	Mitigation planting would include reinstatement of planting along new verges on the A46 corridor. Planting would restore any removed vegetation within the view. The elevated nature of the proposed scheme would not be able to be screened at this close distance therefor in at design year overall there would be some noticeable alterations to the view. However the urban nature of the view would not change significantly. **The magnitude of change is likely to be Moderate adverse resulting in Slight adverse effects.**

Receptors	Existing Outlook and Susceptibility	Construction	Winter Year of Year 1	Summer of Year15
	Moderate in construction to Low in operation to the dominance of existing highway infrastructure and urban expansion that has degraded the view.	partly completed structures. **The magnitude of change is likely to be Major adverse resulting in Slight/Moderate adverse effects.**		

VIEWPOINT 3: Broadstreet Rugby Club

Receptors	Existing Outlook and Susceptibility	Construction	Winter Year of Year 1	Summer of Year15
Users of Recreational facility Value of view :Low Susceptibility construction: Medium Susceptibility Operation: Low Sensitivity Construction: Low	This location affords no direct view of the current junction. Large expanse of car parking is surrounded by mature trees screening containing the view to that within the rugby field grounds. The susceptibility of the view varies from Moderate in construction to Low in operation to the dominance of existing highway infrastructure that has degraded the view.	From this viewpoint there would be a significant change in the view during construction phases due to the close proximately of a potential construction compound, north of the rugby club ground. The construction works associated with the proposed development are likely to be considerably more intrusive than the completed scheme due to the following elements: - Localised demolition, material stockpiles and earthworks; - Site signage, traffic control (pedestrian, vehicular and plant), fencing, hoarding and	From this viewpoint there would be an awareness of the Proposed Scheme; the elevated flyover may be visible over the existing vegetation. **The magnitude of change is likely to be Minor resulting in Negligible/Slight adverse effects.**	Mitigation planting would include reinstatement of planting along new verges on the A46 corridor. Planting would restore any removed vegetation within the view. The elevated nature of the proposed scheme would not be able to be screened at this close distance therefore in at design year overall there would be some noticeable alterations to the view. however the urban nature of the view as a would not change significantly **The magnitude of change is likely to be negligible resulting in neutral/slight adverse effects.**

Receptors	Existing Outlook and Susceptibility	Construction	Winter Year of Year 1	Summer of Year15
Sensitivity operation: Low		overhead gantries; - Construction traffic and working machinery; - Site huts, storage units and stored materials; - Cranes; and - Scaffolding, hoardings and partly completed structures. **The magnitude of change is likely to be Major adverse resulting in Slight/Moderate adverse effects.**		

VIEWPOINT 4: Greens Home & Garden Centre

Receptors	Existing Outlook and Susceptibility	Construction	Winter Year of Year 1	Summer of Year15
Users of Commercial/Recreational facility Value of view: Moderate Susceptibility construction: Medium Susceptibility	Looking north-east towards the Binley junction, this location has direct views toward the current junction, although filtered slightly by onsite trees. Lighting, signage and traffic movements feature heavily in the view. The susceptibility of the view varies from Moderate in	From this viewpoint there would be a significant change in the view during the construction phase. The construction works associated with the proposed scheme are likely to be considerably more intrusive than the completed scheme due to the following elements: - Localised demolition, material stockpiles and earthworks; - Site signage, traffic control	From this viewpoint there would be a significant changes to the view. The elevated nature of the flyover will increase the relative height and footprint associated with the proposed scheme and lead to an increased awareness of the road and associated traffic. In general the view would be changed by the close proximity of the proposed works and the elevated nature of the scheme, however the urban nature of the view would not change significantly. **The magnitude of change is likely to be Major adverse resulting in Slight**	mitigation planting would include reinstatement of planting along new verges on the A46 corridor. Planting would restore any removed vegetation within the view. The elevated nature of the proposed scheme would not be able to be screened at this close distance therefore in at design year there would be some noticeable alterations to the view. However the urban nature of the view would not change significantly. **The magnitude of change is likely to**

Receptors	Existing Outlook and Susceptibility	Construction	Winter Year of Year 1	Summer of Year15
Operation: Low Sensitivity Construction: Low Sensitivity operation: Low	construction to Low in operation to the dominance of existing highway infrastructure that has degraded the view from the listed building.	(pedestrian, vehicular and plant), fencing, hoarding and overhead gantries; - Construction traffic and working machinery; - Site huts, storage units and stored materials; - Cranes; and - Scaffolding, hoardings and partly completed structures. **The magnitude of change is likely to be Major adverse resulting in Slight/Moderate adverse effects.**	**/Moderate adverse effects.**	**be Moderate adverse resulting in Slight adverse effects.**

VIEWPOINT 5: A428 Rugby Road

Receptors	Existing Outlook and Susceptibility	Construction	Winter Year of Year 1	Summer of Year15
Residents and Transient Car users Value of view: Low Susceptibility construction: Medium	Looking east along the A428 rugby road lined with mature trees, the current junction features in the mid distance of this view. Associated lighting signage can be clearly seen against the sky line. The susceptibility of	From this viewpoint there would be a significant change in the view during construction works. The construction works associated with the proposed development are likely to be considerably more intrusive than the completed scheme due to the following elements: - Vegetation clearance;	From this location the proposed scheme will be visible; any removal of intervening vegetation would open up the view of the junction and A46 corridor. The elevated flyover and increased junction footprint lead to an increased awareness of the road and associated traffic. **The magnitude of change is likely to be Minor adverse resulting in Slight**	mitigation planting would include reinstatement of planting along new verges on the A46 corridor. Planting would restore any removed vegetation within the view. The elevated nature of the proposed scheme would not be able to be screened at this close distance therefore in at design year overall there would be some

Receptors	Existing Outlook and Susceptibility	Construction	Winter Year of Year 1	Summer of Year15
Susceptibility Operation: Low Sensitivity Construction: Medium Sensitivity operation: Medium	the view varies from Moderate in construction to Low in operation to the dominance of existing highway infrastructure that has degraded the view.	- Localised demolition, material stockpiles and earthworks; - Site signage, traffic control (pedestrian, vehicular and plant), fencing, hoarding and overhead gantries; - Construction traffic and working machinery; - Site huts, storage units and stored materials; - Cranes; and - Scaffolding, hoardings and partly completed structures. **The magnitude of change is likely to be Moderate adverse resulting in Moderate adverse effects**	**adverse effects.**	noticeable alterations to the view. However the urban nature of the view would not change significantly **The magnitude of change is likely to be Minor adverse resulting in Slight adverse effects.**

VIEWPOINT 6: Binley Woods

Receptors	Existing Outlook and Susceptibility		Winter Year of Year 1	Summer of Year15
Residents Value of view: Low Susceptibility construction:	Looking east towards the Binley junction, post war housing forms the view from this residential position, screening direct	From this viewpoint there would be little awareness of the proposed scheme during its construction phase. There may be views of the proposed construction compound.	From this viewpoint there would be little awareness of the proposed scheme. The majority of the proposed works would be visually contained by the woodland structure to the east of the junction.	Mitigation planting would include reinstatement of planting along new verges on the A46 corridor. Planting would restore any removed vegetation within the view. Overall there would be some

Receptors	Existing Outlook and Susceptibility		Winter Year of Year 1	Summer of Year15
High Susceptibility Operation: High Sensitivity Construction: high Sensitivity operation: high	views to the Junction. Mature trees and vegetation feature within the front and back garden. Some secondary storey views to the junction may be possible. The susceptibility of the view varies from High in construction to Moderate in operation to the dominance of existing highway infrastructure and urban expansion in the vicinity that has degraded the views from this area	**The magnitude of change is likely to be negligible minor adverse resulting in Slight adverse effects**	The intervening properties and landscape screens views to the proposed works**,** although some second storey views may be possible. **The magnitude of change is likely to be Negligible resulting in Slight adverse effects**	noticeable alterations to the view. However the urban nature of the view would not change significantly. **The magnitude of change is likely to be Negligible resulting in slight adverse effects**

VIEWPOINT 7: Public Right of Way R145

Receptors	Existing Outlook and Susceptibility		Winter Year of Year 1	Summer of Year15
Recreation users Value of view Moderate	Open views from the footpath looking to the north across the largely flat arable fields towards the	- From this viewpoint there would be views of the construction works with views opened up by associated vegetation	From this location the proposed scheme will be partially visible. The elevated flyover and increased junction footprint would be visible even from this distance but would filtered by the vegetation, any	Mitigation planting would include reinstatement of planting along new verges on the A46 corridor. Planting would restore any

Receptors	Existing Outlook and Susceptibility		Winter Year of Year 1	Summer of Year15
Susceptibility construction: Medium Susceptibility Operation: Medium Sensitivity Construction: Medium Sensitivity operation: Medium	vegetated A46 corridor with the junction in the background along which partial and filtered views of traffic movements are visible. Electricity pylons, road signage and lighting columns are visible. The susceptibility of the view varies from High in construction to Moderate in operation to the dominance of existing highway infrastructure, lighting and electricity columns within the existing view.	clearance; - Site signage, traffic control (pedestrian, vehicular and plant), fencing, hoarding and overhead gantries; - Construction traffic and working machinery; - Site huts, storage units and stored materials; - Cranes; and - Scaffolding, hoardings and partly completed structures. **The magnitude of change is likely to be Moderate adverse resulting in Moderate adverse effects**	removal of intervening vegetation would open up the view of the junction and A46 corridor further. **The magnitude of change is likely to be Minor adverse resulting in Slight adverse effects**	removed vegetation within the view. Overall there would be some noticeable alterations to the view. however the urban nature of the view would not change significantly **The magnitude of change is likely to be Negligible adverse resulting in Neutral/Slight adverse effects**

VIEWPOINT 8: A428 Brandon Road

Receptors	Existing Outlook and Susceptibility		Winter Year of Year 1	Summer of Year15
Transient Car users Commercial	The view from the A428 takes in a view of highway	From this viewpoint there would be little awareness of the proposed scheme during	The proposed scheme would be visible in the far distance of view. The elevated nature of the junction will increase the	mitigation planting would include reinstatement of planting along new verges on the A46 corridor.

Receptors	Existing Outlook and Susceptibility		Winter Year of Year 1	Summer of Year15
properties Value of View: Low Susceptibility construction: Low Susceptibility Operation: Low Sensitivity Construction: Low Sensitivity operation: Low	infrastructure surrounding the industrial and retail centre, including island, lighting and associated signage. The Binley junction is partially visible in the mid distance, mature vegetation frames the view into the distance. The susceptibility of the view is low in both construction and operation, the degradation of the view from existing highway infrastructure means that the view will not be further damaged by the proposed scheme.	its construction phase. Some vegetation removal may open views of some of the construction and any elevated platforms. **The magnitude of change is likely to be minor adverse resulting in Neutral/Slight adverse effects**	prominence of the junction. The removal of any intervening vegetation would further open up the view of the junction and A46 corridor. Overall there would be some alterations to the view. however the urban nature of the view would not change significantly **The magnitude of change is likely to be Minor adverse resulting in Neutral/Slight adverse effects**	Planting would restore any removed vegetation within the view. **The magnitude of change is likely to be Negligible adverse resulting in Neutral/Slight adverse effects**

VIEWPOINT 9: Kings Park Drive

Receptors	Existing Outlook and Susceptibility		Winter Year of Year 1	Summer of Year15
Transient Car users	A belt of trees and shrubs filters the	- From this viewpoint there would be views of the	From this location the proposed scheme will be partially visible. The	Mitigation planting would include reinstatement of planting along new

Receptors	Existing Outlook and Susceptibility		Winter Year of Year 1	Summer of Year15
Commercial properties Value- of View Low Susceptibility construction: Low Susceptibility Operation: Low Sensitivity Construction: Low Sensitivity operation: Low	view of the A46 in this location. The view takes in the outskirts of the car park and signage belonging to a retail park. The susceptibility of the view is low in both construction and operation, the degradation of the view from existing highway infrastructure means that the view will not be further damaged by the Proposed Scheme	construction phase with views opened up by associated vegetation clearance; - Site signage, traffic control (pedestrian, vehicular and plant), fencing, hoarding and overhead gantries; - Construction traffic and working machinery; - Site huts, storage units and stored materials; - Cranes; and - Scaffolding, hoardings and partly completed structures. **The magnitude of change is likely to be moderate adverse resulting in Slight adverse effects**	elevated flyover and increased junction footprint would be visible even from this distance but would filtered by the vegetation, any removal of intervening vegetation would open up the view of the junction and A46 corridor further. **The magnitude of change of is likely to be minor adverse resulting in Neutral /Slight Adverse effects.**	verges on the A46 corridor. Planting would restore any removed vegetation within the view. **The magnitude of change of is likely to be minor adverse resulting in Neutral /Slight Adverse effects.**

VIEWPOINT 10: Play area off Twickenham Way

Receptors	Existing Outlook and Susceptibility		Winter Year of Year 1	Summer of Year15
Users of Recreational facility Value of View: Low Susceptibility construction: Medium Susceptibility Operation: Low Sensitivity Construction: Medium Sensitivity operation: Medium	Looking east towards the A46 this view takes in a large recreation and play ground. The A46 to the east is screened by Mature highway vegetation. To the west is a well-kept executive housing estate. View from these properties of the A46 are screening by the highway planting. The susceptibility of the view varies from Moderate in construction to Low in operation due to the existing large vegetation belt which means the view would not be damaged by the proposed scheme	From this viewpoint there would be little awareness of the proposed scheme during its construction phase, some vegetation removal may open views of some of the construction compound and any elevated platforms and machinery. **The magnitude of change is likely to be Minor adverse resulting in Slight adverse effects**	From this viewpoint there would be little awareness of the proposed scheme. The distance to the proposed scheme and the intervening landscape screens views to the proposed works. **The magnitude of change of is likely to be Negligible resulting in Neutral /Slight effects.**	mitigation planting would include reinstatement of planting along new verges on the A46 corridor. Planting would restore any removed vegetation within the view. **The magnitude of change of is likely to be Negligible resulting in Neutral /Slight effects**

VIEWPOINT 11: Binley Wood Recreation Ground

Receptors	Existing Outlook and Susceptibility		Winter Year of Year 1	Summer of Year15
Users of Recreational facility Value of View: Medium Susceptibility construction: Medium Susceptibility Operation: Low Sensitivity Construction: Medium Sensitivity operation: Medium	This view takes in Binley Wood recreation ground with associated play equipment. Boundary hedgerow planting screens views past the middle distance. There are no view of the current junction The susceptibility of the view varies from Moderate in construction to Low in operation due to the existing vegetation and distance from the A46 ,means the view would not be damaged by the Proposed Scheme	From this viewpoint there would be little awareness of the Proposed Scheme during its construction phase, some vegetation removal may open views of some of the construction and any elevated platforms and machinery. **The magnitude of change of is likely to be negligible resulting in Slight adverse effects.**	From this viewpoint there would be little awareness of the Proposed Scheme. The distance to the proposed scheme and the intervening landscape screens views to the proposed works. **The magnitude of change of is likely to be Negligible resulting in Neutral/Slight effects**	mitigation planting would include reinstatement of planting along new verges on the A46 corridor. Planting would restore any removed vegetation within the view. **The magnitude of change of is likely to be Negligible resulting in Neutral /Slight effects**

VIEWPOINT 12: PRoW- Centenary Way long distance footpath /Coombe

Receptors	Existing Outlook and Susceptibility		Winter Year of Year 1	Summer of Year15
Users of Recreational facility Value of View Medium Susceptibility construction: High Susceptibility Operation: Moderate Sensitivity Construction: High Sensitivity operation: Medium	View from the access to a public footpath, stretching over arable farmland. Dense woodland is in the far distance, the current junction is not visible from this distance. The susceptibility of the view varies from High in construction to Moderate in operation to the existing highway infrastructure, lighting and electricity columns within the existing view.	From this viewpoint there would be little awareness of the proposed scheme during its construction phase, some vegetation removal may open views of some of the construction and any elevated platforms and machinery, although this would be in the far distance. **The magnitude of change is likely to be Minor adverse resulting in Slight adverse effects**	From this viewpoint there would be little awareness of the proposed scheme. The distance to the proposed scheme and the intervening landscape screens views to the proposed works. **The magnitude of change of is likely to be Negligible resulting in Neutral /Slight effects**	mitigation planting would include reinstatement of planting along new verges on the A46 corridor. Planting would restore any removed vegetation within the view. **The magnitude of change of is likely to be Negligible resulting in Neutral /Slight effects**

Appendix 8

Appendix 8.1: Summary of ecological study and survey areas

Study / Survey	Date	Study Area
Desk Study	2019 and 2016	International statutory designated sites up to 30 km from the Proposed Scheme[1] for sites designated at an international level for bats, or where potential impact pathways are present with regards to birds. All other statutory and non-statutory designated sites and non-designated sites of interest and protected / notable species records up to 2km from the Proposed Scheme boundary.
Extended Phase 1	2019 and 2017	Up to 50m from the Proposed Scheme boundary
Great crested newt habitat suitability survey (incl. environment DNA eDNA)	2018, 2017 and 2016	Up to 500m from the Proposed Scheme boundary
Preliminary roost and habitat assessment for bats	2019	Up to 50m from the Proposed Scheme boundary.
Bat activity surveys	2018 and 2017	Up to 50m from the Proposed Scheme boundary.
Ornithological walkover survey	2019	Up to 250m from the Proposed Scheme boundary.
Badger surveys	2019 and 2017	Up to 50m from the Proposed Scheme boundary. The survey in 2017 also included a visit to any known historical badger setts within 500m to determine whether they were still active.

[1] The 'Proposed Scheme boundary' refers to the updated 2019 Proposed Scheme boundary which this environmental assessment report is based on; unless otherwise noted. The 2016 proposed scheme boundary is referred to as / where applicable.

Study / Survey	Date	Study Area
Water vole and otter assessment and survey	2019	Up to 200m from the Proposed Scheme boundary where potential hydrological links are present.
Aquatic macro-invertebrate assessment and survey	2018 and 2017	Up to 200m from the Proposed Scheme boundary where potential hydrological links are present.

Appendix 8.2 a

A46 Coventry Junctions Upgrade Scheme

HE551486-MOU-00-XX-PC-EN-0001

Assessment of Implications on European Sites (AIES) Report (Stage 1 Options)

Report Number: HE551486-MOU-00-XX-PC-EN-0001
March 2016

THIS PAGE IS LEFT INTENTIONALLY BLANK

Document Control

Document Title	A46 Coventry Junctions Upgrade Scheme HE551486-MOU-00-XX-PC-EN-0001 Assessment of Implications on European Sites (AIES) Report
Author	Joseph Booth
Owner	Tom Clancy, Highways England
Distribution	Khalid Pervez, Highways England Tom Clancy, Highways England Malcolm Mitson, Highways England Natural England
Document Status	Draft

Record of Issue

Version	Status	Author	Date	Checked	Date	Approver	Date	Authorised for Issue	Date
0.1	Draft issued for review	K. Jackson	29.01.16	J. Booth L. Deacon	29.01.16	P. Joyce	29.01.16	P. Joyce	29.01.16
0.2	Draft issued for review	K. Jackson	04.04.16	J. Booth	04.04.16	P. Joyce	04.04.16	P. McCrery	05.04.16
0.3	Final Draft	K. Jackson	13.04.16	J. Booth	13.04.16	P. Joyce	13.04.16	P. McCrery	13.04.16

Reviewer List

Name	Role
Tom Clancy	Regional Environmental Advisor
Malcolm Mitson	Project Director

Approvals

Name	Signature	Title	Date of Issue	Version

T. Clancy		Regional Environmental Advisor		0.2

The original format of this document is copyright to Highways England

Table of Contents

Document Control iii
1 Introduction 6
1.1 Background and Scope 6
2 Screening Assessment 7
2.1 Overview 7
2.2 Conclusion 9
3 References 10
Glossary of Terms and Abbreviations 11
Appendix A - Location of Special Areas of Conservation (Drawing HE551486-MOU-EGN-A46-DR-EN-0007) 12

Tables

Table 2-1 Replication of HD 44/09 Annex D: No significant Effects Report 7

1 Introduction

1.1 Background and Scope

1.1.1 Mouchel have been commissioned by Highways England to deliver PCF Stage 1 for the A46 Coventry Junctions AS14 (Autumn Statement 2014) project (formerly known as “RIP” Regional Investment Programme). This comprises the options identification of improvement schemes at two existing junctions on the routes – the A428 Binley (or TGI) junction and the B4082 Walsgrave junction.

1.1.2 It is a requirement that the potential for proposed highway projects to impact upon ‘European Sites’ is investigated, where such sites are designated for their nature conservation interests. For the purposes of an Appropriate Assessment those sites to be included are those that make up the European ecological network, also referred to as Natura 2000 sites. These include;

- Sites of Community Importance (SCIs);
- Special Protection Areas (SPAs), and potential SPAs (pSPAs);
- Special Areas of Conservation (SACs), and candidate or possible SACs (cSACs or pSACs);and
- RAMSAR sites

1.1.3 The whole process is referred to as an Assessment of Implications on European Sites (AIES).

1.1.4 This document presents a screening exercise, the purpose of which is to determine if there are likely to be significant effects and inform a decision as to whether or not an Appropriate Assessment[1] is required. This report has been prepared in accordance with the following guidelines:

- DMRB Volume 11 Environmental Assessment, Section 4 Assessment of Implications on European Sites (including Appropriate Assessment), HD 44/09, (February 2009); and
- Interim Advice Note 141/11 Assessment of Implications (of Highways and/or Roads Projects) on European Sites (Including Appropriate Assessment) and the Planning Act 2008 (March 2011).

1.1.5 This assessment has been undertaken based on the screening process outlined in the DMRB HD44/09 guidance. The table below conforms to Annex D for a finding of no significant effect (screening). For the PCF Stage 1 delivery this briefing note will be sent for consultation with Natural England.

1.1.6 The geographical boundary and footprint of the proposed options for the A46 Coventry Junctions are >2 km from any SACs, cSACs, pSACs, SPAs, pSPAs or Ramsar sites or >30 km from any SACs, cSACs or pSACs, where bats are one of the qualifying interests (see Drawing HE551486-MOU-EGN-A46-DR-EN-0007, referred to hereafter as Figure 1).

1.1.7 Therefore, the scope of this document has been limited to a description of the nearest qualifying SAC and the reasons why no significant effects are anticipated using Annex D of HD 44/09.

[1] in compliance with Regulations 60 to 67 of the Habitats Regulations 2010, implementing Article 6(3) of the Habitats Directive (92/43/EEC)

2 Screening Assessment

2.1 Overview

2.1.1 The Assessment of Implications on European Sites follows the process within Figure 4.1 Generic Screening Process for Assessment of the Implications on European Sites (DMRB Volume 11 HD 44/09, February 2009).

2.1.2 In accordance with the above guidance during the Screening process no European sites have been identified within the given distances of the route corridor. As such an Annex D: No significant Effects Report is provided in Table 2-1 to complete the AIES process.

Table 2-1 Replication of HD 44/09 Annex D: No significant Effects Report

Project Name:	A46 Coventry Junctions
Natura 2000 Site under Consideration:	Ensor's Pool SAC
Date:	12.01.2016
Author (Name/Organisation):	Katie Jackson, Mouchel Consulting
Verified (Name/Organisation):	Lewis Deacon, Mouchel Consulting
Name and location of European Site:	Ensor's Pool SAC, Warwickshire, England
Description of the project:	The A46 forms part of the national strategic highway network, linking the M6/M69 with the M5. The route connects a number of major employment sites to the wider motorway network, and forms a key element of the North-South Travel To Work Area. The efficient and reliable performance of this corridor is therefore critical to the Coventry and Warwickshire areas. The A46 corridor also provides significant opportunities for economic growth and improved accessibility within the city and the county of Warwickshire, to enable the unlocking of sites for residential development and improving access to key existing employment sites. The corridor also has a key strategic role in linking the Advanced Manufacturing Sector within the Warwickshire Sub Region. Mouchel have been commissioned by Highways England to deliver PCF Stage 1 for the A46 Coventry Junctions AS14 (Autumn Statement 2014) project (formerly known as "RIP" Regional Investment Programme). This comprises the options identification of improvement schemes at two existing junctions on the routes – the A428 Binley (or TGI) junction and the B4082 Walsgrave junction. There are 3 options being assessed at PCF Stage 1, an overview of the location of these options is shown on Figure 1. A description of each follows: Option A - Grade separation of Binley/TGI junction only. Do nothing at Walsgrave. Option B - Option A above plus Do minimum (DM) at Walsgrave (modifications to the existing roundabout to provide capacity for the design year (2031).

Project Name:	A46 Coventry Junctions
	Option C - Option A above plus relocation and grade separation of Walsgrave junction.
Is the project directly connected with or necessary to the management of the site:	No potential effect pathways have been identified between the works and designated site.
Are there other projects or plans that together with the project being assessed could affect the site:	No, this section refers to the potential of the A46 Coventry Junctions having 'in combination effects' or 'cumulative effects' on the SAC. None of the 'other' proposals we have identified within the vicinity of the proposed options create a pathway to the site 'in combination' or 'cumulatively' and the interactions between the other proposals and the proposed options are not physical. In addition, none of the other roads projects are reliant on construction of the A46 to facilitate the development of these.
The assessment of significance of effects	
Describe how the project (alone or in combination) is likely to affect the European Site:	Not applicable. No impacts from the proposed options are considered likely on the integrity of the designated site or its qualifying features. Given the distance between the works and the designated site (10km), with no effect pathways identified, a conclusion of no likely significant effects has been determined.
Explain why these effects are not considered significant:	Ensor's Pool SAC is located 10km to the closest point of the proposed options boundary. Bats are not a qualifying feature of this designated site, therefore there are no significant effects of consideration. **No other Natura 2000 sites are located within, ≤2km, or ≤30km of the proposed scheme boundary with bats as a qualifying feature**, as specified in - DMRB, Volume 11, Section 4, Part 1 HD 44/09; Chapter 4 Assessment Methods; Figure 4.1 Generic Screening Process for Assessment of the Implications on European Sites; Screening: Identification of Potential Constraints on European Sites.
List of agencies consulted (provide contact name and telephone or e-mail address):	Natural England
Response to consultation:	TBC
Data collected to carry out the assessment	
Who carried out the assessment:	Katie Jackson
Sources of data:	http://www.magic.gov.uk https://rsis.ramsar.org http://natura2000.eea.europa.eu
Level of assessment completed:	Screening: Identification of Potential Constraints on European Sites
Where can the full results of the assessment be accessed and viewed?	N/A

2.2 Conclusion

2.2.1 Ensor's Pool SAC is 10km from the proposed options and bats are not considered a qualifying feature of the site. There are no other proposals identified within the vicinity of the proposed options which would create a pathway to the site 'in combination' or 'cumulatively'. Therefore, this report concludes that the proposed options are not likely to have significant effects on the SAC alone or in combination with other projects.

3 References

DMRB (2009). Volume 11 Environmental Assessment Section 4 Assessment of Implications on European Sites. Part 1. HD 44/09/ Assessment of Implications (of Highways and/or Roads Projects) on European Sites (including Appropriate Assessment).

DMRB (2011). Interim Advice Note 141/11. Assessment of Implications (of Highways and/or Roads Projects) on European Sites (Including Appropriate Assessment) and the Planning Act 2008.

European Union (2016). Habitats and Birds Directive Sites [Accessed 14.02.2016]. Available from: http://natura2000.eea.europa.eu. EU.

Ramsar (2016). Ramsar Sites Information Service [Accessed 14.02.2016]. Available from: https://rsis.ramsar.org. RSIS.

UK Government (2016). European Designated Sites [Accessed 14.02.2016]. Available from: Magic Map Application - http://www.magic.gov.uk. UK Gov.

Glossary of Terms and Abbreviations

Acronym	Description
AIES	Assessment of Implications on European Sites
DMRB	Design Manual for Roads and Bridges
SACs	Special Areas of Conservation
cSACs	candidate SACs
pSACs	possible SACs
SPAs	Special Protection Areas
pSPAs	potential SPAs

Appendix A - Location of Special Areas of Conservation (Drawing HE551486-MOU-EGN-A46-DR-EN-0007)

Appendix 8.2 b

PCF Stage 4 Deliverable for Highways England

Preliminary Ecological Appraisal and Potential Roost Feature (PRF) Reassessment for Bats

A46 Coventry Junctions Upgrade

October 2019

This page is left intentionally blank

A46 Coventry Junction Upgrade

Preliminary Ecological Appraisal and Potential Roost Feature (PRF) Reassessment for Bats

Report No: HE551486-ACM-EGN-A46_SW_000_Z-RP-LE-0021
P02 S4
October 2019

Revision	Current Status	Date	Prepared By	Reviewed By	Approved By
P01	S3	13.09.19	Alan Bull Matthew White	Neil Gates	Matt Oakley
P02	S4	15.10.19	Alan Bull Matthew White	Helen Yesugey Hannah Procter	John Waterman

AECOM Infrastructure & Environment UK Limited ("AECOM") has prepared this Report for the sole use of Highways England ("Client") in accordance with the terms and conditions of appointment. No other warranty, expressed or implied, is made as to the professional advice included in this Report or any other services provided by AECOM. This Report may not be relied upon by any other party without the prior and express written agreement of AECOM.

Where any conclusions and recommendations contained in this Report are based upon information provided by others, it has been assumed that all relevant information has been provided by those parties and that such information is accurate. Any such information obtained by AECOM has not been independently verified by AECOM, unless otherwise stated in the Report. AECOM accepts no liability for any inaccurate conclusions, assumptions or actions taken resulting from any inaccurate information supplied to AECOM from others.

The methodology adopted and the sources of information used by AECOM in providing its services are outlined in this Report. The work described in this Report was undertaken between July 2019 and September 2019 and is based on the conditions encountered and the information available during the said period of time. The scope of this Report and the services are accordingly factually limited by these circumstances. AECOM disclaim any undertaking or obligation to advise any person of any change in any matter affecting the Report, which may come or be brought to AECOM's attention after the date of the Report. © This Report is the copyright of AECOM. Any unauthorised reproduction or usage by any person other than the addressee is strictly prohibited.

SCHEDULE OF REVISIONS

Revisions Issued Since Publication

Report Revision Number	Revision Date	Paragraphs amended
P02	04.10.19	Minor revisions following internal review

Standard codes for suitability models and documents See BS1192:2007 Table 5 for further details					
Revision	Status	Description	Revision	Status	Description
P01.01 etc. to Pnn.nn etc.	S0	Initial status or WIP	P01.1 etc. to Pnn.nn etc.	D1	Costing
P01.01 to Pnn.nn	S1	Co-ordination	P01.1 etc. to Pnn.nn etc.	D2	Tender
P01 to Pnn	S2	Information	P01.1 etc. to Pnn.nn etc.	D3	Contractor Design
P01 to Pnn	S3	Review & Comment	P01.1 etc. to Pnn.nn etc	D4	Manufacture/ Procurement
P01 to Pnn	S4	Stage Approval	C01 to Cnn	A1, A2 etc	Approved and accepted as stage complete
P01 to Pnn	S5	Manufacture	P01.01 etc. to Pnn.nn etc.	B1, B2 etc	Partially signed-off:
P01 to Pnn	S6	PIM Authorization	C01 to Cnn	CR	As Construction Record
P01 to Pnn	S7	AIM Authorization			

Contents

1 INTRODUCTION 1
1.1 Background 1
1.2 Project Description 1
1.3 Site Description 2
1.4 Aims and Objectives 2

2 LEGISLATION AND POLICY 4
2.1 Wildlife Legislation 4
2.2 National Planning Policy 5
2.3 Local Planning Policy 5
2.4 Local Biodiversity Action Plan 6
2.5 Highways England Biodiversity Plan 6

3 METHODS 8
3.1 Desk Study 8
3.2 Field Survey 9
3.3 Survey Limitations 10

4 RESULTS 11
4.1 Nature Conservation Designations 11
4.2 Habitat 11
4.3 Protected and notable species 12

5 IDENTIFICATION OF ECOLOGICAL CONSTRAINTS AND RECOMMENDATIONS 15
5.1 Overview 15
5.2 Constraints and Requirements for Further Survey: Designated Sites 15
5.3 Non-statutory Designated Sites 16
5.4 Constraints and Requirements for Further Survey: Habitats 16
5.5 Constraints and Requirements for Further Survey: Species 16

6 CONCLUSIONS 21
6.1 Designated Sites 21
6.2 Habitats 21
6.3 Protected and Notable Species 21

7 REFERENCES 22

Appendices

Appendix A Figures

Appendix B Bat Habitat Suitability Criteria

List of Tables

Table 1 Desk study data sources 8

Table 2 Notable Habitats Present 11

Table 3 Protected and notable species relevant or potentially relevant to the Proposed Scheme 12

1 INTRODUCTION

1.1 Background

1.1.1 Highways England commissioned the provision of design services of a section of the A46 surrounding Binley junction and its immediate surrounds in Coventry, Warwickshire, that is proposed to be upgraded (hereafter referred to as the Proposed Scheme).

1.1.2 These services included an extended Phase 1 habitat survey, undertaken in 2016[1] as part of the initial PCF stage assessment and then repeated in 2017 to reaffirm (*i.e.* 'ground-truth') the ecology work[2]; and surveys to identify whether any of the habitats within, or immediately adjacent to, the footprint of the Proposed Scheme (hereafter referred to as the 'Site') were used by roosting bats (undertaken in 2016[3] and 2017[4]).

1.1.3 In 2019, a suite of surveys was commissioned to update the ecological baseline associated with the Site; and to determine if there had been any changes to the baseline. The results of the updated desk study, Phase 1 habitat survey and potential roost feature reassessment for bats are reported within this document, which will support the Environmental Assessment Report (EAR) for the Proposed Scheme.

1.1.4 Further ecological surveys, undertaken in 2019 and reported separately, to update the ecological baseline, are:

- an ornithological scoping walkover (AECOM 2019 Report Reference: HE551486-ACM-EGN-A46_SW_000_Z-RIP-LE-0020);
- riparian mammal (water vole *Arvicola amphibius* and otter *Lutra lutra*) survey (AECOM 2019 Report Reference: HE551486-ACM-EGN-A46_SW_000_Z-RP-LE-0019); and
- badger *Meles meles* survey (AECOM 2019 Report Reference: HE551486-ACM-EGN-A46_SW_000_Z-RP-LE-0025)

1.1.5 The preliminary appraisal for the above species is not included within this report.

1.2 Project Description

1.2.1 The Proposed Scheme comprises an upgrade to the A46 Binley junction (see Figure 1, Appendix A). Specifically, it entails grade separation of the existing junction by raising the A46 dual carriageway over the A428 Rugby Road and providing entry and exit slip roads to an at grade gyratory junction.

1.2.2 The length of the Proposed Scheme is 0.96 mile, or 1.55 km. The four A46 slip roads would tie into the existing circulatory carriageway. The east to west A428 Rugby Road arms would not be significantly affected by the Proposed Scheme. It is proposed that the existing east-west footpath to the south of the junction will be retained by widening the footpath along the A428 to Oakdale Road. This includes a slight modification to the existing toucan crossing as to conform with the modifications to the junction configuration. The footway will be widened but will retain, as close as possible, its existing alignment. The thin eastern portion of the Proposed Scheme, which extends

[1] Mouchel (2016) A46 Coventry Junctions Extended Phase 1 Habitat Report
[2] AECOM (2017) A46 Coventry Junction Upgrade. Ground Truth Extended Phase 1 Habitat Survey Report
[3] Mouchel (2016) A46 Coventry Junctions Preliminary Roost and Habitat Assessment Report
[4] AECOM (2017) A46 Coventry Junction Upgrade. Ground Truth Extended Phase 1 Habitat Survey Report

along Rugby Road, will include footpath widening so as to improve access for non-motorised users.

1.2.3 Other key physical design aspects of the Proposed Scheme include:

- re-surfacing of the existing circulatory carriageway with line markings consistent with the Proposed Scheme and existing A428 roads;
- lighting for the Proposed Scheme, including the existing roundabout and new lighting along the verges of the slip roads, central reserve of the main-line and circulatory central island;
- new road signs with modification of the existing advance direction signs due to the new junction rearrangement; and
- maintaining the existing drainage infrastructure as much as possible.

1.2.4 Earthworks will be required at some of the infrastructure locations and will generally require steepening of slopes with cut and fill to be a gradient of one vertical unit for every two horizontal units; where this is not possible, retaining solutions including reinforced earth retaining walls are proposed.

1.3 Site Description

1.3.1 The landscape within and surrounding the Site comprises various semi-natural and man-made habitats. The extent of the Proposed Scheme boundary is shown in Figure 1, Appendix A. The Proposed Scheme area itself comprises the A46 road, with associated road verges, hedgerows, woodland, amenity grassland and arable farmland. It is predominantly urban to the west of the Proposed Scheme boundary, with a mixture of arable, field drains, woodland and recreational land to the east. To the north-east of the Site is Coombe Country Park and Combe Pools Site of Special Scientific Interest (SSSI)[5], designated for its ornithological interest; and to the south-west is Herald Way Marsh (Claybrookes Marsh) SSSI and Local Nature Reserve (LNR), designated for its range of wetland habitats and assemblage of invertebrates.

1.3.2 The survey area for the ground truth Phase 1 habitat survey was the same as that used in 2017 and includes the Site, plus a 50 m buffer (hereafter referred to as the 'survey area').

1.3.3 Figure 1, Appendix A shows the survey area and its surrounds.

1.4 Aims and Objectives

1.4.1 The aims and objectives of the assessment in 2019 were to:

- update the ecological desk study;
- identify any changes to habitats within the survey area since 2017 that would require further ecological survey and assessment;
- reaffirm any potential bat roosts that may be impacted by the Proposed Scheme;
- map and target note the location of identified ecological features (that is, nature conservation designations and protected and/ or notable habitat and species) of relevance;

[5] Combe Pool SSSI Natural England Designated Site

- carry out an appraisal of the potential of the habitats recorded to support protected or notable[6] species of fauna and flora;
- update information regarding non-native invasive plant species; and
- make recommendations for further surveys, if required.

[6] A species with a conservation designation, but no legal protection

2 LEGISLATION AND POLICY

2.1 Wildlife Legislation

2.1.1 The following wildlife legislation has been considered when undertaking the ground-truth Phase 1 survey:

- Directive 92/43/EEC on the conservation of natural habitats and of wild fauna and flora (Habitats Directive);
- Wildlife and Countryside Act (WCA) 1981 (as amended);
- Countryside and Rights of Way (CRoW) Act 2000;
- Natural Environment and Rural Communities (NERC) Act 2006;
- The Conservation of Habitats & Species and Planning (various amendments) (England and Wales) Regulations 2018; and
- Protection of Badgers Act 1992; and
- The Hedgerow Regulations 1997.

2.1.2 Compliance with legislation may require the attainment of relevant protected species licences prior to the implementation of the Proposed Scheme.

Bats

2.1.3 All UK native bat species and their roosts (whether bats are present or not) are protected under the Conservation of Habitats & Species and Planning (various amendments) (England and Wales) Regulations 2018 and under the Wildlife and Countryside Act 1981 (as amended). Taken together, under this legislation it is an offence to:

- deliberately, intentionally or recklessly capture, injure or kill a bat;
- damage/destroy a breeding site or resting place of a bat (this is an offence whether the act is deliberate or not);
- deliberately, intentionally or recklessly disturb a bat; or
- intentionally or recklessly obstruct access to any structure which a bat uses for shelter or protection.

2.1.4 A bat roost is defined as “any structure or place, which is used for shelter or protection” or a “breeding site or resting place” (HMSO 2017). As bats commonly use the same roosts at particular times of the year after periods of absence, the roost is protected whether or not bats are resident.

2.1.5 Given the above protection, the potential presence of bats represents a material consideration in the planning process for development. Even where planning permission is not required there is still a legal responsibility placed on the developer to ensure that works with the potential to result in an offence under the above legislation, are undertaken in such a way to avoid offences.

2.1.6 In addition to the above legislation, Section 41 of the NERC Act (2006) requires the secretary of state to publish and maintain lists of species and types of habitats which are regarded by Natural England to be of "principal importance" for the purposes of conserving biodiversity in England. Seven of the UK bat species are included within this

list as 'priority species' namely, the barbastelle (*Barbastella barbastellus*), bechstein's (*Myotis bechsteinii*), noctule (*Nyctalus noctula*), soprano pipistrelle (*Pipistrellus pygmaeus*), brown long-eared bat (*Plecotus auritus*), greater horseshoe (*Rhinolophus ferrumequinum*) and lesser horseshoe (*Rhinolophus hipposideros*).

2.2 National Planning Policy

2.2.1 The National Planning Policy Framework (NPPF) was originally published on 27th March 2012 and detailed the Government's planning policies for England and how these are expected to be applied. The NPPF was then revised on 24th July 2018 and 19th February 2019.

2.2.2 The NPPF states the commitment of the UK Government to minimising impacts on biodiversity and providing net gains in biodiversity where possible, contributing to the Government's commitment to halt the overall decline in biodiversity.

2.2.3 It specifies the obligations that the Local Authorities and the UK Government have regarding statutory designated sites and protected species under UK and international legislation and how this it to be delivered in the planning system. Protected or notable habitats and species can be a material consideration in planning decisions and may therefore make some sites unsuitable for particular types of development, or if development is permitted, mitigation measures may be required to avoid or minimise impacts on certain habitats and species, or where impact is unavoidable, compensation may be required.

2.2.4 The NPPF is clear that pursuing sustainable development includes moving from a net loss of biodiversity to achieving net gains for nature, and that a core principle for planning is that it should contribute to conserving and enhancing the natural environment and reducing pollution.

2.3 Local Planning Policy

2.3.1 The *Coventry Local Plan 2017* contains policies, designations and allocations which will be used to shape development and to determine planning applications in Coventry. Green environment policies applicable to biodiversity include:

- Policy GE1: Green infrastructure; and
- Policy GE3: Biodiversity, Geological, Landscape and Archaeological Conservation.

2.3.2 The *Rugby Borough Council Local Plan 2019* sets out the council's policies and proposals to support the development of the borough through to 2031. This includes natural environment policies applicable to biodiversity including:

- NE1: Protecting Designated Biodiversity and Geodiversity Assets;
- NE2: Strategic Green and Blue Infrastructure; and
- NE3: Landscape Protection and Enhancement.

2.3.3 The *Coventry Local Plan 2017* and *Rugby Borough Council Plan 2019* highlight that all development proposals will be expected to avoid negative impacts on existing biodiversity. Where this is not possible, mitigation measures should be identified, and if these are not possible onsite then these should be offset elsewhere as a compensatory measure. In this instance development proposals should be guided by the council's

approach to biodiversity offsetting as set out in the *Warwickshire, Coventry and Solihull Green Infrastructure Strategy*, or any subsequent update to the Local Plan and national policy.

2.4 Local Biodiversity Action Plan

2.4.1 The national strategy for biodiversity is delivered at a local level via Local Biodiversity Action Plans (LBAP). The LBAP which covers the Proposed Scheme is the Warwickshire, Coventry and Solihull LBAP. This document provides action plans that define conservation objectives for local priority habitats and species.

2.4.2 The LBAP habitats and species potentially relevant to the Proposed Scheme and considered within this report are:

- Built Environment;
- Marsh and Swamp, Wet Grassland and Wet Woodland;
- Arable Field Margins;
- Gardens;
- Hedgerows;
- Old Parkland & Veteran Trees;
- Ponds;
- Rivers & Streams;
- Roadside Verges;
- Woodland;
- Bats;
- Black Poplar *Populus nigra*;
- Dormouse *Muscardinus avellanarius*;
- Dingy Skipper *Erynnis tages*;
- Great Crested Newt *Triturus cristatus*;
- Hedgehog *Erinaceus europaeus*; and
- Rare Bumblebees.

2.5 Highways England Biodiversity Plan

2.5.1 Highways England, through the national Road Investment Strategy, has set an aspiration that the operation, maintenance, and enhancement of the Strategic Road Network should move to a position that delivers no net loss of biodiversity; and, in the long term, Highways England should deliver a net gain in biodiversity across its broader range of works.

2.5.2 "*Our Plan to Protect and Increase Biodiversity*" (Highways England, June 2015) was published with the aim to show how it will work with service providers to halt overall biodiversity loss and maintain and enhance habitats and ecological networks. The 2015 Biodiversity Plan provides a general plan to protect and increase biodiversity. The 2015

Biodiversity Plan supersedes the 2002 Highways Agency (now Highways England) Biodiversity Action Plan (BAP), which still carries some relevance as it lists specific species of conservation concern.

2.5.3 The Government requires Highways England to demonstrate progress against the 2015 Biodiversity Plan, to secure an ongoing annual reduction in the net loss of biodiversity due to its activities.

3 METHODS

3.1 Desk Study

3.1.1 An updated data search was carried out in 2019 to identify nature conservation designations and protected / notable habitats and species potentially relevant to the Proposed Scheme.

3.1.2 A stratified approach was taken when defining the desk study area, based on the likely zone of influence of the Proposed Scheme on different ecological receptors; and, an understanding of the maximum distances typically considered by statutory consultees. Accordingly, the desk study identified any international nature conservation designations within 10 km of the Proposed Scheme boundary; other statutory nature conservations designations within 2 km of the Proposed Scheme boundary; and, local non-statutory nature conservation designations and protected and notable habitats and species within 2 km of the Proposed Scheme boundary.

3.1.3 The desk study was carried out using the data sources detailed in Table 1. Protected / notable habitats and species include those listed under Schedules 1, 5 and 8 of the WCA 1981; Schedules 2 and 4 of the Habitats Regulations; species and habitats of principal importance for nature conservation in England listed under Section 41 (S41) of the NERC Act 2006; and other species that are Nationally Rare, Nationally Scarce or listed in national or local Red Data Lists and Biodiversity Action Plans.

Table 1 Desk study data sources

Data Source	Accessed	Data Obtained
Multi-Agency Geographic Information for the Countryside (MAGIC) website	August 2019	International statutory designations within 10 km of the Site boundary. Other statutory designations within 2 km of the Site boundary. Ancient woodlands and notable habitats within 2 km.
Ordnance Survey 1:2500 Pathfinder maps and aerial photography	August 2019	Information on habitats and habitat connections (based on aerial photography) relevant to interpretation of planning policy and assessment of potential protected and notable species constraints.
Warwickshire Ecological Records Centre	August 2019	Sites designated for their nature conservation value within 2 km of the Site boundary. Protected / notable species within 2 km of the Site boundary.
A46 Coventry Junction Upgrade: Ground Truth Extended Phase 1 Habitat Survey Report (AECOM, 2017)	August 2019	Existing habitat and species information, recorded within the Site boundary in 2017. Including bat roost features.
Extended Phase 1 habitat survey (Mouchel 2016)	August 2019	Existing habitat and species information, recorded within the Site boundary in 2016.
A46 Coventry Junctions Preliminary Roost and Habitat Assessment Report (Mouchel 2016)	August 2019	Bat preliminary roost and habitat assessments.

Data Source	Accessed	Data Obtained
A46 Coventry Junction Improvements Bat Activity Surveys 2018 (AECOM 2018)	September 2019	Bat activity transects 2017/2018 and assessment of habitat suitability for commuting and foraging bats.
A46 Coventry Junction Improvements: Great Crested Newt Survey Technical Note 2018 (AECOM 2018)	August 2019	HSI assessment and eDNA results of ponds 1-9.
A46 Coventry Junction Improvements: Aquatic Ecology Spring Macroinvertebrate Surveys (AECOM 2018)	August 2019	Surveys of Smite Brook, Combe Pool SSSI drain, Field drain east of rugby fields, River Sowe U/S of Smite Brook confluence, River Sowe D/S of Smite Brook confluence.

3.2 Field Survey

Ground Truth Phase 1 Habitat Survey

3.2.1 A Phase 1 Habitat survey was undertaken in accordance with the standard survey method (Joint Nature Conservation Committee, 2010). Phase 1 Habitat survey is a standard method of environmental audit. It involves categorising different habitat types and habitat features within a survey area. The information gained from the survey can be used to determine the likely ecological importance of a site and to direct any more specific survey work which may need to be carried out prior to the submission of a planning application. The standard Phase 1 Habitat survey method was “extended” to record target notes on protected, notable and invasive species.

3.2.2 A note was made of the dominant vegetation present within the survey area where access permission had been granted in advance of survey, or where land was visible from within the Proposed Scheme boundary or from public rights of way, or other publicly accessible areas.

Appraisal of Potential Suitability of Habitats to Support Protected and Notable Species

3.2.3 An appraisal was made of the potential suitability of the habitats present to support protected / notable species of plants or animals (as defined in Section 3.1). Field signs, habitat features with potential to support protected species and any sightings or auditory evidence were recorded when encountered, but no detailed surveys were carried out for any particular species. Additional species surveys are reported separately (where applicable).

3.2.4 The presence was noted of any invasive, non-native plant species that were visible at the time of survey. This included recording the location and extent of any plants that are listed under Schedule 9 of the WCA 1981 (as amended), including Japanese knotweed (*Reynoutria japonica)* (where applicable).

Ground Level Assessment of Trees and Buildings with Potential to Support Roosting Bats

3.2.5 A daytime inspection, following guidance as described in ‘*Bat Surveys for Professional Ecologists: Good Practice Guidelines 3rd Edition’ (Collins, 2016),* was undertaken of mature trees and buildings within the survey area for their potential to support roosting bats.

3.2.6 All mature trees within the survey area were assessed from ground level, using binoculars, for their potential to support roosting bats. Suitable features include splits, cracks, woodpecker holes, hazard beams and dense ivy coverage. Such features were identified from the ground, using binoculars to inspect cavities and shaded areas of the branch structure that were not obstructed from view. The features were identified using The Bat Tree Habitat Key (Andrews, 2013) and the suitability categorised using the criteria outlined in Appendix B, a reproduction of Table 4.1 of the Bat Conservation Trust (BCT) Good Practice Guidelines (Collins, 2016).

3.2.7 All buildings within the survey area were inspected and assessed for their potential to support roosting bats. All the external areas of the buildings were thoroughly assessed from the ground using binoculars to inspect cavities and shaded areas of the buildings. Suitable features include cracks and crevices in the brickwork, entrance holes around the eaves and potential void spaces within the soffits, missing mortar under tiles, gaps in flashing, missing roof tiles/ridge tiles; and gaps under fascia boards. The suitability of buildings to support roosting bats was determined using the criteria outlined in Appendix B, a reproduction of Table 4.1 of the BCT Good Practice Guidelines (Collins 2016).

3.2.8 The bat potential roost feature assessment was carried out by an experienced licenced bat worker holding a Natural England Class 2 bat licence.

3.3 Survey Limitations

3.3.1 Where habitat boundaries coincide with physical boundaries recorded on OS maps, the resolution is as determined by the scale of mapping. Elsewhere, habitat mapping is as estimated in the field. Where areas of habitat are given they are approximate and should be verified by measurement on site where required for design or construction. While indicative locations of trees are recorded this does not replace requirements for detailed specialist arboricultural survey to British Standard 5837:2012 Trees in Relation to Design, Demolition and Construction.

3.3.2 There was no access to two land compartments to the east of the A46, between Broadstreet Rugby club and Oak Farm Nurseries and between Piles coppice and Binley Wood. However, these areas were surveyed from adjoining land parcels and the potential for any ecological constraints was assessed accordingly.

3.3.3 There was no access to the road verges along the A46 or the roundabout island at the A46 Binley junction, due to health and safety considerations. However, the habitats within these areas were mapped from a distance and potential for any ecological constraints have been assessed accordingly.

3.3.4 Note all individual trees/woodland blocks and/or buildings within the survey area were assessed for bat roost suitability. This comprised trees associated with the areas of the A46 road verge. However, all the trees were of young age and subject to pruning / management so considered negligible suitability to support roosting bats. Enough information was collected to determine the suitability of the Proposed Scheme area for roosting, foraging and commuting bats and to reaffirm any potential future survey requirements.

4 RESULTS

4.1 Nature Conservation Designations

4.1.1 There are no European sites or proposed European sites; Special Protection Areas (SPA), Special Areas of Conservation (SAC) or Wetlands of International Importance (Ramsar sites), within 10 km of the Site boundary.

4.1.2 Seven statutory sites are located within 2 km from the Site boundary (see Figure 2). In 2019 there are 63 non-statutory sites within 2 km of the Site boundary (see Figure 3) comprising Local Wildlife Sites (LWS); potential LWSs (pLWSs) and Ecosites.

4.1.3 Full details of the designated sites considered relevant to the Proposed Scheme - that is with potential to be impacted by the proposed development due to potential impact pathways (such as habitat and/or hydrological links) can be found in the *A46 Coventry Junction Upgrade. Ground Truth Extended Phase 1 Habitat Survey Report 2017.*

4.2 Habitat

4.2.1 The updated ground truthing Phase 1 habitat survey was undertaken on 10th July 2019 by suitably qualified AECOM ecologists who recorded and mapped all habitat types present within the survey area, along with any associated relevant ecological receptors observed. Results were compared to the existing baseline information from surveys undertaken in 2016 and 2017 to determine any significant difference or changes.

4.2.2 Minor re-classifications to habitats are shown in the Phase 1 map (see Figures 4A & 4B, Appendix A), but there have been no substantial changes to habitat compositions within the survey area since the previous habitat survey in 2017.

4.2.3 Full details of habitats, including protected / notable habitats, relevant to the Proposed Scheme can be found in the *A46 Coventry Junction Upgrade Ground Truth Extended Phase 1 Habitat Survey Report 2017*.

4.2.4 Table 2 provides a summary of the notable habitats within the survey area based on the results of the Phase 1 habitat survey and with reference to guidance for the recognition of NERC Act S41 (Maddock, 2010), LBAP (WWT, 2012-2015), and LWS quality habitats (based on Warwickshire data records).

4.2.5 No veteran trees, black poplar or rivers and streams were recorded within the survey area.

Table 2 Notable Habitats Present

Habitat	NERC Act?	LBAP?	LWS Quality?	Supporting Comments
Buildings and hard-standing; and Private gardens	x	?	x	Although not designated, the Built Environment LBAP exists to highlight enhancement opportunities for this habitat type.
Swamp	✓	✓	✓	Swamp habitats are present in the Herald Way Marsh SSSI.

Habitat	NERC Act?	LBAP?	LWS Quality?	Supporting Comments
Arable field margins	?	✓	x	Arable field margins, east of the A46 are narrow and are of poor quality
Species-poor hedgerow	✓	✓	?	Species-poor hedgerows running alongside A46, southbound and northbound.
Pond	?	✓	?	Pond in association with Binley Common Farm Wood pLWS.
Roadside Verges	x	✓	x	Roadside verges alongside the A46 are narrow and maintained through heavy and regular mowing
Broadleaved woodland – semi-natural woodland (including ancient woodland)	✓	✓	✓	Including Piles Coppice LWS and Binley Common Farm Wood pLWS.
Key to symbols: ✓ = yes, x = no, ? = possible,				

4.3 Protected and notable species

4.3.1 Table 3 provides a summary of potentially relevant species identified through a combination of desk study and field survey. The table summarises the conservation status of each species and provides comment on the likelihood of presence within the survey area. Figure 5 also provides records of protected and notable species within a 2km buffer of the Proposed Scheme boundary within the last ten years.

4.3.2 Where species are identified in Table 3 as likely or possible, they are likely to represent legal constraints or may be material to the determination of a planning application. Further surveys will or may be required to determine presence or probable absence.

4.3.3 As stated in Section 1, surveys for water vole, otter, birds and badger have been undertaken and are reported separately.

Table 3 Protected and notable species relevant or potentially relevant to the Proposed Scheme

Species	Supporting Comments
Plants	The data search returned records of 37 notable plant species recorded within the last ten years and within 2 km from the Site. No notable or protected plant species were recorded within the survey area.
Invertebrates	The data search returned 54 records of protected or notable terrestrial invertebrate species, including moths, butterflies, beetles, bees and small red-eyed damselfly *Erythromma viridulum*. The terrestrial habitats within the Site boundary were assessed to have limited potential to support a diverse community of terrestrial invertebrates, including notable species. However, the road verges do provide suitable habitat for a variety of common

Species	Supporting Comments
	and widespread invertebrates. Piles Coppice woodland was noted in its citation for lobster *Stauropus fagi* and orange footman *Eilema sorocula*. The watercourses within the Site boundary were surveyed in 2017 and 2018 for their potential to support aquatic invertebrate communities. The highest conservation value was Moderate with no notable species.
Amphibians	Nine ponds were identified within 500 m of the Proposed Scheme. The data search returned seven records of great crested newt, within 2 km from the Site boundary, the closest of which was from 0.8 km to the south of the Proposed Scheme boundary at Brandon Marsh. Twelve records of common toad *Bufo bufo* were received, the closest of which was c. 0.3 km in Claybrookes Marsh, adjacent to the Proposed Scheme. Surveys of ponds potentially affected by the Proposed Scheme were undertaken in 2018 and did not record great crested newt.
Reptiles	The data search returned c. 38 records of grass snake *Natrix helvetica* and one record of slow-worm *Anguis fragilis* from within 2 km of the Site boundary and within the last ten years. The closest grass snake was recorded from Claybrookes Marsh, c. 0.3 km to the south and the slow-worm was recorded in Brandon Woods, c. 1 km to the south-east of the Site. The roadside verges and arable field margins within the Site boundary offer low quality habitat for basking and foraging reptiles. No other habitats (such as woodland, arable farmland or scrub) within the survey area are suitable for reptiles.
Bats	The data search returned 51 records of flying, grounded or dead bat (of nine species) from within 2 km of the Site and within the last ten years. Additionally, the data search also returned nine records of bat roosts within 2 km of the Site, the closest of which was approximately 300 m from the Site boundary. No trees or built structures were found to be suitable for roosting bats within the Proposed Scheme boundary. Three trees with moderate potential to support roosting bats and one building with low potential to support roosting bats were found within 50 m of the Site boundary.
Hazel Dormouse	The data search returned no records of dormouse within 2 km of the Site boundary and from the last ten years.
Hedgehog	The data search returned 43 records of hedgehog within 2 km from the Site. This species is likely to occur on Site within the grassland and scrub habitats.
Brown Hare *Lepus europaeus*	The data search did not return any records of brown hare from within 2 km from the Proposed Scheme boundary in the last ten years. This species may occur in the arable habitats, to the east of the A46.
Polecat *Mustela putorius*	The data search returned three records of polecat pre-2017, the closest of which was 900m south-east of the Proposed Scheme red-line boundary in Brandon Marsh, 2017. The species has the potential to occur within the roadside verges and scrub / woodland habitat.
Invasive Non-native species (INNS)	The data search returned records of eleven flora and eight fauna INNS within 2 km of the Site and within the last ten years. No INNS were recorded within the survey area.

Potential Roost Feature Assessment for Bats

4.3.4 No trees or built structures were found to be suitable for roosting bats within the Proposed Scheme boundary.

4.3.5 Three trees with moderate potential to support roosting bats and one building with low potential to support roosting bats were found within 50 m of the Proposed Scheme boundary, see target notes below.

- T1, SP3896577609, pedunculate oak, 12m height, 0.8m DBH. Peeling bark on multiple faces, well separated in places but some areas appear to offer suitable shelter for bats. Split on limb 6m/SW unable to see extent from ground but may lead to larger cavity. Knot hole 5m/NE doesn't appear to go anywhere but flagged as precaution. Moderate.
- T2, SP3889077619, common ash, 15m height, 0.8m DBH. Tear out 3-4M/E unable to see if callusing is tight to heartwood thus requires further investigation. Broken limb 4m/E unable to fully assess but may have splits which would provide suitable shelter for a bat. Ivy covering is superficial and not arboreal but may be covering other potential PRFs. Moderate.
- T3, SP3878677436, Japanese cherry, 5m height, 0.45m DBH. Tree is standing deadwood with multiple splits/holes which appear to provide suitable shelter for bats. Unsafe to climb but could be assessed with an endoscope from the ground. Low/Moderate.
- B1, SP3879477609, Garden centre. No access to conduct detailed external survey so building was assessed from Public Rights of Way with binoculars. Externally the building (e.g. mortar) appears to be in a good state of repair however several missing tiles were recorded. The building is currently well lit (at night time) from the existing road network and subject to high levels of disturbance due to current use as a garden centre. West of the building backs onto an area of broad-leaved woodland. No access to conduct internal inspection.

5 IDENTIFICATION OF ECOLOGICAL CONSTRAINTS AND RECOMMENDATIONS

5.1 Overview

5.1.1 The purpose of this section is to discuss the potential ecological constraints associated with the Proposed Scheme. Where further baseline information is required to inform the environmental assessment, recommendations for further survey are made as appropriate. Mitigation and enhancement measures are briefly discussed as appropriate.

5.1.2 Relevant ecological receptors that may represent constraints to the Proposed Scheme, or that provide opportunities to deliver ecological enhancement in accordance with planning policy, are identified in Section 4 of this report.

5.1.3 The NPPF and local planning policy (summarised in Section 2 of this report) specify requirements for the protection of features of importance for biodiversity. Planning policy is a material consideration when determining planning applications. Compliance with planning policy requires that the proposed development considers and engages the following mitigation hierarchy where there is potential for impacts on relevant ecological receptors:

- avoid features where possible;
- minimise impact by design, method of working or other measures (mitigation) e.g. by enhancing existing features; and
- compensate for significant residual impacts, *e.g*. by providing suitable habitats elsewhere (whether in the control of Highways England or otherwise legally enforceable through planning condition or Section 106 agreement).

5.1.4 This hierarchy requires the highest level to be applied where possible. Only where this cannot reasonably be adopted should lower levels be considered. The rationale for the proposed mitigation and/or compensation should be provided with planning applications, including sufficient detail to show that these measures are feasible and would be provided.

5.1.5 In pursuance of the objectives within the NPPF, consideration should be given to the scope for biodiversity enhancement as part of the proposed development. This should represent biodiversity gain over and above that achieved through mitigation and compensation. Enhancement could be achieved on and/or, if possible, off the Site.

5.2 Constraints and Requirements for Further Survey: Designated Sites

5.2.1 There are no International or European sites within 10 km of the Proposed Scheme and therefore no International or European sites will be impacted by the Proposed Scheme.

5.2.2 There is potential for negative impacts to the Herald Way Marsh SSSI and Combe Poole SSSI, through reductions in air quality and water quality, given their proximity (<100m) and hydrological links to the Proposed Scheme. There are currently outfalls discharging highways runoff to Herald Way Marsh and Combe Pool SSSIs and changes to these from the Proposed Scheme could affect habitats within the SSSIs, which may in turn also have impacts upon associated notable flora and fauna, such as birds and invertebrates.

5.2.3 There are potential wider hydrological links present (through ground water and surface water) from the Proposed Scheme to Stoke Floods LNR, Ryton and Brandon Gravel Pits SSSI and Brandon Marsh SSSI (located >500m), which may also be indirectly affected and need to be considered.

5.2.4 Wider hydrological links present from the Proposed Scheme to Combe Pool SSSI, Herald Way March LNR and SSSI, Claybrookes Marsh LNR, Ryton & Brandon Gravel Pits SSSI / Brandon Marsh SSSI are further considered in the EAR update.

5.3 Non-statutory Designated Sites

5.3.1 No non-statutory designated sites will be directly impacted by the Proposed Scheme through land take.

5.3.2 There is potential for indirect impacts on non-statutory sites, for example through changes in air quality and changes in water quality, given their proximity to the Proposed Scheme and any such indirect impacts are considered within the EAR.

5.4 Constraints and Requirements for Further Survey: Habitats

5.4.1 The majority of habitats within the survey area are unchanged from 2017, with minor reclassification of habitats adjacent to the A46 and to the east of the A46.

5.4.2 The Proposed Scheme will directly impact (through habitat loss) on the following habitats:

- arable land;
- scrub (dense / continuous);
- amenity grassland;
- broad-leaved woodland (semi-natural); and
- species-poor hedgerow.

5.4.3 As noted within the 2017 report, there are four notable habitats present within the survey area: broadleaved semi-natural woodland, species-poor hedgerow, swamp and a pond. Whilst the swamp and pond are within the survey area, they will not be directly affected by the Proposed Scheme.

5.4.4 Suitable mitigation measures to avoid or minimise loss of habitat and/ or provide alternative planting as compensation for any loss of hedgerows and/ or broad-leaved woodland is considered further in the EAR.

5.4.5 Indirect impacts to notable habitats (such as through dust emissions) are considered to be minimal and can be adequately mitigated by following standard best practice construction guidelines.

5.5 Constraints and Requirements for Further Survey: Species

Plants

5.5.1 No notable or protected plant species, including non-native invasive species, were recorded within the survey area. The habitat survey showed the habitats present on site were widespread common types and species-poor and the plant species within these areas are likely to be common and widespread. Therefore, further surveys for plants, including non-native plant species, are not necessary.

Terrestrial Invertebrates

5.5.2 Terrestrial invertebrate species and communities present within the survey area are likely to be common and widespread, given the limited quality and extent of habitats. The road verges provide habitat for a variety of invertebrates; however, the verges within the site boundary were very heavily managed limiting their potential to support invertebrate species. The areas of greatest interest are in association with Herald Way Marsh SSSI and Piles Copplice LWS which will remain unaffected by the Proposed Scheme. Habitats outside of the Proposed Scheme boundary will remain intact and protected, it is considered unlikely that any impacts on habitats potentially supporting notable invertebrates will occur.

5.5.3 Therefore, no further surveys for terrestrial invertebrates are necessary.

Aquatic Invertebrates

5.5.4 Several of the watercourses within the survey area were deemed suitable to support notable aquatic invertebrates and these were surveyed in 2017 and 2018, the results of which are reported separately.

Amphibians

5.5.5 The data search returned seven records of great crested newt from within 2 km of the Site boundary and twelve records record of common toad, 2 km from the Site boundary.

5.5.6 Environmental DNA (eDNA) surveys of ponds potentially affected by the Proposed Scheme were undertaken in 2018 and did not positively test for great crested newt presence or any other amphibian species.

5.5.7 The loss of grassland habitat, potentially supporting common toad during their terrestrial phase, has potential to result in mortality through incidental killing due to the direct loss of habitats potentially supporting this species. Therefore, a precautionary principle of works should be employed, concordant with the requirements for reptiles. During construction, any open pits / holes should be covered at night or where not possible a wooden plank positioned at a 45° angle from the base to the top of the hole so that Common Toad and any other amphibians can escape.

5.5.8 Great crested newt is known from within 2 km of the Proposed Scheme, with the nearest record 0.8 km to the south at Brandon Marsh, this area will not be directly impacted upon by the Proposed Scheme. The nearest known population to the Proposed Scheme is separated by intensively managed arable fields and therefore the connectivity between this pond and the Proposed Scheme is limited. Furthermore, it is outside of the 500 m radius from a waterbody that is typically used by great crested newt. Therefore, the risk of great crested newt being present within the Proposed Scheme boundary is low.

Reptiles

5.5.9 The data search returned over 38 records of grass snake (the closest being c. 300 m south of the Proposed Scheme) and one record of slow-worm (c. 1km south-east of the Proposed Scheme) from within the 2 km search area.

5.5.10 All reptiles native to the UK are listed under Schedule 5 of the Wildlife & Countryside Act 1981 (as amended). The four most widespread species of reptile; adder *Vipera berus*, grass snake *Natrix helvetica*, common lizard *Zootoca vivipara* and slow worm are protected under Section 9 (1 and 5) of the Act. This prohibits intentional injuring or killing of a reptile.

5.5.11 Habitats within the Site boundary, offering low quality habitat for basking, foraging or sheltering reptiles, if present, include the roadside verges and arable field margins – both of which are intensively managed.

5.5.12 Therefore, these habitats are unlikely to support reptiles and it is unlikely that the Proposed Scheme will result in reptile mortality due to the direct loss of habitats potentially supporting common reptile species. Furthermore, the extent of loss of habitat, potentially supporting reptiles, is small.

5.5.13 However, as a precautionary principle, it is considered appropriate to reduce the suitability of vegetation for reptiles (if present) within the arable field margins and the roadside verges of the A46, under the assumption of very low numbers of reptiles present, which will displace any individuals, if present, into adjacent suitable habitat.

5.5.14 The vegetation within the Proposed Scheme should be cleared in the presence of an Ecological Clerk of Works (ECoW). The vegetation will be cleared by hand, using strimmers or other metal blade hand tools. The vegetation will be cleared to ground level and will be cut in two passes: the first cut of the vegetation cuts to no less than 30cm from above ground level. After a period of no less than 24 hours, a second cut of the vegetation will be made to ground level. All arisings will be removed from site immediately after clearance. Thereafter, prior to the commencement of development, this area should then be maintained as short vegetation to minimise potential constraints of the Proposed Scheme from reptiles and breeding birds.

5.5.15 The vegetation clearance should be undertaken whilst reptiles are active and above ground, between April and October. Any site clearance between April and August (inclusive) is within the nesting bird season and any vegetation clearance should be undertaken in concordance with the legal protection and consideration for nesting birds. Therefore, where possible, vegetation clearance should be undertaken in September or October.

5.5.16 During construction, any open pits / holes should be covered at night or where not possible a wooden plank positioned at a 45° angle from the base to the top of the hole so that reptiles can escape.

Roosting Bats

5.5.17 The 2017 and 2018 bat surveys and assessments found negligible potential for roosting bats within the Proposed Scheme boundary. The woodlands within 50 m of the Proposed Scheme were assessed as blocks rather than as individual trees and were assessed to have features with low to moderate potential to support roosting bats.

5.5.18 In 2019, bat assessments found negligible potential for roosting bats within the Proposed Scheme boundary, the same woodland blocks within 50m of the Proposed Scheme were assessed to again have low to moderate potential to support roosting bats. These areas are outside the land take of the current scheme design and are not thought to be negatively impacted by the Proposed Scheme.

5.5.19 In 2019, one building with low potential to support roosting bats was recorded. This is outside the land take of the current scheme design and is not thought to be negatively impacted by the Proposed Scheme.

5.5.20 Throughout the pre-construction and operational phases of the scheme mitigation measures will be implemented to reduce possible disturbance impacts to roosting and foraging bats including bat friendly lighting and habitat creation, these mitigation measures will be further discussed in the EAR report.

Foraging and Commuting Bats

5.5.21 The potential habitat suitability for foraging and commuting bats within the proposed scheme area was assessed as low importance for bats in 2017 and 2018 within the Proposed Scheme boundary, with very low or low bat activity recorded in Proposed Scheme boundary areas.

5.5.22 Habitat loss and land take from the Proposed Scheme is of limited extent and due to the low to moderate habitat value of these habitats to foraging and commuting bats, no significant impacts are anticipated.

Hazel Dormouse

5.5.23 Two historical (over ten years) records of dormouse were returned from the data search, both from Brandon Wood, c. 1 km south east of the Proposed Scheme boundary. Brandon Wood is ecologically connected to Piles Coppice, which is adjacent to the southern extent of the Proposed Scheme.

5.5.24 Surveys for Dormouse, undertaken by the Warwickshire Dormouse Conservation Group (WDCG) between 2009 and 2016 (reported in '*The Status of the Hazel Dormouse (Muscardinus avellanarius) in Warwickshire, Coventry & Solihull in 2016'*) confirmed that there are no recent records of dormouse in Piles Coppice, Little Brandon Wood, Great Brandon Wood and none within 2 km of Brandon Wood LWS.

5.5.25 Whilst the report suggests that dormice may have been missed during surveys, but still present: "*There may be an alternative explanation that we are looking for Dormice in the wrong place. There is evidence that dormice spend more time in the woodland canopy than in the shrub layer where, for our convenience, we are installing the nest tubes and boxes. As these are all mature woods, perhaps the canopy is where the dormice are, which is why we are not finding them (pers. comm. Andy Bucklitch, 2017)*", it is likely that if dormice were present in these areas, there would be evidence to support this (such as chewed nuts, or nests in tubes) and these signs of dormouse presence would have been recorded during surveys undertaken by WDCG.

5.5.26 Dormice can and will inhabit road verges, particularly where foraging resources (such as bramble *Rubus fruticosus*) are present (Garland, 2005). Whilst some bramble was recorded in 2019, growing within a small section of the Proposed Scheme adjacent to

Piles Coppice, it is confined to small areas of low-quality growth and is not extensive. Piles Coppice will not be effected by the scheme.

5.5.27 Given that there are no recent records of dormouse within 2 km of the Site, or within the last ten years; and that the habitat within a small section of the Proposed Scheme, adjacent to Piles Coppice, is largely sub-optimal and offers limited foraging habitat for Dormouse, it is highly unlikely that this species occurs within the survey area.

Other Species

5.5.28 Habitat suitable for foraging hedgehogs, such as scrub, grassland and woodland, is present within the survey area. Brown hares typically inhabit grassland and arable habitats, whilst polecat can be found in lowland wooded habitats, marshes and along riverbanks, or in buildings or dry-stone walls (Wildlife Trust 2019).

5.5.29 Hedgehog, brown hare and polecat may use habitat within the Proposed Scheme boundary. All receive limited legal protection but are Species of Principal Importance on S41 of the NERC Act. As such precautions are recommended to ensure they are not harmed during construction through a Construction Environmental Management Plan (CEMP) or precautionary working method statement.

5.5.30 It is recommended that the Proposed Scheme is planned to take account of likely mitigation requirements for these species. This may include timing of site clearance to avoid Brown Hare during their breeding season. This is concordant with the requirements for nesting birds. As such, it is recommended that site clearance and preparatory works be undertaken over the autumn / winter period between September and February inclusive. Where possible, the vegetation clearance should be undertaken in September or October, concordant with the requirements for reptiles and nesting birds.

5.5.31 Any unnecessary damage to retained semi-natural habitats (*e.g.* hedgerows) outside the direct footprint of the Proposed Scheme should be avoided. This might include the use of temporary fencing to protect such habitats. This is concordant with the expected requirements for any tree protection zones. During construction, any open pits / holes should be covered at night or where not possible a wooden plank positioned at a 45° angle from the base to the top of the hole so that mammals, particularly Hedgehog, can escape.

Land Not Accessed

5.5.32 The land to the south of the railway that could not be accessed for survey is proposed for new road signage. It is assumed that works in association with the new road signs would be localised within the Highway boundary and may require some (although limited) vegetation clearance, and the construction works will be short term. It is advised that a preconstruction ecological survey is conducted by the ECoW to ensure any potential ecological constraints are identified, once further details are known.

Further Recommendations

5.5.33 The majority of ecological data are valid only for short periods due to the inherently transient nature of the subject (CIEEM, 2019). The findings of this report would remain valid until Spring 2021.

6 CONCLUSIONS

6.1 Designated Sites

6.1.1 The situation regarding designated sites remains that reported in AECOM (2017) *Ground Truth Extended Phase 1 Habitat Survey Report* and the potential for adverse effects on the following statutory and non-statutory sites will need to be considered during the assessment process:

- Herald way Marsh SSSI;
- Combe Pool SSSI;
- Ryton and Brandon Gravel Pits SSSI;
- Brandon Marsh SSSI;
- Stokes Flood LNR;
- Piles Coppice LWS and Ecosite and Ancient Woodland;
- Binley Common Farm Wood pLWS and Ecosite and Ancient Woodland;
- Willenhall Wood LWS and Ancient Woodland;
- Claybrookes Marsh LWS and Herald Way Marsh Ecosite;
- Hungerly Hall Farm Ecosite; and
- Grassland adjacent to Brandon Wood LWS and Area between Brandon Wood and Piles Coppice Ecosite.

6.2 Habitats

6.2.1 Overall, the survey in 2019 confirmed that the majority of habitats within the survey area are unchanged from 2017, with very minor reclassification of habitats adjacent to the A46 and the east of the A46. Suitable mitigation measures to avoid or minimise loss of notable habitats within the survey area and/ or alternative planting as compensation for any loss, is detailed within the EAR.

6.3 Protected and Notable Species

6.3.1 Detailed surveys for protected species have been undertaken between 2017 and 2019 and it is recommended that these continue to be updated as required during and post-construction; as detailed within the EAR and Construction Environmental Management Plan. However, desk top records have been recorded for polecat in 2017 and a precautionary approach will be taken for ecological assessment.

7 REFERENCES

AECOM (2017) A46 Coventry Junction HSI Technical note.

AECOM (2017) A46 Coventry Junction Upgrade Ground Truth Extended Phase 1 Report.

AECOM (2017) A46 Coventry Junction Scoping report.

AECOM (2019) A46 Coventry Junction Upgrade Ornithology Report (Report Reference: HE551486-ACM-EGN-A46_SW_000_Z-RIP-LE-0020).

AECOM (2019) A46 Coventry Junction Upgrade, Water Vole and Otter Report (Report Reference: HE551486-ACM-EGN-A46_SW_000_Z-RP-LE-0019).

AECOM (2019) A46 Coventry Junction Upgrade, Badger Report (Reference: HE551486-ACM-EGN-A46_SW_000_Z-RP-LE-0025).

Andrews (2013) Bat Tree Habitat Key. Available online at: http://battreehabitatkey.co.uk/ Accessed July 2019.

Büchner, S. (2008) Dispersal of common dormice *Muscardinus avellanarius* in a habitat mosaic, Acta Theriologica 53, 2008. Available online at: http://ptes.org/wp-content/uploads/2014/06/Buchner-2008-Dispersal-of-dormice-in-habitat-mosaic.pdf - accessed August 2019

CIEEM (2019). *Advice Note on the Lifespan of Ecological Report & Surveys.* Chartered Institute of Ecology and Environmental Management, Winchester.

Collins J (ed) (2016). Bat surveys for professional ecologists: good practice guidance 3rd Ed. Bat Conservation Trust, London.

Coventry City Council (2016) Coventry Local Plan 2011-2031. Publication Draft.

JNCC (2010) Handbook for Phase 1 habitat survey a technique for environmental audit.

Harris S, Creswell P and Jefferies D (1989) Surveying Badgers. Mammal Society.

Highways Agency (2009) Design Manual for Roads and Bridges, Volume 11, Section 4, Part 1, HD44/09, Assessment of Implications (of Highways and/or Roads Projects).

Highways England (2015) Our plan to protect and increase biodiversity.

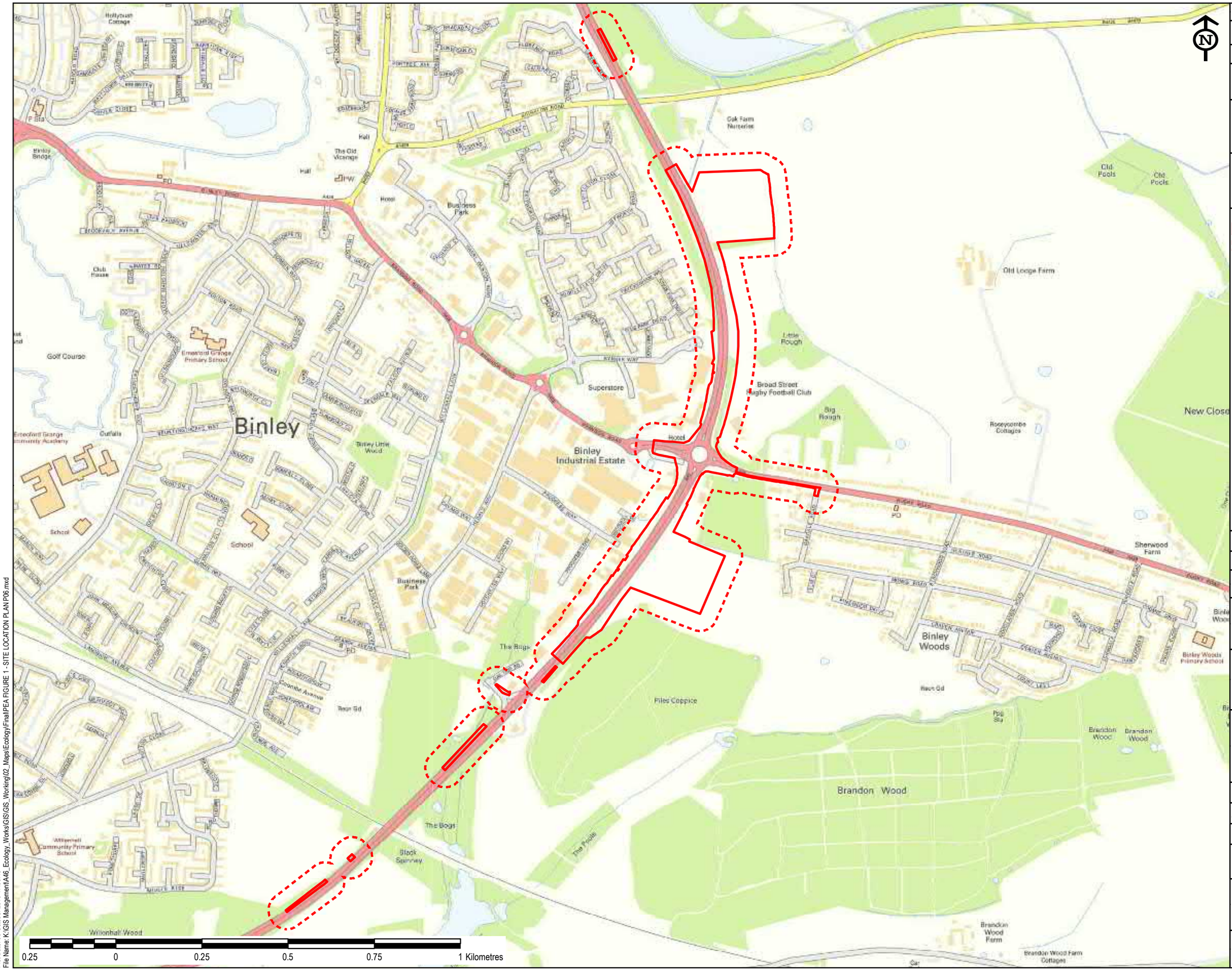
Oldham R.S., Keeble J., Swan M.J.S. & Jeffcote M. (2000) Evaluating the suitability of habitat for the Great Crested Newt (*Triturus cristatus*). Herpetological Journal 10 (4), 143-155.

Rugby Borough Council (2016) Rugby Borough Council Local Plan 2011-2031. Publication Draft. September 2016.

Warwickshire Wildlife Trust. Local Biodiversity Action Partnership. The Species and Habitat Action Plans 2012 to 2017. Available online: https://www.warwickshirewildlifetrust.org.uk/LBAPActionPlans accessed August 2019.

Wildlife Trust (2019) Polecat. Retrieved from https://www.wildlifetrusts.org/wildlife-explorer/mammals/polecat

Appendix A Figures



Plot Date: 09 October 2019 17:09:46
File Name: K:\GIS Management\A46_Ecology_Works\GIS\GIS_Working\02_Maps\Ecology\Final\PEA FIGURE 1 - SITE LOCATION PLAN P06.mxd

SAFETY, HEALTH AND ENVIRONMENTAL INFORMATION BOX

IT IS ASSUMED THAT ALL WORKS ON THIS DRAWING WILL BE CARRIED OUT BY A COMPETENT CONTRACTOR WORKING, WHERE APPROPRIATE, TO AN APPROPRIATE METHOD STATEMENT.

THIS DRAWING IS TO BE USED ONLY FOR THE PURPOSE OF ISSUE THAT IT WAS ISSUED FOR AND IS SUBJECT TO AMENDMENT.

EXCEPTIONAL RISKS RELATING TO THE WORKS ASSOCIATED WITH THIS DRAWING ARE IDENTIFIED BELOW.

CONSTRUCTION

MAINTENANCE / OPERATION / DECOMMISSIONING / DEMOLITION

KEY:

Site Boundary (Highways Boundary)

Site Boundary + 50m Buffer

NOTES

1. THIS DRAWING IS TO BE READ IN CONJUNCTION WITH ALL OTHER RELEVANT DOCUMENTATION.
2. DO NOT SCALE FROM THIS DRAWING, USE ONLY PRINTED DIMENSIONS.
3. ALL DIMENSIONS IN MILLIMETRES, ALL CHAINAGES, LEVELS AND COORDINATES ARE IN METRES UNLESS DEFINED OTHERWISE.
4. THIS DRAWING IS TO BE READ IN CONJUNCTION WITH THE PROJECT HEALTH & SAFETY FILE FOR ANY IDENTIFIED POTENTIAL RISKS.
5. CONTAINS OS DATA © CROWN COPYRIGHT AND DATABASE RIGHT 2017

Amended Title	By: AG / Check: MW	09/10/19	P06
Revision Details	By / Check	Date	Suffix

Purpose of issue

FOR INFORMATION

Client
Highways England
Major Projects
The Cube
199 Wharfside Street
Birmingham
B1 1RN

Working on behalf of highways england

Project Title

A46 COVENTRY JUNCTION UPGRADE

Drawing Title

FIGURE 1
SITE LOCATION PLAN

Designed	Drawn	Checked	Approved	Date
NT	GB	AR	NT	09/10/2019

Internal Project No.	Suitability
60547444	S0
Scale @ A3	Zone
1:10,000	BINLEY JUNCTION

THIS DOCUMENT HAS BEEN PREPARED PURSUANT TO AND SUBJECT TO THE TERMS OF AECOM'S APPOINTMENT BY ITS CLIENT. AECOM ACCEPTS NO LIABILITY FOR ANY USE OF THIS DOCUMENT OTHER THAN BY ITS ORIGINAL CLIENT OR FOLLOWING AECOM'S EXPRESS AGREEMENT TO SUCH USE, AND ONLY FOR THE PURPOSES FOR WHICH IT WAS PREPARED AND PROVIDED.

Project Office
Royal Court
Basil Close, Chesterfield
Derbyshire. S41 7SL
Tel: (01246) 209221
Fax: (01246) 209229
www.aecom.com

AECOM

AECOM Infrastructure & Environment UK Limited
Registered in England Registered number: 880328
Registered office: Scott House, Alencon Link, Basingstoke, Hampshire RG21 7PP

Drawing Number Highways England PIN	Originator	Volume			Rev
HE551486	-ACM	-EGN	-		P06
A46_SW_ZZ		-DR	-EG	-00006	
Location		Type	Role	Number	

Combe Pool
Stoke Floods
Herald Way Marsh
Willenhall Wood
Ryton and Brandon Gravel Pits
Brandon Marsh
COVENTRY
0 1 2 3 4 5 Kilometres

SAFETY, HEALTH AND ENVIRONMENTAL INFORMATION BOX

IT IS ASSUMED THAT ALL WORKS ON THIS DRAWING WILL BE CARRIED OUT BY A COMPETENT CONTRACTOR WORKING, WHERE APPROPRIATE, TO AN APPROPRIATE METHOD STATEMENT.

THIS DRAWING IS TO BE USED ONLY FOR THE PURPOSE OF ISSUE THAT IT WAS ISSUED FOR AND IS SUBJECT TO AMENDMENT.

EXCEPTIONAL RISKS RELATING TO THE WORKS ASSOCIATED WITH THIS DRAWING ARE IDENTIFIED BELOW.

CONSTRUCTION

MAINTENANCE / OPERATION / DECOMMISSIONING / DEMOLITION

KEY:
- Site Boundary (Highways Boundary)
- Site Boundary + 2km Buffer
- Site of Special Scientific Interest (SSSI)
- Local Nature Reserve (LNR)

NOTES
1. THIS DRAWING IS TO BE READ IN CONJUNCTION WITH ALL OTHER RELEVANT DOCUMENTATION.
2. DO NOT SCALE FROM THIS DRAWING, USE ONLY PRINTED DIMENSIONS.
3. ALL DIMENSIONS IN MILLIMETRES, ALL CHAINAGES, LEVELS AND COORDINATES ARE IN METRES UNLESS DEFINED OTHERWISE.
4. THIS DRAWING IS TO BE READ IN CONJUNCTION WITH THE PROJECT HEALTH & SAFETY FILE FOR ANY IDENTIFIED POTENTIAL RISKS.
5. CONTAINS OS DATA © CROWN COPYRIGHT AND DATABASE RIGHT 2017

Revision Details	By	Check	Date	Suffix
Updated Stat Site Boundaries	AG	MW	06/09/19	P04

Purpose of issue: FOR INFORMATION

Client: Highways England, Major Projects, The Cube, 199 Wharfside Street, Birmingham, B1 1RN

Working on behalf of highways england

Project Title: A46 COVENTRY JUNCTION UPGRADE

Drawing Title: FIGURE 2 STATUTORY SITES WITHIN 2KM OF THE PROPOSED SCHEME

Designed	Drawn	Checked	Approved	Date
HP	GB	AR	NT	11/10/2019

Internal Project No.	Suitability
60547444	S0
Scale @ A3: 1:30,000	Zone: BINLEY JUNCTION

THIS DOCUMENT HAS BEEN PREPARED PURSUANT TO AND SUBJECT TO THE TERMS OF AECOM'S APPOINTMENT BY ITS CLIENT. AECOM ACCEPTS NO LIABILITY FOR ANY USE OF THIS DOCUMENT OTHER THAN BY ITS ORIGINAL CLIENT OR FOLLOWING AECOM'S EXPRESS AGREEMENT TO SUCH USE, AND ONLY FOR THE PURPOSES FOR WHICH IT WAS PREPARED AND PROVIDED.

Project Office
Royal Court
Basil Close, Chesterfield
Derbyshire, S41 7SL
Tel: (01246) 209221
Fax: (01246) 209229
www.aecom.com

AECOM
AECOM Infrastructure & Environment UK Limited
Registered in England Registered number: 880328
Registered office: Scott House, Alencon Link, Basingstoke, Hampshire RG21 7PP

Drawing Number	Originator	Volume			Rev
Highways England PIN					
HE551486	-ACM	-EGN	-		P04
A46_SW_ZZ		-DR	-LE	-00004	
Location		Type	Role	Number	

Plot Date: 11 October 2019 11:28:19
File Name: K:\GIS Management\A46_Ecology_Works\GIS\GIS_Working\02_Maps\Ecology\Final\PEA FIGURE 2 - STAT SITES 2KM P04.mxd

LWS Ref	LWS Site Name	LWS Status	Number
47/37	Binley Little Wood	LWS	1
39/37	Claybrookes Marsh	LWS	2
8/37	Stoke Floods	LWS	3
10/37	Brandon Marsh Sheep Field	LWS	4
17/37	Piles Coppice	LWS	5
01/37	Brandon Wood	LWS	6
92/37	Grassland adjacent to Brandon Wood	LWS	7
45/38Z	Sowe Valley Dorchester Way	LWS	8
15.1/47	New Close and Birchley Wood	LWS	9
226/37	Gainford Rise	LWS	10
02/48	Coombe Abbey	LWS	11
13/37s	River Avon and Tributaries	LWS	12
46/37	Willenhall Wood	LWS	13
42/37	Binley Common Farm Wood	potential site	14
86/37	The Pools, Black Spinney and Long Spinney	potential site	15
91/47Y	Railway Verge	potential site	16
07/37	Coombe Countryside Park West Deer Park	potential site	17
86/37	Grassland	rejected	18
07/37	Coombe Abbey	rejected	19
226/37	Gainford Rise	rejected	20
92/37	Grassland West of Piles Coppice	deferred	21
226/37	Sharman's Tip	destroyed	22

Ecosite	Ecosite Name	Number
92/37	Area between Brandon Wood, Piles Coppice	1
55/37	Big Rough	2
42/37	Binley Common Farm Wood	3
47/37	Binley Little Wood	4
86/37	Black SPinney and Long Spinney	5
16/37	Brandon Lane Verge	6
10/37	Brandon Marsh	7
01/37	Brandon Wood	8
103/37	Brinklow Slag Heap	9
07/37 & 23_47	Coombe Abbey Pool (part SSSI)	10
07/37	Coombe Abbey Pool (Part SSSI)	11
216/37	East of Willenhall Junior School	12
223/37	Field by Caludon Castle School	13
39/37	Herald Way Marsh (part SSSI)	14
226/37	Hungerly Hall Farm	15
91/47Y	London to birmingham Mainline Railway	16
15.1/47	New Close Wood	17
72/47	Old Pools Wood	18
17/37	Piles Coppice	19
40/37U	River Sowe	20
40/37Z	River Sowe	21
45/38Z	River Sowe	22
8/37	River Sowe, Stoke Floods	23
28/37	Ryton and Brandon Gravel Pits	24
95/37	Smite Brook, headwaters and tributaries. Tributary of the River Sowe.	25
221/37	St Bartholomew's Churchyard	26
66/37	The Pools	27
46/37	Willenhall Wood and Meadow	28

SAFETY, HEALTH AND ENVIRONMENTAL INFORMATION BOX

IT IS ASSUMED THAT ALL WORKS ON THIS DRAWING WILL BE CARRIED OUT BY A COMPETENT CONTRACTOR WORKING, WHERE APPROPRIATE, TO AN APPROPRIATE METHOD STATEMENT.

THIS DRAWING IS TO BE USED ONLY FOR THE PURPOSE OF ISSUE THAT IT WAS ISSUED FOR AND IS SUBJECT TO AMENDMENT.

EXCEPTIONAL RISKS RELATING TO THE WORKS ASSOCIATED WITH THIS DRAWING ARE IDENTIFIED BELOW.

CONSTRUCTION

MAINTENANCE / OPERATION / DECOMMISSIONING / DEMOLITION

KEY:

- Site Boundary (Highways Boundary)
- Site Boundary + 0.5km Buffer
- Site Boundary + 1km Buffer
- Ecosite
- Local Wildlife Site (LWS)
- Potential LWS
- Deferred LWS
- Destroyed LWS
- Rejected LWS

NOTES

1. THIS DRAWING IS TO BE READ IN CONJUNCTION WITH ALL OTHER RELEVANT DOCUMENTATION.
2. DO NOT SCALE FROM THIS DRAWING, USE ONLY PRINTED DIMENSIONS.
3. ALL DIMENSIONS IN MILLIMETRES, ALL CHAINAGES, LEVELS AND COORDINATES ARE IN METRES UNLESS DEFINED OTHERWISE.
4. THIS DRAWING IS TO BE READ IN CONJUNCTION WITH THE PROJECT HEALTH & SAFETY FILE FOR ANY IDENTIFIED POTENTIAL RISKS.
5. CONTAINS OS DATA © CROWN COPYRIGHT AND DATABASE RIGHT 2017

Revision Details	By / Check	Date	Suffix
Updated Non-Stat Site Boundaries	AG / MW	06/09/19	P04

Purpose of issue: FOR INFORMATION

Client
Highways England
Major Projects
The Cube
199 Wharfeside Street
Birmingham
B1 1RN

Working on behalf of highways england

Project Title
A46 COVENTRY JUNCTION UPGRADE

Drawing Title
FIGURE 3
NON-STATUTORY DESIGNATED SITES

Designed	Drawn	Checked	Approved	Date
DM	DM	OP	OP	11/10/2019

Internal Project No.	Suitability
60547444	S0
Scale @ A3: 1:20,000	Zone: BINLEY JUNCTION

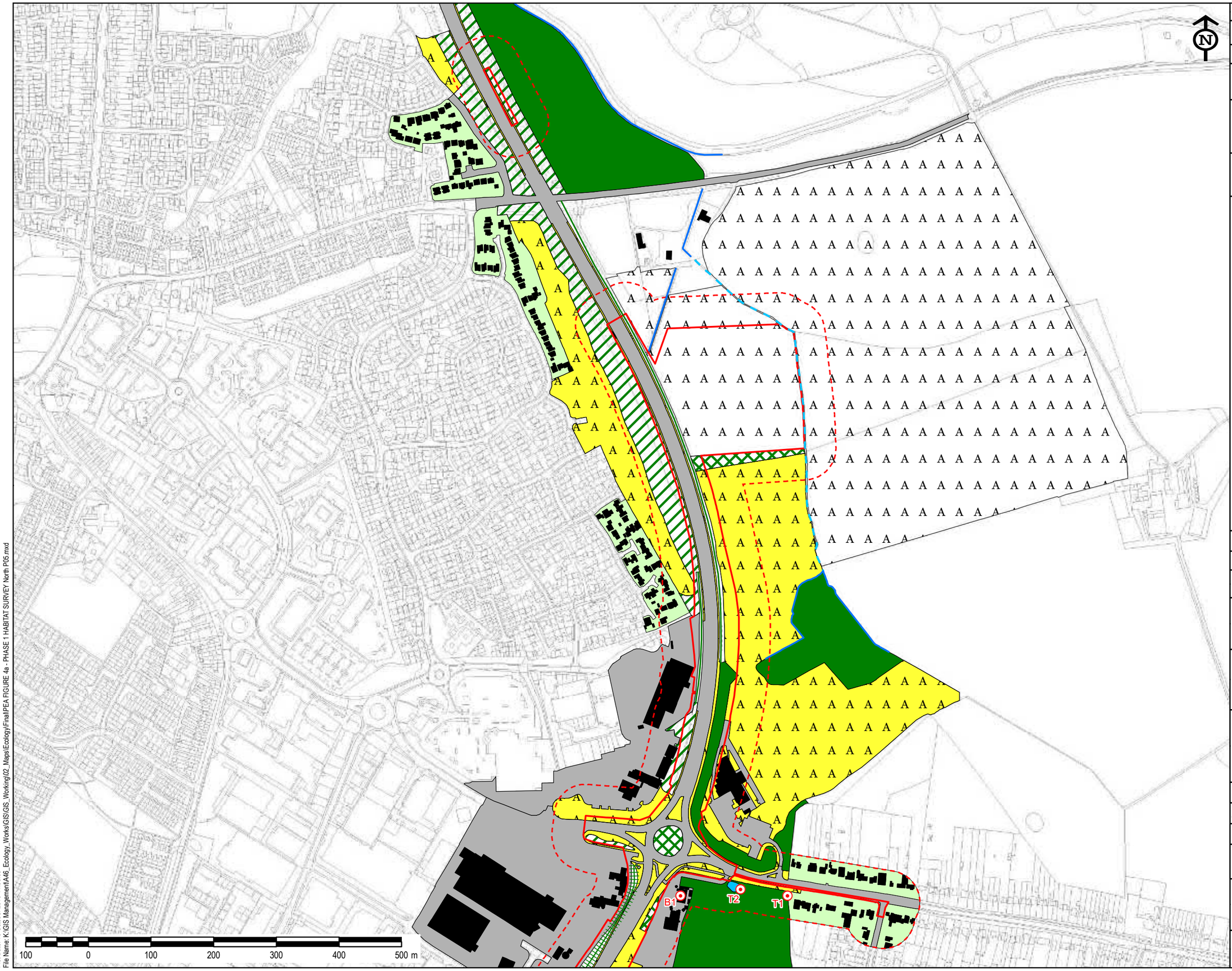
THIS DOCUMENT HAS BEEN PREPARED PURSUANT TO AND SUBJECT TO THE TERMS OF AECOM'S APPOINTMENT BY ITS CLIENT. AECOM ACCEPTS NO LIABILITY FOR ANY USE OF THIS DOCUMENT OTHER THAN BY ITS ORIGINAL CLIENT OR FOLLOWING AECOM'S EXPRESS AGREEMENT TO SUCH USE, AND ONLY FOR THE PURPOSES FOR WHICH IT WAS PREPARED AND PROVIDED.

Project Office
Royal Court
Basil Close, Chesterfield
Derbyshire, S41 7SL
Tel: (01246) 209221
Fax. (01246) 209229
www.aecom.com

AECOM Infrastructure & Environment UK Limited
Registered in England Registered number: 880328
Registered office: Scott House, Alencon Link, Basingstoke, Hampshire RG21 7PP

Drawing Number: Highways England PIN	Originator	Volume	Rev
HE551486 A46_SW_ZZ (Location)	-ACM	-EGN - -DR -EG -00001 (Type | Role | Number)	P04

Plot Date: 11 October 2019 11:30:48
File Name: K:\GIS Management\A46_Ecology_Works\GIS\GIS_Working\02_Maps\Ecology\Final\PEA FIGURE 3 - NON STAT SITES P04.mxd



SAFETY, HEALTH AND ENVIRONMENTAL INFORMATION BOX

IT IS ASSUMED THAT ALL WORKS ON THIS DRAWING WILL BE CARRIED OUT BY A COMPETENT CONTRACTOR WORKING, WHERE APPROPRIATE, TO AN APPROPRIATE METHOD STATEMENT.

THIS DRAWING IS TO BE USED ONLY FOR THE PURPOSE OF ISSUE THAT IT WAS ISSUED FOR AND IS SUBJECT TO AMENDMENT.

EXCEPTIONAL RISKS RELATING TO THE WORKS ASSOCIATED WITH THIS DRAWING ARE IDENTIFIED BELOW.

CONSTRUCTION

MAINTENANCE / OPERATION / DECOMMISSIONING / DEMOLITION

KEY:

- Site Boundary (Highways Boundary)
- Site Boundary + 50m Buffer
- Target Note
- G2 - Running Water
- J2.1.2 - Intact Hedge - Species-poor
- J2.3.2 - Hedge With Trees - Species-poor
- J2.6 - Dry ditch
- A1.1.1 - Broadleaved Woodland - Semi-natural
- A1.1.2 - Broadleaved Woodland - Plantation
- A2.1 - Scrub - Dense/Continuous
- G1 - Standing Water
- J1.1 - Cultivated/Disturbed Land - Arable
- J1.2 - Cultivated/Disturbed Land - Amenity Grassland
- J3.6 - Buildings
- J5 - Other Habitat - Hard Standing
- J5 - Other habitat - Private Gardens

Revision Details	By / Check	Date	Suffix
Amended Target Notes	AG / MW	07/10/2019	P05

Purpose of issue: FOR INFORMATION

Client
Highways England
Major Projects
The Cube
199 Wharfside Street
Birmingham
B1 1RN

Working on behalf of highways england

Project Title
A46 COVENTRY JUNCTION UPGRADE

Drawing Title
FIGURE 4A
PHASE 1 HABITAT SURVEY
NORTH

Designed	Drawn	Checked	Approved	Date
HP	GB	AR	NT	10/10/2019

Internal Project No.	Suitability
60547444	S0
Scale @ A3: 1:5,500	Zone: BINLEY JUNCTION

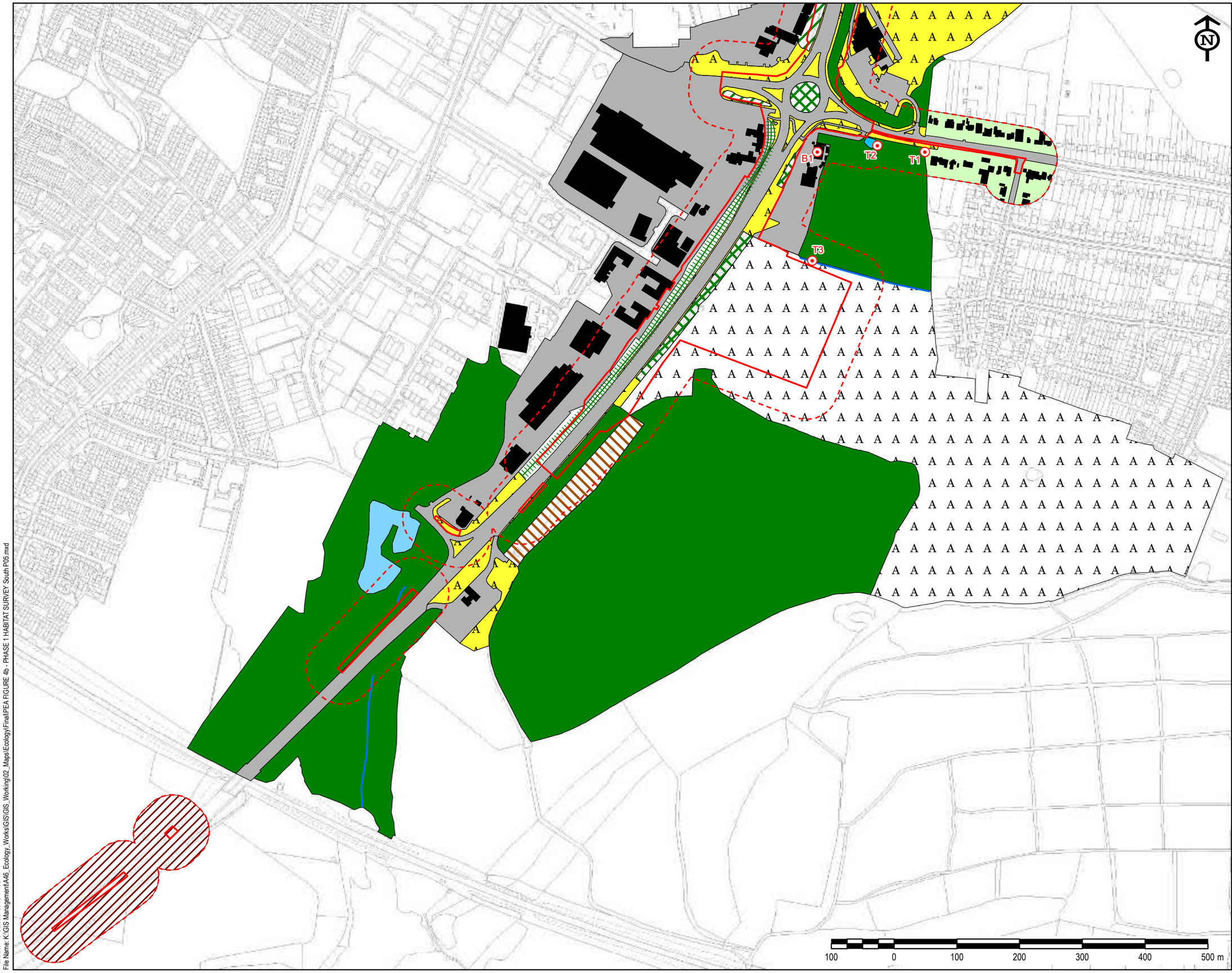
THIS DOCUMENT HAS BEEN PREPARED PURSUANT TO AND SUBJECT TO THE TERMS OF AECOM'S APPOINTMENT BY ITS CLIENT. AECOM ACCEPTS NO LIABILITY FOR ANY USE OF THIS DOCUMENT OTHER THAN BY ITS ORIGINAL CLIENT OR FOLLOWING AECOM'S EXPRESS AGREEMENT TO SUCH USE, AND ONLY FOR THE PURPOSES FOR WHICH IT WAS PREPARED AND PROVIDED.

Project Office
Royal Court
Basil Close, Chesterfield
Derbyshire. S41 7SL
Tel: (01246) 209221
Fax: (01246) 209229
www.aecom.com

AECOM
AECOM Infrastructure & Environment UK Limited
Registered in England Registered number: 880328
Registered office: Scott House, Alencon Link, Basingstoke, Hampshire RG21 7PP

Drawing Number: Highways England PIN	Originator	Volume			Rev
HE551486	-ACM	-EGN	-		P05
A46_SW_ZZ		-DR	-EG	-00001	
Location		Type	Role	Number	

Plot Date: 10 October 2019 14:30:09
File Name: K:\GIS Management\A46_Ecology_Works\GIS\GIS_Working\02_Maps\Ecology\Final\PEA FIGURE 4a - PHASE 1 HABITAT SURVEY North P05.mxd



SAFETY, HEALTH AND ENVIRONMENTAL INFORMATION BOX

IT IS ASSUMED THAT ALL WORKS ON THIS DRAWING WILL BE CARRIED OUT BY A COMPETENT CONTRACTOR WORKING, WHERE APPROPRIATE, TO AN APPROPRIATE METHOD STATEMENT.

THIS DRAWING IS TO BE USED ONLY FOR THE PURPOSE OF ISSUE THAT IT WAS ISSUED FOR AND IS SUBJECT TO AMENDMENT.

EXCEPTIONAL RISKS RELATING TO THE WORKS ASSOCIATED WITH THIS DRAWING ARE IDENTIFIED BELOW.

CONSTRUCTION

MAINTENANCE / OPERATION / DECOMMISSIONING / DEMOLITION

KEY:

- Site Boundary (Highways Boundary)
- Site Boundary + 50m Buffer
- Target Note
- G2 - Running Water
- J2.3.2 - Hedge With Trees - Species-poor
- A1.1.1 - Broadleaved Woodland - Semi-natural
- A1.1.2 - Broadleaved Woodland - Plantation
- A2.1 - Scrub - Dense/Continuous
- C3.1 - Other Tall Hherb and Fern - Ruderal
- F1 - Swamp
- G1 - Standing Water
- J1.1 - Cultivated/Disturbed Land - Arable
- J1.2 - Cultivated/Disturbed Land - Amenity Grassland
- J3.6 - Buildings
- J5 - Other Habitat - Hard Standing
- J5 - Other habitat - Private Gardens
- Not Accessed Land

Revision Details	By	Check	Date	Suffix
Amended Target Notes	AC	MW	07/10/2019	P05

Purpose of issue: FOR INFORMATION

Client
Highways England
Major Projects
The Cube
199 Wharfside Street
Birmingham
B1 1RN

Working on behalf of highways england

Project Title
A46 COVENTRY JUNCTION UPGRADE

Drawing Title
FIGURE 4B
PHASE 1 HABITAT SURVEY SOUTH

Designed	Drawn	Checked	Approved	Date
HP	GB	AR	NT	10/10/2019

Internal Project No.	Suitability
60547444	S0
Scale @ A3	Zone
1:5,500	BINLEY JUNCTION

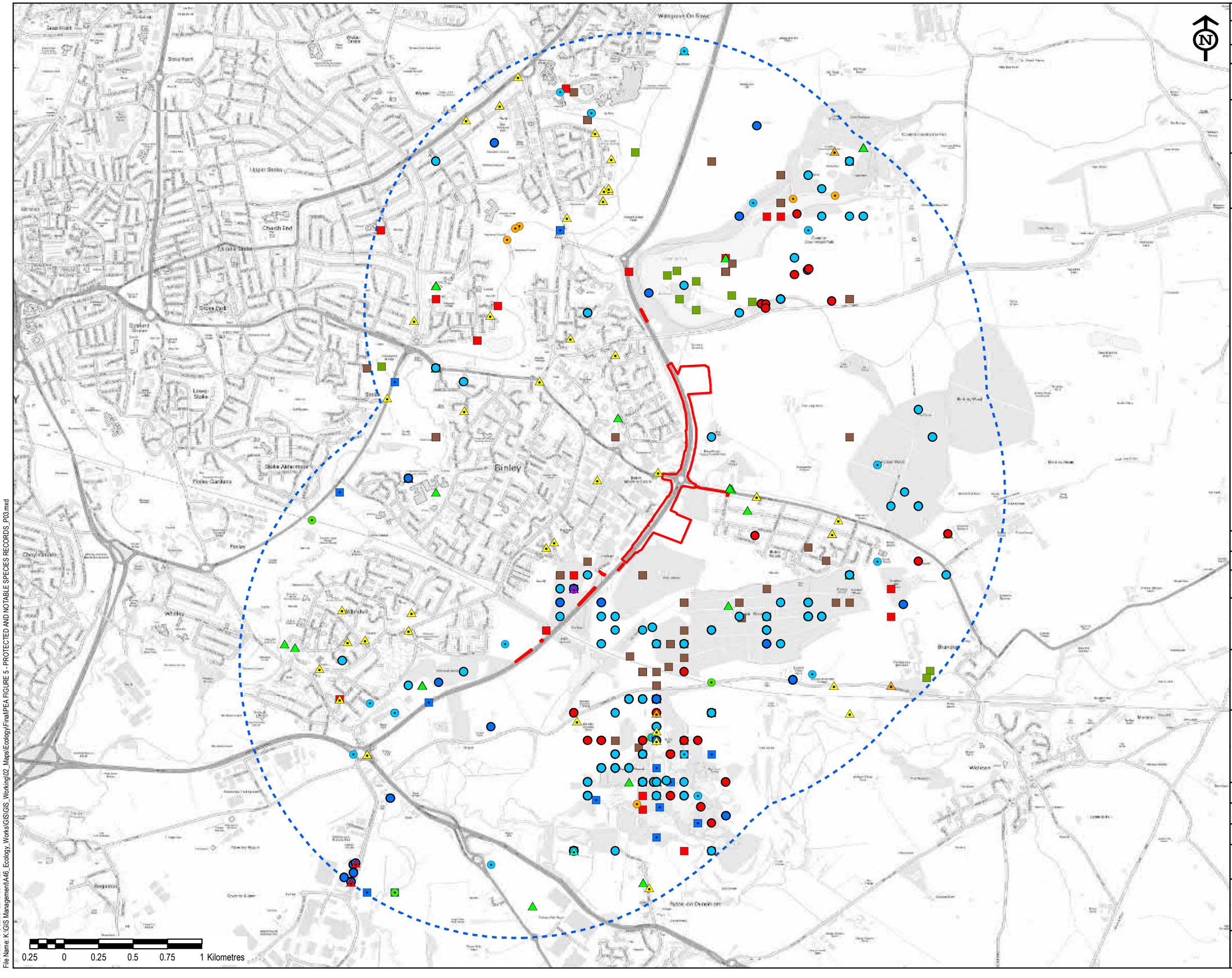
THIS DOCUMENT HAS BEEN PREPARED PURSUANT TO AND SUBJECT TO THE TERMS OF AECOM'S APPOINTMENT BY ITS CLIENT. AECOM ACCEPTS NO LIABILITY FOR ANY USE OF THIS DOCUMENT OTHER THAN BY ITS ORIGINAL CLIENT OR FOLLOWING AECOM'S EXPRESS AGREEMENT TO SUCH USE, AND ONLY FOR THE PURPOSES FOR WHICH IT WAS PREPARED AND PROVIDED.

Project Office
Royal Court
Basil Close, Chesterfield
Derbyshire, S41 7SL
Tel: (01246) 209221
Fax: (01246) 209229
www.aecom.com

AECOM Infrastrudure & Environment UK Limited
Registered in England Registered number: 880328
Registered office: Scott House, Alencon Link, Basingstoke, Hampshire RG21 7PP

Drawing Number	Originator	Volume			Rev
Highways England PIN					
HE551486	-ACM	-EGN	-		P05
A46_SW_ZZ		-DR	-EG	-00001	
Location		Type	Role	Number	

Plot Date: 10 October 2019 14:50:44
File Name: K:\GIS Management\A46_Ecology_Works\GIS\GIS_Working\02_Maps\Ecology\Final\PEA FIGURE 4b - PHASE 1 HABITAT SURVEY South P05.mxd



0.25 0 0.25 0.5 0.75 1 Kilometres

SAFETY, HEALTH AND ENVIRONMENTAL INFORMATION BOX

IT IS ASSUMED THAT ALL WORKS ON THIS DRAWING WILL BE CARRIED OUT BY A COMPETENT CONTRACTOR WORKING, WHERE APPROPRIATE, TO AN APPROPRIATE METHOD STATEMENT.

THIS DRAWING IS TO BE USED ONLY FOR THE PURPOSE OF ISSUE THAT IT WAS ISSUED FOR AND IS SUBJECT TO AMENDMENT.

EXCEPTIONAL RISKS RELATING TO THE WORKS ASSOCIATED WITH THIS DRAWING ARE IDENTIFIED BELOW.

CONSTRUCTION

MAINTENANCE / OPERATION / DECOMMISSIONING / DEMOLITION

CONFIDENTIAL

KEY:

- Site Boundary (Highways Boundary)
- Site Boundary + 2km Buffer

Protected and notable species records from Warwickshire Ecological Records Centre:

- Eurasian Water Shrew
- Feral Ferret
- Harvest Mouse
- Polecat
- West European Hedgehog
- Amphibian
- Reptile
- Notable Invertebrates
- Black_Poplar
- Notable Birds
- Barn Owl
- Veteran Trees
- Notable Higher and Lower Plants
- Water Vole
- Otter
- Bats
- Schedule 9 Invasive Species

Revision Details	By / Check	Date	Suffix
Symbolised Notable Mammals	AG / HP	15/10/19	P03

Purpose of issue: FOR INFORMATION

Client: Highways England, Major Projects, The Cube, 199 Wharfside Street, Birmingham, B1 1RN

Working on behalf of highways england

Project Title: A46 COVENTRY JUNCTION UPGRADE

Drawing Title: FIGURE 5 RECENT PROTECTED AND NOTABLE SPECIES RECORDS WITHIN 2KM OF THE SCHEME (I.E. ≤10 YEARS)

Designed	Drawn	Checked	Approved	Date
HP	GB	AR	NT	16/10/2019

Internal Project No.	Suitability
60547444	S0
Scale @ A3: 1:25,000	Zone: BINLEY JUNCTION

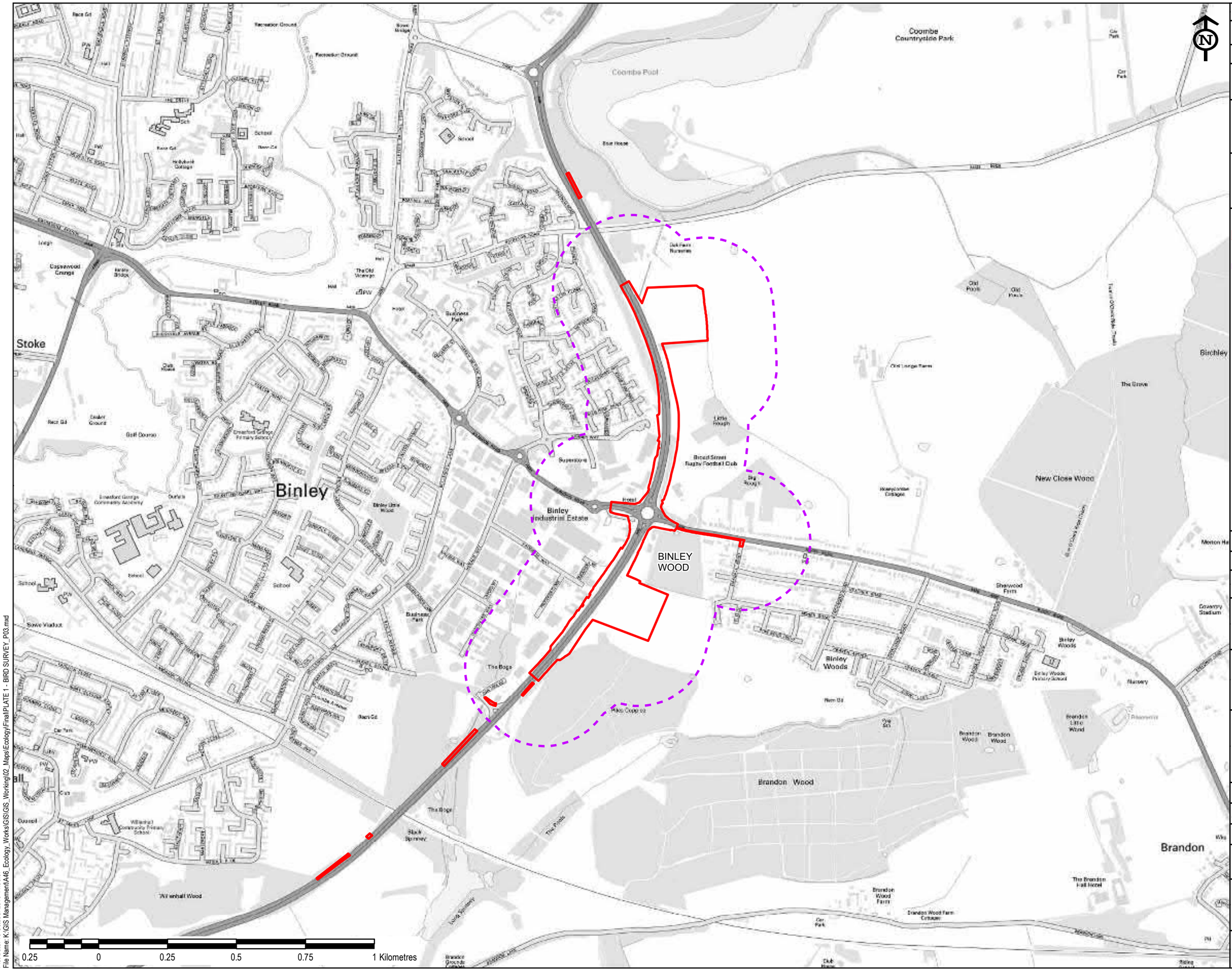
THIS DOCUMENT HAS BEEN PREPARED PURSUANT TO AND SUBJECT TO THE TERMS OF AECOM'S APPOINTMENT BY ITS CLIENT. AECOM ACCEPTS NO LIABILITY FOR ANY USE OF THIS DOCUMENT OTHER THAN BY ITS ORIGINAL CLIENT OR FOLLOWING AECOM'S EXPRESS AGREEMENT TO SUCH USE, AND ONLY FOR THE PURPOSES FOR WHICH IT WAS PREPARED AND PROVIDED.

Project Office
Royal Court
Basil Close, Chesterfield
Derbyshire, S41 7SL
Tel: (01246) 209221
Fax. (01246) 209229
www.aecom.com

AECOM
AECOM Infrastructure & Environment UK Limited
Registered in England Registered number: 880328
Registered office: Scott House, Alencon Link, Basingstoke, Hampshire RG21 7PP

Drawing Number: Highways England PIN	Originator	Volume			Rev
HE551486 A46_SW_ZZ	-ACM	-EGN	-DR	-EG -0000X	P03
Location		Type	Role	Number	

Plot Date: 16 October 2019 09:47:23
File Name: K:\GIS Management\A46_Ecology_Works\GIS\GIS_Working\02_Maps\Ecology\Final\PEA FIGURE 5 - PROTECTED AND NOTABLE SPECIES RECORDS_P03.mxd



SAFETY, HEALTH AND ENVIRONMENTAL INFORMATION BOX

IT IS ASSUMED THAT ALL WORKS ON THIS DRAWING WILL BE CARRIED OUT BY A COMPETENT CONTRACTOR WORKING, WHERE APPROPRIATE, TO AN APPROPRIATE METHOD STATEMENT.

THIS DRAWING IS TO BE USED ONLY FOR THE PURPOSE OF ISSUE THAT IT WAS ISSUED FOR AND IS SUBJECT TO AMENDMENT.

EXCEPTIONAL RISKS RELATING TO THE WORKS ASSOCIATED WITH THIS DRAWING ARE IDENTIFIED BELOW.

CONSTRUCTION

MAINTENANCE / OPERATION / DECOMMISSIONING / DEMOLITION

KEY:

- Site Boundary (Highways Boundary)
- 250m Buffer Ornithological walkover survey area

NOTES

1. THIS DRAWING IS TO BE READ IN CONJUNCTION WITH ALL OTHER RELEVANT DOCUMENTATION.
2. DO NOT SCALE FROM THIS DRAWING, USE ONLY PRINTED DIMENSIONS.
3. ALL DIMENSIONS IN MILLIMETRES, ALL CHAINAGES, LEVELS AND COORDINATES ARE IN METRES UNLESS DEFINED OTHERWISE.
4. THIS DRAWING IS TO BE READ IN CONJUNCTION WITH THE PROJECT HEALTH & SAFETY FILE FOR ANY IDENTIFIED POTENTIAL RISKS.
5. CONTAINS OS DATA © CROWN COPYRIGHT AND DATABASE RIGHT 2017

Revision Details	By / Check	Date	Suffix
Amended Survey area legend name	AG / MW	07/10/19	P03

Purpose of issue: FOR INFORMATION

Client: Highways England, Major Projects, The Cube, 199 Wharfeside Street, Birmingham, B1 1RN

Working on behalf of: highways england

Project Title: A46 COVENTRY JUNCTION UPGRADE

Drawing Title: PLATE 1 ORNITHOLOGICAL WALKOVER SURVEY AREA

Designed	Drawn	Checked	Approved	Date
HP	GB	AR	NT	10/10/2019

Internal Project No.	Suitability
60547444	S0
Scale @ A3: 1:12,500	Zone: BINLEY JUNCTION

THIS DOCUMENT HAS BEEN PREPARED PURSUANT TO AND SUBJECT TO THE TERMS OF AECOM'S APPOINTMENT BY ITS CLIENT. AECOM ACCEPTS NO LIABILITY FOR ANY USE OF THIS DOCUMENT OTHER THAN BY ITS ORIGINAL CLIENT OR FOLLOWING AECOM'S EXPRESS AGREEMENT TO SUCH USE, AND ONLY FOR THE PURPOSES FOR WHICH IT WAS PREPARED AND PROVIDED.

Project Office
Royal Court
Basil Close, Chesterfield
Derbyshire. S41 7SL
Tel: (01246) 209221
Fax: (01246) 209229
www.aecom.com

AECOM Infrastructure & Environment UK Limited
Registered in England Registered number: 880328
Registered office: Scott House, Alencon Link, Basingstoke, Hampshire RG21 7PP

Drawing Number	Originator	Volume	Rev
Highways England PIN: HE551486	-ACM	-EGN -	P03
Location: A46_SW_ZZ		-DR -EG -00001	
		Type | Role | Number	

Plot Date: 10 October 2019 14:56:07
File Name: K:\GIS Management\A46_Ecology_Works\GIS\GIS_Working\02_Maps\Ecology\Final\PLATE 1 - BIRD SURVEY_P03.mxd

Appendix B Bat Habitat Suitability Criteria

The following criteria to determine bat roosting habitat and commuting and foraging habitat suitability was used as part of the extended Phase 1 habitat survey (based on Collins, 2016).

Suitability/Risk	Description of roosting habitats	Commuting and foraging habitats
Negligible	Negligible habitat features on site likely to be used by roosting bats.	Negligible habitat features on site likely to be used by commuting or foraging bats.
Low	A structure with one or more potential roost sites that could be used by individual bats opportunistically. However, these potential roost sites do not provide enough space, shelter, protection, appropriate conditions and/or suitable surrounding habitat to be used on a regular basis or by larger numbers of bats (i.e. unlikely to be suitable for maternity or hibernation). A tree of sufficient size and age to contain Potential Roost Features (PRFs) but with none seen from the ground or features seen with only very limited roosting potential.	Habitat that could be used by small numbers of commuting bats such as a gappy hedgerow or unvegetated stream, but isolated, i.e. not very well connected to the surrounding landscape by other habitat. Suitable, but isolated habitat that could be used by small numbers of foraging bats such as a lone tree (not in a parkland situation) or a patch of scrub.
Moderate	A structure or tree with one or more potential roost sites that could be used by bats due to their size, shelter, protection, conditions and surrounding habitat but unlikely to support a roost of high conservation status (with respect to roost type only – the assessments in this table are made irrespective of species conservation status, which is established after presence is confirmed).	Continuous habitat connected to the wider landscape that could be used by bats for commuting such as lines of trees and scrub or linked back gardens. Habitat that is connected to the wider landscape that could be used by bats for foraging such as trees, scrub, grassland or water.
High	A structure or tree with one or more potential roost sites that are obviously suitable for use by larger numbers of bats on a more regular basis and potentially for longer periods of time due to their size, shelter, protection, conditions and surrounding habitat.	Continuous, high-quality habitat that is well connected to the wider landscape that is likely to be used regularly by commuting bats such as river valleys, streams, hedgerows, lines of trees and woodland edge. High-quality habitat that is well connected to the wider landscape that is likely to be used regularly by foraging bats such as broadleaved woodland, tree lined watercourses and grazed parkland. Site is close to and connected to known roosts.

Negligible is used to show that the feature has been surveyed and there is no suitable habitat features for roosting bats. Trees with moderate to high risk and buildings with low to high risk would normally require further more detailed PRF inspection or presence/absence surveys.

Appendix 8.2 c

Ground Truth Extended Phase 1 Habitat Survey Report 2017

1. INTRODUCTION

1.1 Background

1.1.1 This report presents an extended Phase 1 habitat survey of the A46 Coventry Junction Upgrade (the *proposed scheme*) and immediate surrounds. This was done to reaffirm (that is, ground truth) ecology work that had been carried out in 2016 as part of the initial options assessment.

1.1.2 The proposed scheme includes upgrades to the A46 Binley junction. Specifically, it entails grade separation of the existing junction by raising the A46 dual carriageway over the A428 Rugby Road and providing entry and exit slips roads to an at grade gyratory junction. The elevated section of the A46 would utilise a combination of embankments, retaining walls and bridge structures. Local traffic using the A428 will continue to use the revised roundabout with access to and from the A46 without the need for drivers on the A46 to slow down for a roundabout as they do now. As at present, the gyratory would be signalised and the national speed limit will be maintained along the A46.

1.1.3 It is anticipated that the proposed scheme will take approximately 2 years to build with construction starting in autumn 2019. The length of the proposed scheme is 0.96 miles (1.55km).

1.2 Site Description

1.2.1 The landscape within and surrounding the proposed scheme site boundary comprises various semi-natural and man-made habitats. The extent of the proposed scheme boundary is shown in Figure 1, Annex A. The proposed scheme site itself comprises the A46 road, with associated road verges, hedgerows, woodland, amenity grassland and arable farmland. It is predominantly urban to the west of the proposed scheme site boundary, with a mixture of arable, field drains, woodland and recreational land to the east. 245m to the north-east of the proposed scheme is Coombe Country Park and Coombe Pools Site of Special Scientific Interest (SSSI), designated for its ornithological interest; and directly to the south-western boundary is Herald Way Marsh (Claybrookes Marsh) SSSI and Local Nature Reserve (LNR), designated for its range of wetland habitats and assemblage of invertebrates.

1.3 Objectives

1.3.1 Previous ecological work had been completed within the proposed scheme boundary in 2016. In order to provide a robust ecological baseline, the objectives of the updated survey were to:

- update the ecological desk study
- reaffirm the habitats previously mapped, including a slight extension of the survey boundary encompassing potential construction compound locations and proposed new road signage
- map and target note the location of the identified ecological features (that is, nature conservation designations, and protected and notable habitat and species) of relevance

- carry out an appraisal of the potential of the habitats recorded to support protected or notable species of fauna and flora
- conduct a badger (*Meles meles*) survey and great crested newt (*Triturus cristatus*) (GCN) habitat suitability assessment
- update information regarding invasive plant species
- identify any changes on site since 2016 that require further ecological survey and assessment
- discuss potential ecological constraints and highlight recommendations for further baseline surveys

1.3.2 Mitigation and enhancement measures are mentioned briefly, where appropriate. For example, where recommendations for further surveys are not proposed. Recommendations for mitigation and enhancement will be detailed within the environmental assessment report, following the completion of further surveys (where applicable).

2 LEGISLATION AND POLICY

2.1 Wildlife Legislation

2.1.1 The following wildlife legislation is potentially relevant to the proposed scheme:

- Wildlife and Countryside Act (WCA) 1981 (as amended)
- Countryside and Rights of Way (CRoW) Act 2000
- Natural Environment and Rural Communities (NERC) Act 2006
- The Conservation of Habitats & Species Regulations 2017
- The EC Birds Directive (Directive 79/409/ECC) as translated into UK law by The Habitats and Species Regulations 2017
- The EC Habitats Directive (Directive 92/43/ECC) as translated into UK law by The Habitats and Species Regulations 2017
- Protection of Badgers Act 1992
- The Hedgerow Regulations 1997

2.1.2 The above pieces of legislation have been considered when undertaking this work using the methods described in Section 3, when identifying potential constraints to the proposed scheme, and when making recommendations for further survey, as discussed in Section 5. Compliance with legislation may require the attainment of relevant protected species licences prior to the implementation of the proposed scheme.

2.2 National Planning Policy

2.2.1 The National Planning Policy Framework (NPPF) was published on 27 March 2012 and details the Government's planning policies for England and how these are expected to be applied.

2.2.2 The NPPF states the commitment of the UK Government to minimising impacts on biodiversity and providing net gains in biodiversity where possible, thereby contributing to the Government's commitment to halt the overall decline in biodiversity. It specifies the obligations that the local authorities and the UK government have regarding statutory designated sites and protected species under UK and international legislation and how this it to be delivered in the planning system. Protected or notable habitats and species can be a material consideration in planning decisions and may therefore make some sites unsuitable for particular types of development, or if development is permitted, mitigation measures may be required to avoid or minimise impacts on certain habitats and species, or where impact is unavoidable, compensation may be required.

2.3 Local Planning Policy

2.3.1 The *Coventry Local Plan 2016* contains policies, designations and allocations which will be used to shape development and to determine planning applications in Coventry. Green environment policies applicable to biodiversity include:

- Policy GE1: Green infrastructure
- Policy GE3: Biodiversity, Geological, Landscape and Archaeological Conservation

2.3.2 The *Rugby Borough Council Draft Local Plan 2016* sets out the council's policies and proposals to support the development of the borough through to 2031. This includes natural environment policies applicable to biodiversity including:

- NE1: Protecting designated biodiversity and geodiversity areas
- NE2: Biodiversity
- NE3: Blue and green infrastructure policy

2.3.3 The *Coventry Local Plan 2016* and *Rugby Borough Council Draft Plan 2016* highlight that all development proposals will be expected to avoid negative impacts on existing biodiversity. Where this is not possible, mitigation measures should be identified, and if these are not possible onsite then these should be offset elsewhere as a compensatory measure. In this instance development proposals should be guided by the council's approach to biodiversity offsetting as set out in the *Warwickshire, Coventry and Solihull Green Infrastructure Strategy*, or any subsequent update to the Local Plan and national policy.

2.4 Local Biodiversity Action Plan

2.4.1 The national strategy for biodiversity is delivered at a local level via Local Biodiversity Action Plans (LBAP). The LBAP which covers the proposed scheme is the Warwickshire, Coventry, and Solihull LBAP (accessed online via the Warwickshire Wildlife Trust (WWT) website, 2012 - 2017). This document provides action plans that define conservation objectives for local priority habitats and species.

2.5 Highways England Biodiversity Plan

2.5.1 Highways England has set an aspiration through the national Road Investment Strategy that the operation, maintenance, and enhancement of the Strategic Road Network should move to a position that delivers no net loss of biodiversity; and, in the long term, Highways England should deliver a net gain in biodiversity across its broader range of works.

2.5.2 "*Our Plan to Protect and Increase Biodiversity*" (Highways England, June 2015) was published with the aim to show how it will work with service providers to halt overall biodiversity loss, and maintain and enhance habitats and ecological networks. The 2015 Biodiversity Plan provides a general plan to protect and increase biodiversity. The 2015 Biodiversity Plan supersedes the 2002 Highways Agency (now Highways England) Biodiversity Action Plan (BAP), which still carries some relevance as it lists specific species of conservation concern.

2.5.3 The Government requires Highways England to demonstrate progress against the 2015 Biodiversity Plan, to secure an ongoing annual reduction in the net loss of biodiversity due to its activities.

3 METHODOLOGY

3.1 Desk Study

Review of Existing Information

3.1.1 A review was conducted of the following baseline reports completed in 2016 as part of the initial options assessment:

- Assessment of Implications on European Sites (AIES) Report
- Extended Phase 1 habitat survey from January 2016
- GCN habitat suitability assessment and environmental DNA (eDNA) testing from June 2016
- Bat preliminary roost and habitat assessment from May 2016

3.1.2 The information within these reports was then used to guide the proposed scope of work for the field surveys (as detailed in Section 3.2).

Desk Study Data Search

3.1.3 The need for an Assessment of Implications on European Sites (AIES) was reviewed in accordance with HD44/0919 (Highways Agency (2009) Design Manual for Roads and Bridges, Volume 11, Section 4, Part 1, HD44/09, Assessment of Implications (of Highways and/or Roads Projects) on European or International sites (including Appropriate Assessment). This takes into account European sites within 1.24 miles (2km) of the proposed scheme boundary; any European sites where bats area listed as a primary qualifying interest within 18.64 miles (30km) of the proposed scheme; and where potential impact pathways may be present linking the proposed scheme to International or European sites designated for birds, that is, flight paths or feeding areas.

3.1.4 In addition, an updated desk study was carried out to reaffirm national and local statutory and non-statutory designated sites, and records of protected and notable species up to 1.24 miles (2km) of the proposed scheme site boundary.

3.1.5 Online resources including the Multi Agency Geographic Information for the Countryside (MAGIC) website (www.magic.gov.uk) was reviewed as part of the desk study. This is an interactive tool which allows the identification of statutory designated sites for nature conservation.

3.1.6 Records of protected and notable species and non-statutory designated sites were also requested from the Warwickshire Ecological Records Centre for a 1.24 miles (2km) search area from the proposed scheme site boundary. Additionally, the Peoples Trust for Endangered Species (PTES) and the Warwickshire Dormouse Conservation Group (WDCG) were contacted for any recent dormouse (*Muscardinus avellanarius*) records in association with Brandon Wood Local Wildlife Site (LWS) and the local area. Brandon Wood LWS cites historical records of dormouse.

3.1.7 Particular attention was given to protected and notable habitats and species included under Schedules 1, 5 and 8 of the *Wildlife and Countryside Act 1981* (as amended), Schedules 2 and 4 of *The Conservation of Habitat & Species Regulations 2017* (as amended), and Species and Habitats of Principal Importance in England, listed under Section 41 of the *Natural Environment and Rural Communities (NERC) Act 2006* and other species that are nationally rare, nationally scarce or listed in national or local Red Data Lists and the LBAP. The data from EnvIS (Highways England data centre) has not been reviewed at this stage.

3.2 Field Survey

Ground Truth Phase 1 Habitat Survey

3.2.1 The field survey comprised a ground truth Phase 1 habitat survey and an appraisal of the potential suitability of the habitats present to support protected and notable species.

3.2.2 A note was made of the dominant vegetation present within the proposed scheme boundary plus a 50m buffer (herein referred to as the *survey area*) where access permission had been granted in advance of survey, or where land was visible from within the proposed scheme site boundary or from public rights of way, or other publicly accessible areas. The habitats present were mapped in accordance with the published Phase 1 methodology (Joint Nature Conservation Committee, 2010). The survey was undertaken in August to early-October 2017, which is within the optimal period for undertaking this type of survey. Results were compared to the existing baseline information from the 2016 Phase 1 habitat survey to determine any significant difference or changes.

Appraisal of Potential Suitability of Habitats to Support Protected and Notable Species

3.2.3 An appraisal was undertaken of the potential suitability of the habitats present to support protected and notable species of plants or animals. Field signs, habitat features with potential to support protected species and any sightings or auditory evidence were recorded when encountered.

3.2.4 Further information on how potential risks for bats, GCN, and badgers were assessed is detailed below. No further detailed surveys were carried out for any other species as part of the extended Phase 1 habitat survey. Additional species surveys are reported separately (where applicable).

3.2.5 The presence was noted of any invasive, non-native plant species that were visible at the time of survey. This included recording the location and extent of any plants that are listed under Schedule 9 of the WCA 1981 (as amended), including Japanese knotweed (*Fallopia japonica)* (where applicable).

3.2.6 Bat Habitat Suitability and Potential Roost Feature Assessment

3.2.7 An assessment of bat habitat suitability was done to reaffirm the results of the initial assessment carried out in 2016 and updated to reflect site boundary changes. Habitats within and adjacent to the proposed scheme, within 50m, were assessed for their potential to provide commuting, foraging and swarming habitat. Habitats such as stream corridors, woodland edge, hedgerows, grassland and scrub can provide important linkages to the wider landscape. Features such as connectivity and quality of the habitat were considered and suitability categorised using the criteria outlined in Annex B, a reproduction of Table 4.1 of the Bat Conservation Trust (BCT) *Good*

Practice Guidelines (Collins, 2016).

3.2.8 The trees within and adjacent to the proposed scheme boundary, including woodland blocks (specifically, Binley Common Farm Wood, Piles Coppice and Coombe Pool SSSI and Country Park), were inspected and assessed for their potential to support roosting bats. Suitable features include splits, cracks, woodpecker holes, hazard beams and dense ivy coverage. Such features were identified from the ground, using binoculars to inspect cavities and shaded areas of the branch structure that were not obstructed from view. The features were identified using *The Bat Tree Habitat Key* (Andrews, 2013) and the suitability categorised using the criteria outlined in Annex B, a reproduction of Table 4.1 of the BCT *Good Practice Guidelines* (Collins, 2016).

3.2.9 The bat habitat suitability and potential roost feature assessment was carried out by an ecologist and overseen and reviewed by an experienced licenced bat worker.

Badger Survey

3.2.10 Particular attention was paid to the presence of field signs which would indicate the presence of badger on site including active setts, disused setts, latrines, scrapes, paths through vegetation, footprints and hair. This was based on the methodology within the Mammal Society *Surveying Badgers* (Harris *et. al* 1989).

Great Crested Newt Appraisal

3.2.11 Through desktop analysis an additional 5 ponds were identified in 2017 within 500m of the proposed scheme boundary since the 2016 survey. A Habitat Suitability Index (HSI) survey was undertaken in 2017 on these to assess their suitability for GCN based on the methodology within *Evaluating the suitability of habitat for the Great Crested Newt (Triturus cristatus)* (Oldham *et. al*, 2000).

3.3 Limitations

3.3.1 The surveys were carried out between August 2017 and October 2017; early flowering flora species may have been missed. However, this was not intended to be a detailed inventory of the plant species present in the survey area, as this was not required for the purposes of a Phase 1 habitat survey.

3.3.2 The areas of woodland on site including Binley Common Farm Wood, Coombe Poole SSSI and Country Park, Herald Way Marsh SSSI, and Piles Coppice have potential for badgers but these areas could not be extensively surveyed during the Phase 1 survey due to the dense vegetation present. Therefore recommendations for further badger survey have been made as appropriate. See Section 5 - *Discussion and Recommendations for Further Survey*.

3.3.3 Access was not possible to assess the suitability of Pond 4 to support GCN during the 2017 survey. However, anecdotal evidence confirmed that the pond was dry. See Section 5 - *Discussion and Recommendations for Further Survey*.

3.3.4 The area to the south of the railway line (TN31 on Figure 5, Annex A) and the area to the north by Coombe Pool SSSI and Country Park (TN29 on Figure 5, Annex A) were not accessed as they were not part of the scope at the time of the original surveys and no access was granted or available when the sites were revisited. Section 5 - *Discussion and Recommendations for Further Survey* explains how this limitation has been addressed with conclusions and recommendations made (as appropriate).

3.3.5 Note that not all individual trees or buildings were assessed for roost suitability within 50m of the proposed scheme boundary. However, enough information was collected to determine the suitability of the proposed scheme area for roosting, foraging and commuting bats and to reaffirm any potential future survey requirements.

3.3.6 There was restricted access to the arable field which comprises the candidate construction compound site to the north (TN27, *Figure 5, Annex A*). This was surveyed from adjoining land parcels. Potential for any ecological constraints have been assessed accordingly.

3.3.7 There was no access to the roundabout island at the A46 Binley junction. However, the habitat was mapped from a distance and potential for any ecological constraints have been assessed accordingly.

3.3.8 Note that ponds beyond 500m of the proposed general arrangement (as shown on Figure 1 and Figure 6, Annex A) were not included. This includes the proposed road sign locations to the far north and south of the proposed scheme (see Figure 1, Annex A). It is considered that works in those areas will be localised and non-licensable with minimal vegetation clearance required.

4 RESULTS

4.1 Desk Study

4.1.1 There were no European sites or proposed European sites, Special Protection Areas (SPA), Special Areas of Conservation (SAC) or Wetlands of International Importance (Ramsar sites), within 1.24 miles (2km) of the proposed scheme and no European sites with bats as a primary qualifying interest feature within 18.64 miles (30km). Ensor's Pool SAC is the nearest European site located approximately 7.46 miles (12km) to the north-west (and is the only European site within 18.64 miles (30km) of the proposed scheme). Ensor's Pool SAC is isolated from river systems and is an important *refuge* site for white-clawed crayfish (*Austropotamobius pallipes*). There are no potential impact pathways present from the proposed scheme to this SAC.

4.1.2 Six statutory sites are located within 1.24 miles (2km) from the proposed scheme boundary, as shown in Figure 2, Annex A. There are approximately 60 non-statutory designated sites within this distance from the proposed scheme boundary comprising LWSs, potential LWSs (pLWSs), and Ecosites.

4.1.3 The designated sites considered relevant to the proposed scheme, that is with potential to be impacted by the development due to potential impact pathways (such as habitat and/or hydrological links) and located within 0.62 miles (1km) of the proposed scheme boundary are listed in Table 1 below. These are illustrated on Figure 3, Annex A.

Table 1: Statutory and Non-Statutory Designated Sites

Site Name / Designation	Reason For Designation	Relationship to the proposed scheme
Statutory designated sites		
Coombe Pool SSSI	The pool is fed by the Smite Brook and includes the pool of 36 hectares, reedbeds and woodland. Coombe Pool is one of the most important ornithological sites in Warwickshire for its herons (*Ardea cinerea*), and other breeding birds, and for its wintering wildfowl.	Located approximately 245m to the north-east of the proposed scheme boundary
Herald Way Marsh SSSI	The site contains a range of wetland communities which are scarce in the county. They range from open water through swamp and fen to marsh, as well as areas of grassland, scrub and woodland. However, the site has been selected for its assemblage of invertebrates, a number of which are nationally rare.	Located immediately adjacent to the proposed scheme boundary
Herald Way Marsh (Claybrook Marsh) LNR	One of the most important areas for rare invertebrates in the county. Overlaps with Herald Way Marsh SSSI.	Located immediately adjacent to the proposed scheme boundary

Site Name / Designation	Reason For Designation	Relationship to the proposed scheme
Brandon Marsh SSSI	Diverse complex of flooded gravel pits, fen and scrub lying adjacent to the River Avon. Also of regional importance for several species of breeding and wintering birds.	Located approximately 605m to the south-east of the proposed scheme boundary.
Ryton and Brandon Gravel Pits SSSI	A geological SSSI showing important fluvial sequence.	Located approximately 510m to the south-east of the proposed scheme boundary.
Stoke Floods LNR	The reserve has a large lake, reedbeds and scrub next to the River Sowe. The lake is the result of mining subsidence and supports many wetland plants such as yellow flag and reed canary grass. Bird life is varied from many species of duck, seven species of warbler in the summer and occasional unusual migratory visitors such as black tern and yellow wagtails.	Located approximately 815m to the north-west of the proposed scheme boundary.
Willenhall Wood LNR	A mixed deciduous, ancient and semi-natural woodland covering 9 hectares. Shrub layer contains hazel (*Corylus avellana)*, elder (*Sambucus nigra*), hawthorn (*Crataegus monogyna*), and natural regeneration of oak (*Quercus* sp), aspen (*Populus tremuloides*), birch (*Betula* sp) and ash (*Fraxinus excelsior*). Dead trees are left where possible to provide nest sites for woodpeckers. Also contain insects which birds feed on.	Located approximately 250m west of the proposed scheme boundary.
Non-statutory designated sites		
Coombe Abbey Pool (part SSSI) SSSI Ecosite (Site code: 07/37)	Designated as a nationally important SSSI. Designated for its ornithological interest, particularly large heronry. Water vole (*Arvicola amphibius*) and otter (*Lutra lutra*) are known to be using the site. The site is good for invertebrates (butterflies and moths). Tormentil (*Potentilla erecta*) (noted in the citation as a near threatened plant; however	Located approximately 85m to the east of the proposed scheme boundary.

Site Name / Designation	Reason For Designation	Relationship to the proposed scheme
	current distribution / conservation status is common (The Wildlife Trusts, 2017) was recorded within the site in 2010.	
Coombe Abbey Pool (part LWS) including Countryside Park West Deer Park pLWS (Site code 07/37 & 23_47)	The majority of the site is designated as Coombe Abbey LWS. Parts of the site the south-east and south-west are identified as Coombe Countryside Park West Deer Park pLWS. This site has a variety of habitats, including woodland, tall herb and species rich grassland. The site supports several nationally red-listed birds. Coombe Abbey has one of the best sites in the county for lesser-spotted woodpecker *Dendrocops minor*. The site supports a known population of grass snake.	Located approximately 270m to the east of the proposed scheme boundary.
Coombe Abbey LWS (Site code: 02/48)	The site comprises of broad-leaved woodland and coniferous plantation with standing water and a brook running through it. Water vole, otter and grass snake (*Natrix Helvetica)* are known to use the site. A number of invertebrates were recorded here including *Gyrinus urinator* and *Haliplus* (*Liaphlus*) *laminatus*.	Located approximately 270m to the north-east of the proposed scheme.
Claybrookes Marsh LWS / Herald Way Marsh (part SSSI) Ecosite (Site code: 39/37)	The majority of the site is designated as Herald Way Marsh nationally important SSSI. The remainder of the site is designated as Herald Way Marsh (Claybrookes Marsh) LWS. Site is also Herald Way Marsh statutory LNR. The site contains a range of wet communities which are scarce in the county. One of the most important areas for rare invertebrates in the county. Comprising broadleaved semi-natural woodland and swamp	Located adjacent to the proposed scheme boundary.
Brandon Marsh Sheep Field LWS (Site code: 10/37)	Designated as a nationally important SSSI. Parts of this site are not SSSI, and	Located approximately 605m to the south-east of

Site Name / Designation	Reason For Designation	Relationship to the proposed scheme
	designated as Brandon Marsh Sheep Field LWS, which acts as a high quality and an important buffer to the SSSI. An area of wetland habitat. The site is particularly good for invertebrates and birds (including a variety of waders).	the proposed scheme boundary.
Ryton and Brandon Gravel Pits SSSI Ecosite (Site code: 28/37)	A geological SSSI showing important fluvial sequence.	Located approximately 510m to the south-east of the proposed scheme boundary.
Willenhall Wood and Meadow LWS and LNR Ecosite (Site code 46/37)*	Designated as Willenhall Wood and Meadow LWS. The site is also Willenhall Woods LNR. It contains ancient woodland. The site is not only valuable for its botanical interest but is of interest for birds and invertebrates, with at least five nationally scarce insects recorded.	Ecosite part located approximately 250m west of the proposed scheme boundary. LWS part of the site is located adjacent to the proposed scheme boundary.
Stoke Floods Part LWS and Part LNR Ecosite (Site code: 8/37)	Majority of the site is designated as Stoke Floods LWS. Part of this site is designated as Stoke Flood LNR. A large pool with a mosaic of wetland habitats. Botanical and ornithological value.	Located approximately 815m to the north-west of the proposed scheme boundary.
Piles Coppice LWS and Ecosite (Site code 17/37)*	On Natural England's Ancient Woodland Inventory. The site includes ponds to the east which has a number of dragonfly records.	Located adjacent to the proposed scheme boundary.
Brandon Wood LWS (Site code:01/37)*	Semi-natural ancient woodland and area of semi-improved grassland. Number of ponds important for dragonfly and historical survey work (dated 2001) identified dormouse (*Muscardinus avellanarius*) to be in the woodland.	Located approximately 390m to the east of the proposed scheme boundary.
Grassland adjacent to Brandon Wood LWS - Area between Brandon Wood and Piles Coppice Ecosite (Site code: 92/37)	Designated as Grassland Adjacent to Brandon Wood LWS. Semi-improved grassland.	Located adjacent to the proposed scheme boundary.
Binley Common Farm Wood pLWS and Ecosite* (Site code: 42/37)	On Natural England's Ancient Woodland Inventory.	Located adjacent to the proposed scheme boundary.

Site Name / Designation	Reason For Designation	Relationship to the proposed scheme
The Pools, Black Spinney and Long Spinney pLWS and Black Spinney and Long Spinney Ecosite (Site code: 86/37)	The middle part is designated as part of the River Avon LWS. The remainder is identified as The Pools, Black Spinney and Long Spinney pLWS. Woodland with wet areas and pools along a stream valley. Part of the site includes a section of The Bogs on the east side of the A46.	Located approximately 40m to the south of the proposed scheme boundary.
The Pools Ecosite* (Site code: 66/37)	Identified as part of The Pools, Black Spinney and Long Spinney pLWS. Designated ancient woodland. Small mixed woodland close to Brandon Wood and Piles Coppice. The woodland is in a depression with impeded drainage.	Located approximately 400m to the east of the proposed scheme boundary.
Sowe Valley Dorchester Way LWS and River Sowe Ecosite (Site code: 45/38Z)	Designated as part of the Sowe Valley Dorchester Way LWS. The river includes a considerable area of flood plain. A good variety of bird species. Strong colony of water vole. Aquatic and emergent bankside vegetation.	Located approximately 760m to the north of the proposed scheme boundary.
Sowe Valley Dorchester Way LWS and River Sowe Ecosite (Site code: 40/37Z)	Designated as part of the Sowe Valley Dorchester Way LWS. Aquatic, emergent and bankside vegetation.	Located approximately 800m to the north of the proposed scheme boundary.
Smith Brook, headwater and tributaries. Tributary of the River Sowe. Ecosite. (Site code: 95/37)	Includes a small area of Smite Brook. A linear site which runs through Coombe Pool SSSI. A tributary of the River Sowe with historical records of white-clawed crayfish (*Austropotamobius pallipes*), otter and water vole.	Located approximately 400m to the north of the proposed scheme boundary.
Railway Verge pLWS or London to Birmingham Mainline Railway Ecosite (Site code: 91/47Y)	The site consists of tall herbs and grasses.	Located approximately 185m to the south of the proposed scheme boundary.
Hungerly Hall Farm Ecosite (Site code: 226/37)	Floristically rich grassland with invertebrate interest. South-west part of the site designated as Gainford Rise Local LWS (part of which is now rejected).	Located adjacent to the proposed scheme boundary.
Big Rough Ecosite (and Little Rough) (Site code: 55/37)	Broadleaved plantation woodland with very little understorey and ground flora	Located approximately 80m to the east of the

Site Name / Designation	Reason For Designation	Relationship to the proposed scheme
	limited to bracken (*Pteridium aquilinum*)	proposed scheme boundary.
Brinklow Slag Heap Ecosite (Site code: 103/37)	Semi-improved and amenity grassland. Small stream runs through the site.	Located approximately 400m to the west of the proposed scheme boundary

*** Ancient woodland. No other ancient woodlands were identified within 1.24 miles (2km).**

4.2 Protected and Notable Species

European Protected Species (EPS) Licences

4.2.1 Two existing European Protected Species (EPS) licenses were identified within 1.24 miles (2km) of the proposed scheme on MAGIC database. One bat licence dating from 2016 was granted approximately 500m to the east of the proposed scheme and an EPS license for GCN dating from 2014 was located around 0.93 miles (1.5km) to the south-east of the proposed scheme.

4.3 Species Records

4.3.1 The results of the data search for protected species records are summarised in Table 2 below. The species records are also shown in Figure 4, Annex A.

Table 2: Protected and Notable Species Records

Species Group	Species	Number of Recent Records (i.e. <10 years)	Location of Nearest Record
Amphibians	Great crested newt (*Triturus cristatus*)	4	0.86 miles (1.4km) to the north
	Common toad (*Bufo bufo*)	8	0.07 miles (0.11km) to the west
Reptiles	Grass snake (*Natrix helvetica*)	15	0.07 miles (0.11km) to the west
	Slow worm (*Anguis fragilis*)	1	0.57 miles (0.91km) to the east
Bat roosts	Soprano pipistrelle (*Pipistrellus pygmaeus*)	2	0.81 miles (1.3km) to the south-east
	Common pipistrelle (*Pipistrellus pipistrellus*)	2	0.81 miles (1.3km) to the south-east
	Brown long-eared bat (*Plecotus auritus*)	4	0.16 miles (0.25km) to the east

Species Group	Species	Number of Recent Records (i.e. <10 years)	Location of Nearest Record
	Nathusius's Pipistrelle (*Pipistrellus nathusii*)	1	0.81 miles (1.3km) to the south-east
Bat activity	Soprano pipistrelle (*Pipistrellus pygmaeus*)	8	0.81 miles (1.3km) to the south-east
	Common pipistrelle	15	0.06 miles (0.1km) to the east
	Nathusius's Pipistrelle	2	0.43 miles (0.7km) to the east
	Brown long-eared bat	2	0.81 miles (1.3km) to the south-east
	Serotine bat (*Eptesicus serotinus*)	1	0.75 miles (1.2km) to the south
	Daubenton's bat (*Myotis daubentonii*)	6	0.81 miles (1.3km) to the south-east
	Natterer's bat (*Myotis nattereri*)	1	1.06 miles (1.7km) to the north
	Noctule bat (*Nyctalus noctula*)	12	0.62 miles (1km) to the south
Otter	Eurasian otter (*Lutra lutra*)	8	0.34 miles (0.55km) to the south
Badger	Eurasian badger (*Meles meles)*	CONFIDENTIAL	
Birds	Barn owl (*Tyto alba*)	4	0.68 miles (1.1km) to the east
	Kingfisher (*Alcedo atthis*)	7	0.81 miles (1.3km) to the south-east
	Cetti's warbler (*Cettia cetti*)	15	0.81 miles (1.3km) to the south-east
Invasive species	Japanese Knotweed (*Fallopia japonica*)	6	(0.02 miles) 0.03km to the south

Species Group	Species	Number of Recent Records (i.e. <10 years)	Location of Nearest Record
	New Zealand PygmyWeed (*Crassula helmsii*)	4	0.81 miles (1.3km) to the south-east
	Montbretia *(Crocosmia pottsii x aurea = C. x crocosmiiflora)*	1	0.75 miles (1.2km) to the south-east
	Canadian Waterweed (*Elodea canadensis*)	4	0.75 miles (1.2km) to the north
	Nuttall's Waterweed (*Elodea nuttalli*)	1	0.31 miles (0.5km) to the east
	Orange Balsam (*Impatiens capensis*)	9	0.43 miles (0.7km) to the east
	Indian Balsam (*Impatiens glandulifera*)	8	0.75 miles (1.2km) to the west
	Yellow Archangel (*Lamium galeobdolon subsp. argentatum*)	3	0.06 miles (0.1km) to the west
	American Mink (*Neovison vison*)	1	0.62 miles (1km) to the west
	Rhododendron (*Rhododendron ponticum*)	1	1.12 miles (1.8km) north-east
	Wels Catfish (*Silurus glanis*)	1	0.43 miles (0.7km) east
Water vole	Water vole (*Arvicola amphibius*)	13	1.3 miles (2.1km) north
Notable Mammals	Western European hedgehog (*Erinaceus europaeus*)	17	0.8 miles (0.2km) east
Invertebrates	Invertebrates	949	0.06 miles (0.1km) east
Veteran Trees	Veteran Trees	10	0.25 miles (0.4km) east
Rare plants within Warwickshire County	Heath dog-violet (*Viola canina*)	2	0.06 miles (0.1km) west
	Glabrous whitlowgrass (*Erophila glabrescens*)	1	0.27 miles (0.44km) west
	Knotted clover (*Trifolium striatum*)	2	0.34 miles (0.54km) south-east

Species Group	Species	Number of Recent Records (i.e. <10 years)	Location of Nearest Record
	Heath wood-rush (*Luzula multiflora subsp. congesta*)	3	0.39 miles (0.62km) east
	Smith's pepperwort (*Lepidium heterophyllum*)	1	0.39 miles (0.62km) south-east
	Spreading bellflower (*Campanula patula*)	1	0.39 miles (0.63km) south-west
	Pill sedge (*Carex pilulifera*)	2	0.66 miles (0.66km) south-east
	Small-fruited prickly sedge (*Carex muricata* subsp. pairae)	1	0.47 miles (0.75km) east
	Water purslane (*Lythrum portula*)	1	0.47 miles (0.75km) east
	Bog pondweed (*Potamogeton polygonifolius*)	3	0.52 miles (0.84km) east
	Great marsh-bedstraw (*Galium palustre subsp. elongatum*)	1	1.08 miles (1.84km) to north-east
	Weasel's-snout (*Misopates orontium*)	2	0.6 miles (0.97km) east
	Night-flowering catchfly (*Silene noctiflora*)	1	1.24 miles (2km) east
Black poplar	Black poplar (*Populus nigra subsp. betulifolia*)	6	0.93 miles (1.5km) north-west

4.3.2 Peoples Trust for Endangered Species and Warwickshire Dormice Conversation Group confirmed a historical record of dormouse at Brandon Wood LWS (dated 2001). However, there are no recent records (or monitoring records) on or within 1.24 miles (2km) of Brandon Wood LWS.

4.4 Field Survey

Habitats

4.4.1 The habitats recorded and their approximate extent and distribution are shown on Figure 5, Annex A. The associated Target Notes (TN) are provided as appropriate in Annex C of this report, and illustrative photos are provided in Annex D.

4.4.2 The evolution of the proposed scheme site boundary since 2016 have included the following:

- Additional land to the east where two potential candidate sites for construction compounds are proposed. This mainly comprised arable land (TN27 and TN28) with adjacent boundary features (specifically, field drain and species-poor hedgerow TN14)
- Additional land to the east on Rugby Road where footpath widening is proposed. This comprised of houses and gardens (TN23)
- Additional areas for proposed road signage located to the north and south of the main general arrangement (see Figure 1, Annex A and TN29, TN30 and TN31, Figure 5, Annex A). This comprised primarily of hardstanding and heavily managed road verge habitat
- Inclusion of Herald Way Marsh SSSI and LNR located adjacent to the revised boundary, comprising broadleaved semi-natural woodland and swamp

4.4.3 The significant habitat changes recorded on site in 2017, in comparison to the 2016 survey, were as follows:

- An area of scrub and woodland adjoining the Premier Inn and other commercial buildings was re-classified as species-poor hedgerow (TN12)
- The land separating the rugby club from the A46 originally mapped in 2016 as broadleaved woodland was reclassified as species-poor hedgerow (TN11)
- Two areas of scrub mapped in 2016 to the west of the A46, was reclassified as broadleaved plantation woodland (TN12 and TN32)
- Broadleaved semi-natural woodland mapped in 2016 to the west of the A46, opposite Coombe Pool SSSI and Country Park was reclassified as broadleaved plantation woodland
- Piles Coppice LWS is separated from the A46 by an area of tall ruderal habitat and broadleaved plantation woodland which was not previously mapped in 2016 (TN21 and TN22)

4.4.4 Within the main general arrangement (see Figure 1, Annex A), the updated survey confirmed that the remaining habitats on site have not changed significantly since the previous habitat survey in 2016.

4.4.5 The non-significant habitat changes recorded on site in 2017, in comparison to the 2016 survey, are as follows:

- An area of tall ruderal was identified that separated the rugby club from adjoining arable land (TN10)
- Mixed embankment woodland mapped by in 2016 was reclassified as broadleaved plantation woodland (TN5)

4.4.6 A summary of the habitats present within the proposed scheme boundary plus 50m buffer, are presented in Table 3. Habitat areas and lengths given are approximate only and provided only for those habitats within the proposed scheme boundary.

Table 3: Summary of Habitats Present

2017 Habitat types recorded associated with the survey area	2017 Description	Area or Length of habitat within the proposed scheme boundary	% of Area within the proposed scheme boundary
Cultivated / disturbed - Arable	Unchanged since the 2016 extended Phase 1 habitat survey report. No notable field margins. Dominant habitat to the east of the A46. The land was intensively managed with narrow grassy field margins.	7.99ha	45.4%
Cultivated / disturbed – Amenity grassland	Unchanged since the 2016 extended Phase 1 habitat survey report. The habitat was present along parts of the A46 roadside verge close to the junction and a short sward due to regular mowing. There were no tall or semi-improved grassland areas to the verges at the time of the survey. Species present included perennial rye grass (*Lolium perenne*), common daisy (*Bellis perennis*), dandelion (*Taraxacum officinale* agg.) and white clover (*Trifolium repens*).	1.03ha	5.9%
Broadleaved woodland – semi-natural woodland (including ancient woodland)	Woodland within the boundary of Herald Way Marsh SSSI. All other areas were unchanged since the 2016 extended Phase 1 habitat survey report. Composed of young to mature standing trees, mostly ash (*Fraxinus excelsior*), sycamore (*Acer pseudoplatanus*), alder (*Alnus glutinosa*) and oak (*Quercus* sp.). Some veteran trees were present in the ancient woodland noted at Binley Common Farm Wood and Piles Coppice.	0.35ha (not ancient woodland – primarily young trees to semi-mature trees in this area)	2.0%
Scrub – dense / continuous	Unchanged since the 2016 extended Phase 1 habitat survey report. Scrub bordered the verges adjacent to the eastern side of the A46, in association with arable fields.	0.78ha	4.4%

2017 Habitat types recorded associated with the survey area	2017 Description	Area or Length of habitat within the proposed scheme boundary	% of Area within the proposed scheme boundary
Species-poor hedgerow	Two areas of broadleaved semi-natural woodland were re-classified in 2017 as species-poor hedgerow comprising hawthorn (*Crataegus monogyna*) and blackthorn (*Prunus spinosa*) with stands of trees and scrub along some sections.	887m	N/A
Broadleaved plantation woodland	Reclassified from mixed embankment woodland to broadleaved plantation woodland. Also, some planted trees near the A428 Binley roundabout.	1.26ha	7.2%
Buildings and hardstanding	Unchanged since the 2016 extended Phase 1 habitat survey report (including the existing A46).	6.04ha	34.3%
Other habitat – Private gardens	A new area of houses and gardens mapped within the area of Rugby Road and which was previously outside the proposed scheme boundary. All other areas were unchanged since the 2016 extended Phase 1 habitat survey report.	N/A	N/A
Swamp	There were two areas of swamp located in the Herald Way Marsh SSSI and LNR. These were dominated by common reed (*Phragmites australis*).	N/A	N/A
Tall ruderal	New habitat type identified in 2017. A strip of tall ruderal separated the rugby club from the arable land this was dominated by common nettle (*Urtica* dioica) and spear thistle (*Cirsium vulgare*). Also present to the west of Piles Coppice.	0.03ha	0.2%

2017 Habitat types recorded associated with the survey area	2017 Description	Area or Length of habitat within the proposed scheme boundary	% of Area within the proposed scheme boundary
Open Water	One pond (Pond 3, Figure 6, Annex A) was recorded within Binley Common Farm Wood pLWS. A dry pond was also recorded to the west of the Binley roundabout (TN33, Figure 5, Annex A).	N/A	N/A
Running water	Six watercourses and field drains fell within 50m of the scheme boundary (TN13, TN14, TN15, TN16, TN17 and TN18).	None	N/A
Not accessed (not mapped)	-	0.12ha	0.6%

4.4.7 Table 4 provides a summary of the notable habitats within the survey area (up to 50m from the proposed scheme boundary) based on the results of the Phase 1 habitat survey and with reference to guidance for the recognition of NERC Act S41 (Maddock, 2010), LBAP (WWT, 2012-2015), and LWS quality habitats (based on Warwickshire data records).

Table 4: Notable Habitats Present

Habitat	NERC Act?	LBAP?	LWS Quality?	Supporting Comments
Broadleaved woodland – semi-natural woodland (including ancient woodland)	✓	✓	✓	Including Piles Coppice LWS and Binley Common Farm Wood pLWS.
Species-poor hedgerow	✓	✓	x	Two hedgerows within the proposed scheme boundary. Not assessed in terms of historical importance.
Buildings and hard-standing; and Private gardens	x	?	x	Although not designated, the Built Environment

Habitat	NERC Act?	LBAP?	LWS Quality?	Supporting Comments
				LBAP exists to highlight enhancement opportunities for this habitat type.
Swamp	✓	✓	✓	Swamp in Herald Way Marsh SSSI.
Pond	?	✓	?	Pond in association with Binley Common Farm Wood pLWS.
Key to symbols: ✓ = yes, x = no, ? = possible,				

Bats

4.4.8 The potential habitat suitability for foraging and commuting bats within the proposed scheme site was assessed as a combination of moderate and low importance for bats in 2016 and this assessment value was confirmed by the 2017 Phase 1 ground truth survey. Consistent with this, the additional land included as a result of the evolution of the site boundary was also assessed as being of moderate and low importance; woodland and embankment vegetation with trees or hedgerows connected to parkland and/or woodland were assessed as being of moderate potential; and embankment vegetation and gappy hedgerow with infrequent or few young trees were assessed as low potential.

4.4.9 No trees or built structures were found to be suitable for roosting bats within the proposed scheme boundary.

4.4.10 One tree on the A428 Rugby Road (an oak tree at TN24) was assessed as moderate suitability to support roosting bats located adjacent to the proposed scheme site boundary.

4.4.11 Trees within 50m of the proposed scheme at Binley Common Farm Wood and Piles Coppice were assessed for features that could offer potential to support roosting bats. Potential roost features were recorded at trees, including veteran trees and trees with dead or dying wood. Based on the presence of multiple features Binley Common Farm Wood and Piles Coppice as a whole were rated as offering moderate bat roosting potential.

Badgers

4.4.12 No badger signs were found during the 2016 survey or the 2017 Phase 1 ground truth survey; however, some suitable habitat, such as the woodland, exists adjacent to the proposed scheme site boundary.

Great Crested Newts

4.4.13 Three ponds within 500m of the proposed scheme boundary were surveyed for GCN in 2016 (Ponds 1, 2, and 3, Figure 6, Annex A). An additional 5 ponds were identified by the updated desk study in 2017 due to site boundary changes and an Habitat Suitability Index assessment was carried out on these waterbodies (where possible) in 2017 (Pond 5, 6, 7, 8 and 9, Figure 6, Annex A).

4.4.14 Pond 4 (Figure 6, Annex A) could not be accessed for survey in 2016 and in 2017. However, a conversation with the farmer revealed that the pond was dry.

4.4.15 A summary of the results of the Habitat Suitability Index survey of these ponds, plus the ponds previously surveyed in 2016, are provided in Table 5. Refer to Annex D for full Habitat Suitability Index results for the ponds surveyed in 2017.

Table 5: Pond HSI Scores

Pond Number	Location	Habitat Description	HSI Score	eDNA Result (2016)
1	350m to the south-east	Refer to GCN HSI Report 2016 (see references)	0.75 Good	Negative
2	200m to the east	Refer to GCN HSI Report 2016 (see references)	0.55 Below Average	Negative
3	Adjacent to proposed scheme	Refer to GCN HSI Report 2016 (see references)	0.63 Average	Negative
4	270m to the north-east	No access. Refer to Technical Note 2017 for further details (see references)		
5	40m to the south	Dry at time of survey (October 2017)	Dry	Not tested
6	240m to the north-east	Dry at time of survey (October 2017)	Dry	Not tested
7	40m to the west	Pond 7 is a large pond heavily choked with common reed (*Phragmites australis*) much of the water is not visible from the bank. Surrounding habitat is largely woodland	0.88 Excellent	Not tested
8	40m to the west	Pond 8 is a large pond heavily choked with common reed. Heavily shaded with willow (*Salix* sp.); surrounding habitat is largely woodland.	0.86 Excellent	Not tested
9	400m to the east	Pond 9 is a small heavily vegetated and shaded farmland	0.80 Excellent	Not tested

Pond Number	Location	Habitat Description	HSI Score	eDNA Result (2016)
		pond surrounded by arable fields.		

Birds

4.4.16 Habitats on and within 50m of the proposed scheme boundary such as hedgerows, woodland, scrub, swamp and arable fields have potential for bird species either as nesting or foraging sites.

Reptiles

4.4.17 Much of the habitat within and directly adjacent to the proposed scheme site boundary is made up of arable field, amenity grassland and road verges, which are considered of negligible value to reptiles due to lack of basking or foraging or sheltering habitat. The grasslands associated with the road verge and embankments are heavily managed. However, some areas of tall ruderal scrub and woodland fringes provide potential basking and foraging opportunities for reptiles. In particular the mosaic of habitats making up Herald Way Marsh SSSI provides a range of such opportunities for reptiles (this area was previously outside the scope of the 2016 survey). The ditches and watercourses connected to Herald Way Marsh SSSI also have potential to support reptile species such as grass snake.

Water Vole and Otter

4.4.18 The previous survey in 2016 had identified the potential presence of water vole and a lack of potential otter holt or resting place habitat, within the survey area. This was reaffirmed during the 2017 ground truth extended Phase 1 habitat survey.

4.4.19 The following waterbodies and watercourses identified in 2017 during the extended Phase 1 survey were considered potentially suitable for foraging and commuting otter and water vole, and were located in close proximity to the proposed scheme:

- Coombe Pool SSSI and Coombe Country Park drains (with links to Smite Brook) (TN16)
- Oak Farm Nurseries Drain (TN13)
- Field drain to the east of the rugby fields (TN14)
- Field drain south of Binley Wood (TN15)
- Herald Way Marsh (Claybrookes Marsh) SSSI and LNR waterbodies (TN17)
- Drain to the south of Herald Way Marsh (TN18)

Hedgehog

4.4.20 Several habitats including scrub, woodland and grassland suitable for foraging hedgehogs were identified within 50m of the proposed scheme site boundary.

Dormouse

4.4.21 The species-poor hedgerow and scrub on and within 50m of the proposed scheme site boundary were considered sub-optimal habitat for dormouse due to a lack of food source and flora variety, namely no varied fruit, nuts, or pollen. The woodland within Piles Coppice (TN1), Binley Common Farm Wood (TN3), and Coombe Pool SSSI and Country Park was also considered sub-optimal for dormouse given the sparse suitable understorey. However, the broadleaved woodland to the west of Piles Coppice (TN22) and the area of woodland by The Bogs (TN7) were considered optimal habitat to potentially support dormouse given the suitable understorey of varied fruit, nut and pollen bearing flora for dormouse to forage on.

Terrestrial Invertebrates

4.4.22 The road verges provide suitable habitat for a variety of invertebrates, such as butterfly and moth species. These suitable habitats are associated with the less managed areas of habitat, specifically hedgerow and scrub. Areas of greatest terrestrial invertebrate interest were associated with Herald Way Marsh SSSI, which comprised a mosaic of woodland and scrub habitats suitably designated for its invertebrate interest.

Aquatic Macroinvertebrates

4.4.23 The watercourses within the survey area were considered of potential aquatic invertebrate interest. Local field drains that have *high sensitivity* may potentially support aquatic invertebrate species particularly beetles.

White-clawed Crayfish

4.4.24 None of the watercourses (including field drains and ponds) within 50m of the proposed scheme were considered suitable to support white-clawed crayfish.

Flora Species

4.4.25 No notable or protected plant species were recorded. Additionally, no invasive plant species were found within a 50m buffer of the proposed scheme site boundary.

5 DISCUSSION AND RECOMMENDATIONS FOR FURTHER SURVEY

5.1 Overview

5.1.1 The purpose of this section is to discuss the potential ecological constraints associated with the proposed scheme. Where further baseline information is required to inform the environmental assessment, recommendations for further survey are made as appropriate. Mitigation and enhancement measures are briefly discussed as appropriate (particularly where further surveys are not recommended); however, these will be detailed within the environmental assessment report.

5.2 Statutory Designated Sites

5.2.1 No International or European sites will be directly or indirectly impacted by the proposed scheme. The nearest International or European site is Ensor's Pool SAC located approximately 7.46 miles (12km) to the north-west or the proposed scheme boundary (and is the only European site within 18.6 miles (30km) of the proposed scheme boundary).The SAC site is designated for white-clawed crayfish (*Austropotamobius pallipes)* and the Pool is isolated from any river systems. Given there are no potential impact pathways present between the designated site and the proposed scheme (i.e. no habitat or hydrological links); Ensor's Pool SAC will not be impacted.

5.2.2 No statutory designated sites are considered to be directly impacted by the proposed scheme, particularly through land take. There is potential for indirect impacts on Herald Way Marsh SSSI and Coombe Poole SSSI, through changes in air quality and changes in water quality, given their proximity to the proposed scheme (which is less than 100m) and hydrological links. There are outfalls discharging highways runoff to Herald Way Marsh and Coombe Pool SSSIs currently but changes to these from the proposed scheme could affect habitats within the SSSIs, which may in turn also have impacts upon associated notable flora and fauna, such as birds and invertebrates.

5.2.3 There are potential wider hydrological links present (through ground water and surface water) from the proposed scheme to Stoke Floods LNR, Ryton and Brandon Gravel Pits SSSI, and Brandon Marsh SSSI (located more than 500m from the site), which may also be indirectly affected and will be considered as part of the biodiversity chapter in the environmental assessment report.

5.2.4 In order to fully define the scope of survey and assessment work required on statutory designated sites, Natural England will be consulted as part of the scoping process.

5.3 Non-statutory Designated Sites

5.3.1 At the time of writing it is considered unlikely that any of the non-statutory designated sites will be directly impacted by the proposed scheme through land take. However, this will be assessed in the environmental assessment report, with particular attention to the following sites which are located adjacent to the proposed scheme boundary:

- Piles Coppice LWS and Ecosite and Ancient Woodland
- Binley Common Farm Wood pLWS and Ecosite and Ancient Woodland
- Willenhall Wood LWS and Ancient Woodland
- Claybrookes Marsh LWS and Herald Way Marsh Ecosite

- Hungerly Hall Farm Ecosite
- Grassland adjacent to Brandon Wood LWS and Area between Brandon Wood and Piles Coppice Ecosite

5.3.2 There is potential for indirect impacts on other non-statutory sites (as listed in Table 1), for example through changes in air quality and changes in water quality, given their proximity to the proposed scheme and this will be considered as part of the biodiversity chapter in the environmental assessment report.

5.4 Habitats

5.4.1 Much of the Phase 1 report is unchanged from the original survey carried out in 2016 and many of the habitats are urban in nature. Several new habitats were identified outside the original scope of the previous 2016 report, including swamp associated with Herald Way Marsh SSSI (considered above) and some areas of tall ruderal habitat. Most of the habitats are likely to be unaffected by the proposed scheme as the land take is confined to mostly land adjacent to the existing highway and arable land.

5.4.2 There are 4 notable habitats present on or within 50m of the proposed scheme site: broadleaved semi-natural woodland, species-poor hedgerow, swamp and a pond. The habitat *Buildings and hardstanding* can also be considered as notable in terms of enhancement opportunities, however its value will be assessed as part of the biodiversity chapter in the environmental assessment report.

5.5 Species

Roosting Bats

5.5.1 There are no trees or built structures within the proposed scheme site boundary with features to support roosting bats.

5.5.2 One tree adjacent to the A428 Rugby Road (TN24) was assessed as moderate potential to support roosting bats. An assessment of Binley Common Farm Wood, Piles Coppice LWS, and Coombe Pool SSSI and Country Park also confirmed that trees within these woods (within 50m of the proposed scheme) have moderate potential to support roosting bats. There will be no direct impact to the tree at TN24 or (at the time of writing) to the woodlands as a result of the proposed scheme. However there is potential for indirect impacts in terms of disturbance to bats and their roosts, for example, from lighting and noise during construction and operation. Therefore appropriate mitigation (including lighting design and stand-off distances) will be considered as part of the biodiversity chapter in the environmental assessment report.

5.5.3 One building at the garden centre was assessed in 2016 as having low potential to support roosting bats. One new area of buildings, as a result of site boundary changes, was recorded in 2017 along the A428 Rugby Road. It is considered that these buildings, plus the one at the garden centre, are a sufficient distance away (more than 25m), with appropriate buffers in place, and will not to be affected by the proposed scheme. The works are also primarily localised to the existing footprint and highways boundary in those areas.

Foraging and Commuting Bats

5.5.4 The potential habitat suitability for foraging and commuting bats within the proposed scheme area was assessed as a combination of moderate and low importance for bats in 2016. This assessment value was confirmed by the 2017 Phase 1 ground truth survey for both the previous areas covered in 2016 and for new areas resulting from site boundary changes. Bat activity surveys had previously been recommended following the 2016 survey, and transect and static monitoring surveys commenced in August 2017 (one per month August to October; with one back to back survey in one 24 hour period based on moderate habitat suitability). Further surveys are recommended in spring or early summer 2018. The biodiversity chapter in the environmental assessment report presents the commitments for additional survey work.

5.5.5 Assessment of potential indirect impacts to bats resulting from the proposed scheme shall include temporary impacts from the construction phase as well as post-construction impacts. These will be assessed based upon the results from the 2017 bat activity surveys.

Badgers

5.5.6 No signs of badger activity were found during the field survey; however there are desk study records that indicate badgers are around the area and so it is recommended that a further badger survey is conducted during the winter months (November) when the vegetation has died back making badger field signs more visible. The survey would focus on the areas of woodland which could not be accessed previously. A separate badger report is presented as part of the environmental assessment report.

Great Crested Newts

5.5.7 Nine ponds were identified within 500m of the proposed scheme:

- 3 were previously surveyed in 2016 for the presence or absence of GCN through eDNA sampling techniques (Ponds 1, 2 and 3) and were found to be negative
- 5 further ponds were identified in 2017 that had not been surveyed previously in 2016 (Ponds 5 to 9). Ponds 5 and 6 were dry at the time of the survey in 2017. Ponds 7, 8, and 9 were however assessed in 2017 to potentially have excellent suitable habitat to support GCN
- Pond 4 could not be accessed for survey in 2016 and in 2017; however anecdotal evidence indicated that the pond was dry

5.5.8 It is considered that GCN are a low risk to the proposed scheme given the nearest GCN desk study record is located over 0.87 miles (1.4km) from the site, the negative result from eDNA sampling of Ponds 1, 2, and 3 located within 500m of the proposed scheme, the ephemeral nature of two ponds (Ponds 5 and 6) and reported ephemeral nature of Pond 4, and the nature of the proposed works (earthworks and habitat loss is confined to arable fields, their margins, amenity grassland and roadside verges, which are intensively managed). However, to avoid any potential risk to the proposed scheme, given the strict protection of GCN as a European Protected Species (EPS), it is recommended that the presence or likely absence of GCN is confirmed for Ponds 7, 8, and 9 in 2018. eDNA surveys are recommended in the period of mid-April to the end of June inclusive. The biodiversity chapter in the

environmental assessment report presents the commitments for additional survey work.

5.5.9 A precautionary approach will be adopted when undertaking the environmental impact assessment, with consideration given to the potential suitability of ponds not previously surveyed to support GCN, particularly Ponds 7 and 8 that are immediately adjacent to the proposed scheme. Information pertaining to the presence of GCN in the local area and connectivity of the associated ponds will also be considered.

Barn Owl

5.5.10 The desk study data recorded several records of birds listed on Schedule 1 of the *Wildlife and Countryside Act*, including barn owl. Most of these are associated with Brandon Marsh (over 0.62 miles (1km) from the main area of works) and the proposed scheme is considered unlikely to affect them. It is also considered unlikely that barn owl would use the road verge for hunting, given the proximity of the existing road but if it does so, the proposed scheme does not increase any risk posed to barn owls. The recommended ornithological walkover survey (below) will include a check for any suitable hunting areas in the vicinity of the proposed scheme and any potential flight paths across the road to assist in the assessment.

Other Bird Species

5.5.11 Due to the proximity of Coombe Pool SSSI and Coombe Abbey Pool LWS to the proposed scheme, it is recommended that an ornithological walkover is conducted up to 250m from the proposed scheme boundary targeted on Coombe Pool SSSI and Coombe Abbey Pool LWS and its immediate adjoining habitat. A separate ornithology report is presented as part of the environmental assessment report.

Reptiles

5.5.12 Proposed earthworks and habitat loss is confined to arable fields, their margins, amenity grassland and roadside verges which are intensively managed, offering little habitat for basking, foraging or sheltering reptiles. Recent reptile records have been returned from the 2017 desk study, primarily in association with Coombe Pool Country Park and SSSI and Brandon Marsh SSSI, which are located outside the site boundary at the extreme north and south of the proposed scheme respectively. Based on the level of protection that the commoner reptile species receive and the scale and nature of the proposed scheme, it is considered that there is a low risk of significant impacts from the proposed scheme and no further surveys are recommended. However, the risk of encountering transient reptiles (albeit low) needs to be considered at the next stage of assessment, with precautionary mitigation and avoidance measures adopted where appropriate.

Otter and Water Vole

5.5.13 The phase 1 survey identified watercourses with potential for riparian mammals (water vole and foraging or commuting otter). Some of the watercourses could be considered to be of high sensitivity to potential impacts from the proposed scheme. It is recommended that all watercourses within 50m of the proposed scheme boundary that could be directly affected and all watercourses within 200m that have hydrological links to the proposed scheme are surveyed for riparian mammals, to inform what, if any, mitigation needs to be considered as part of the next stage of assessment. A separate water vole and otter report accompanies the environmental assessment report.

Terrestrial Invertebrates

5.5.14 The road verges provide habitat for a variety of invertebrates, however the areas of greatest interest are in association with Herald Way Marsh SSSI which will remain unaffected by the proposed scheme. Therefore, no further surveys are recommended.

Aquatic Macroinvertebrates

5.5.15 Several of the watercourses on site were deemed suitable for aquatic invertebrates; the desk study identified the ditches draining Herald Way Marsh SSSI as having historical records for notable aquatic invertebrates and so has at least in the past supported these features. There are also other drains close to the proposed scheme boundary that would be considered to have high sensitivity to any impacts the proposed scheme may have. All drains within 200m of the proposed scheme boundary are recommended for survey for aquatic invertebrates, given the known outfalls from the A46 into drainage channels and potential for indirect effects from any hydrological changes, particularly surface water flow. A separate aquatic macroinvertebrate report accompanies the environmental assessment report.

White-clawed Crayfish

5.5.16 None of the stretches of watercourses within 50m of the proposed scheme boundary were deemed suitable for white-clawed crayfish. Smith Brook, headwater and tributaries, tributary of the River Sowe, Ecosite (a linear site which runs through Coombe Pool SSSI) has historical records of white-clawed crayfish. However, no recent records were provided. The 2016 survey noted that there was negligible chance this species could be present in the River Sowe and Smite Brook due to the type of substrate present and the known distribution of white-clawed crayfish in the LBAP. White-clawed crayfish are therefore not considered an ecological constraint to the proposed scheme.

Hedgehog

5.5.17 Habitat suitable for foraging hedgehogs, such as scrub, grassland and woodland, is present within the survey area. However, the habitat on highway verges and embankments, which are to be directly impacted by the scheme, is less likely to be used by these animals, due to the poor quality of foraging habitat available. Therefore, no further surveys are recommended.

Dormouse

5.5.18 Brandon Wood LWS, located approximately 380m to the east of the proposed scheme boundary (nearest point being the southern construction compound candidate site) has historical records of dormouse (over 10 years old). People's Trust for Endangered Species and the Warwickshire Dormouse Conservation Group confirmed there are no recent records and none within 1.24 miles (2km) of Brandon Wood LWS. Dormouse is found largely within the south of the UK and throughout Devon. Dormouse does not normally travel far from its nest and generally require good connectivity of the tree or shrub layer to enable dispersal.

5.5.19 The most suitable areas of habitat are at TN7 and TN22. TN7 will not be directly impacted by the proposed scheme. TN22 may have some, although limited, tree loss in association with construction of the main general arrangement (see Figure 1 and Figure 5, Annex A). However, it is considered that the risk of dormouse presence in one or both of these two small isolated areas is extremely low. Both these areas (TN7 and TN22) are located over 500m from Brandon Wood LWS and isolated from the LWS by fragmented poor quality (sub-optimal) habitat. Dormouse is unlikely to inhabit small isolated woodlands separated by a distance more than 500m (Büchner, 2008). Therefore, it is considered that dormouse is not a risk to the proposed scheme.

Land Not Accessed

5.5.20 The land to the south of the railway that could not be accessed for survey is proposed for new road signage within the existing highways boundary. It is assumed that works in association with the new road signs would be localised within the highway boundary; it may require some (although limited) vegetation clearance, and the construction works will be short term. It is advised that a preconstruction ecological survey is conducted by the Ecological Clerk of Works to ensure any potential ecological constraints are identified, once further details are known.

5.6 Summary of Recommendations for Further Survey

5.6.1 Recommendations for further surveys, to be undertaken at an appropriate stage of the proposed scheme progression, are detailed in Table 7.

5.6.2 Note: at the time of writing this Phase 1 report some of the recommended further surveys have now been completed. This is stated where applicable. Other recommendations may also have been completed as part of the environmental assessment report following production of this Phase 1 report.

5.6.3 Recommendations for mitigation and enhancement of the proposed scheme will be detailed and reported in the environmental assessment report.

Table 6: Summary of Ecology Survey Recommendations

Survey Recommendation	Scope	Proposed Timing	Rationale
Bat activity surveys	Focused on habitats that may be temporarily lost or disturbed by the scheme up to 50m from the proposed scheme boundary. Based on moderate habitat quality, monthly transect visits from April to October, with 5 consecutive nights of static detector surveys per month with at least two static detectors deployed per transect. One of the surveys should also be a dusk and dawn survey (within one 24 hour period). The scope to undertake monthly surveys will be reviewed following completion of the August to October surveys.	August to October 2017 (completed) April to July 2018 (to be confirmed)	There may be potential impacts on foraging and commuting bats during construction and or operation of the proposed scheme which needs to be accurately assessed.
Further badger survey	Up to 50m from the proposed scheme boundary plus records of setts up to 500m (where applicable)	November 2017 (completed)	No signs of badger were found during the Phase 1 ground truth survey undertaken in August 2017. However, there were some areas of dense vegetation that could not be covered or surveyed effectively due to the time of year. Additionally, desk study records have confirmed the location of badger setts nearby the proposed scheme.
Riparian mammal survey	Focused on watercourses within 50m of the proposed scheme boundary and watercourses within 200m of the proposed scheme boundary that have hydrological links to the proposed scheme	September 2017 (completed)	Several watercourses with riparian mammal potential were identified within 50m of the proposed scheme boundary and others that were outside the buffer but due to hydrological links to the proposed scheme area have the potential to be indirectly impacted by the proposed scheme.
Ornithological walkover	Up to 250m from the proposed scheme boundary, targeted on Coombe Pool SSSI and immediate adjoining habitat	September 2017 (completed)	Suitable habitat for birds including hedgerows, woodland, scrub, and arable fields was identified within 50m of the proposed scheme boundary this and the proximity of Coombe Country Park a SSSI

Survey Recommendation	Scope	Proposed Timing	Rationale
			designated due to its ornithological interest means the impact on the bird species present should be assessed
Great crested newt eDNA	eDNA analysis of ponds 7, 8 & 9	March-June 2018	Three further ponds with suitable GCN potential have been identified within 250m of the proposed scheme boundary. It is recommended that these are assessed to determine whether GCN population(s) are present and to help determine the impact of the proposed scheme on these populations, if present.
Aquatic invertebrate assessment	Focused on watercourses up to 200m of the proposed scheme boundary which may be affected by changes in water quality.	Autumn 2017 (completed) Spring 2018 (to be confirmed)	The drains in Herald Way Marsh SSSI have historical records for aquatic invertebrates. Other drains are also considered to be highly sensitive to potential impacts of the proposed scheme.
Preconstruction survey of proposed road sign locations	Ecological walkover	Prior to construction	To reaffirm any potential ecological constraints once further details of proposed works are known.

6 REFERENCES

AECOM (2017). A46 Coventry Junction HSI Technical note

AECOM (2017). A46 Coventry Junction Scoping report

Andrews (2013). Bat Tree Habitat Key. Available online at: http://battreehabitatkey.co.uk/ Accessed 12.12.17

Büchner, S. (2008), Dispersal of common dormice *Muscardinus avellanarius* in a habitat mosaic, Acta Theriologica 53, 2008. Available online at: http://ptes.org/wp-content/uploads/2014/06/Buchner-2008-Dispersal-of-dormice-in-habitat-mosaic.pdf - accessed 20.12.17

Collins J (ed) (2016). Bat surveys for professional ecologists: good practice guidance 3rd Ed. Bat Conservation Trust, London

Coventry City Council (2016). Coventry Local Plan 2011-2031. Publication Draft.

JNCC (2010). Handbook for Phase 1 habitat survey A technique for environmental audit

Harris S, Creswell P and Jefferies D (1989). Surveying Badgers. Mammal Society.

Highways Agency (2009). Design Manual for Roads and Bridges, Volume 11, Section 4, Part 1, HD44/09, Assessment of Implications (of Highways and/or Roads Projects)

Highways England (2015). Our plan to protect and increase biodiversity. June 2015.

Highways Agency (2012). Biodiversity Action Plan. Available online: http://webarchive.nationalarchives.gov.uk/20101110134540tf_/http://www.highways.gov.uk/aboutus/723.aspx - Accessed 11.12.17

Mouchel (2016a) A46 Coventry Junctions Assessment of Implications on European Sites (AIES) Report (Mouchel, 2016a)

Mouchel (2016b) A46 Coventry Junctions Extended Phase 1 Habitat Survey Report

Mouchel (2016c) A46 Coventry Junctions Great Crested Newt Habitat Suitability Report

Mouchel (2016d) Mouchel A46 Coventry Junctions Report Title Preliminary Roost and Habitat Assessment Report

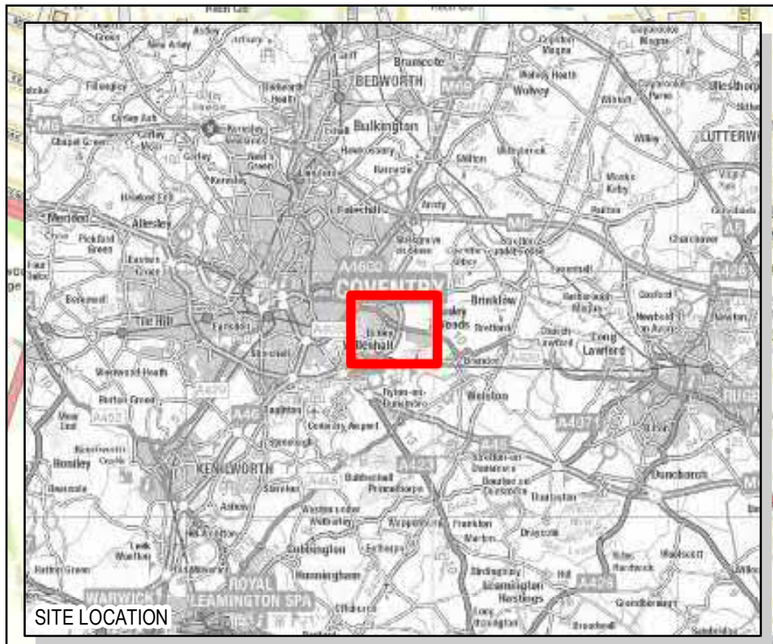
Oldham R.S., Keeble J., Swan M.J.S. & Jeffcote M. (2000). Evaluating the suitability of habitat for the Great Crested Newt (*Triturus cristatus*). Herpetological Journal 10 (4), 143-155

Rugby Borough Council (2016). Rugby Borough Council Local Plan 2011-2031. Publication Draft. September 2016.

The Wildlife Trusts (2017) Tormentil Potentilla erecta. Available online: http://www.wildlifetrusts.org/species/tormentil accessed 09.01.18

Warwickshire Wildlife Trust. Local Biodiversity Action Partnership. The Species and Habitat Action Plans 2012 to 2017. Available online: http://www.warwickshirewildlifetrust.org.uk/LBAP%20Action%20Plans accessed 06.12.17

Annex A: Figures



Proposed Road Signage

Main General Arrangement Area

Proposed Road Signage

Proposed Road Signage

0.25 0 0.25 0.5 0.75 1 Kilometres

Plot Date: 20 December 2017 13:02:26
File Name: E:\GIS Management\A46_Ecology_Works\GIS\GIS_Working\02_Maps\Ecology\Ecology Figures\FIGURE 1.mxd

SAFETY, HEALTH AND ENVIRONMENTAL INFORMATION BOX

IT IS ASSUMED THAT ALL WORKS ON THIS DRAWING WILL BE CARRIED OUT BY A COMPETENT CONTRACTOR WORKING, WHERE APPROPRIATE, TO AN APPROPRIATE METHOD STATEMENT.

THIS DRAWING IS TO BE USED ONLY FOR THE PURPOSE OF ISSUE THAT IT WAS ISSUED FOR AND IS SUBJECT TO AMENDMENT.

EXCEPTIONAL RISKS RELATING TO THE WORKS ASSOCIATED WITH THIS DRAWING ARE IDENTIFIED BELOW.

CONSTRUCTION

MAINTENANCE / OPERATION / DECOMMISSIONING / DEMOLITION

KEY:

Site Boundary (Highways Boundary)

NOTES

1. THIS DRAWING IS TO BE READ IN CONJUNCTION WITH ALL OTHER RELEVANT DOCUMENTATION.
2. DO NOT SCALE FROM THIS DRAWING, USE ONLY PRINTED DIMENSIONS.
3. ALL DIMENSIONS IN MILLIMETRES, ALL CHAINAGES, LEVELS AND COORDINATES ARE IN METRES UNLESS DEFINED OTHERWISE.
4. THIS DRAWING IS TO BE READ IN CONJUNCTION WITH THE PROJECT HEALTH & SAFETY FILE FOR ANY IDENTIFIED POTENTIAL RISKS.
5. CONTAINS OS DATA © CROWN COPYRIGHT AND DATABASE RIGHT 2017

First Issue	DM / OP	07/09/17	P01
Revision Details	By / Check	Date	Suffix

Purpose of issue: EXTENDED PHASE 1 HABITAT SURVEY REPORT

Client
Highways England
Major Projects
The Cube
199 Wharfside Street
Birmingham
B1 1RN

Working on behalf of highways england

Project Title

A46 COVENTRY JUNCTION UPGRADE

Drawing Title

FIGURE 1
SITE LOCATION PLAN

Designed	Drawn	Checked	Approved	Date
NT	GB	AR	NT	20/12/2017

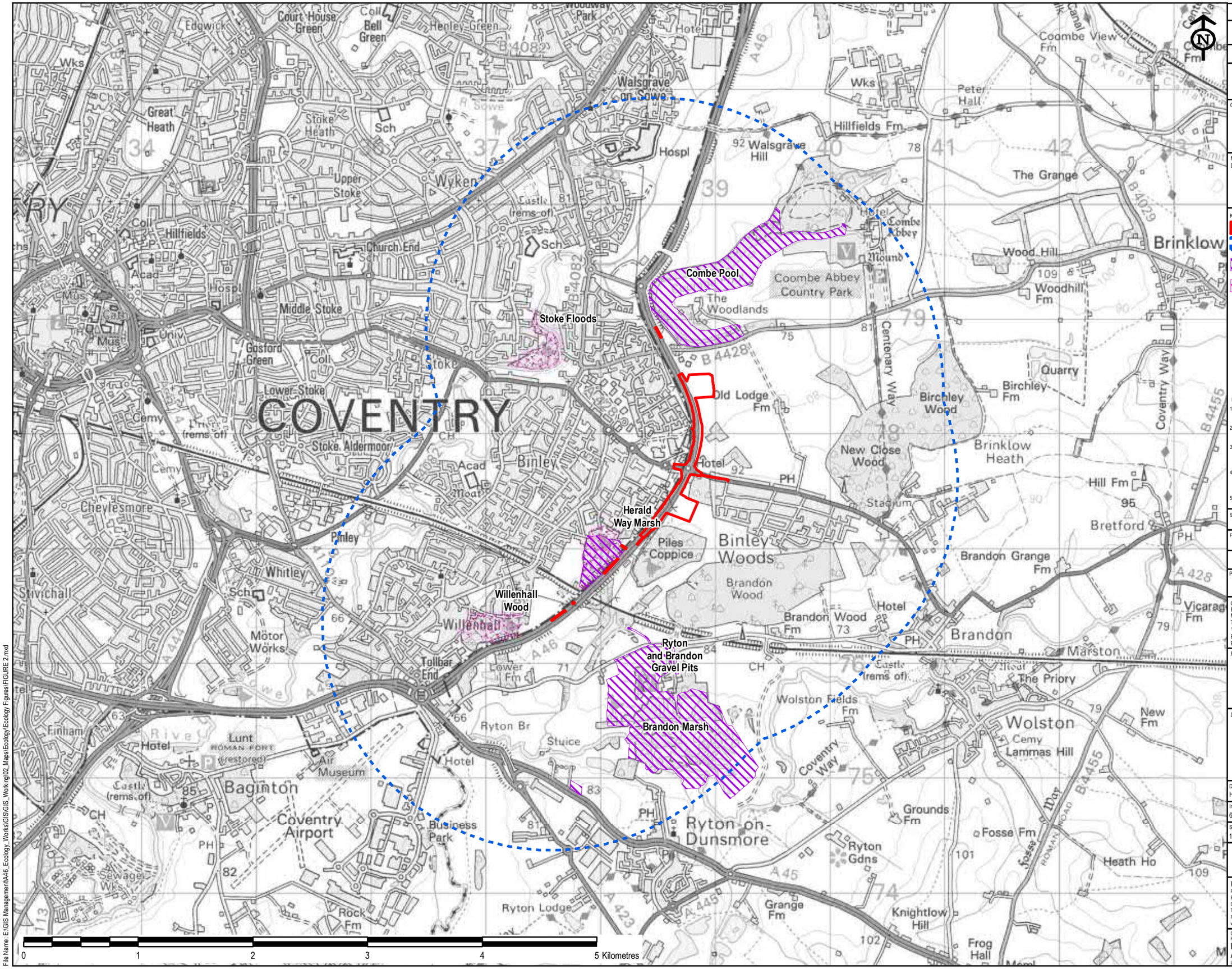
Internal Project No.	Suitability
60547444	S0
Scale @ A3	Zone
1:10,000	BINLEY JUNCTION

THIS DOCUMENT HAS BEEN PREPARED PURSUANT TO AND SUBJECT TO THE TERMS OF AECOM'S APPOINTMENT BY ITS CLIENT. AECOM ACCEPTS NO LIABILITY FOR ANY USE OF THIS DOCUMENT OTHER THAN BY ITS ORIGINAL CLIENT OR FOLLOWING AECOM'S EXPRESS AGREEMENT TO SUCH USE, AND ONLY FOR THE PURPOSES FOR WHICH IT WAS PREPARED AND PROVIDED.

Project Office
Royal Court
Basil Close, Chesterfield
Derbyshire. S41 7SL
Tel: (01246) 209221
Fax: (01246) 209229
www.aecom.com

AECOM Infrastructure & Environment UK Limited
Registered in England Registered number: 880328
Registered office: Scott House, Alencon Link, Basingstoke, Hampshire RG21 7PP

Drawing Number	Originator	Volume			Rev
Highways England PIN					
HE551486	-ACM	-EGN	-		P01
A46_SW_ZZ		-DR	-EG	-00006	
Location		Type	Role	Number	



SAFETY, HEALTH AND ENVIRONMENTAL INFORMATION BOX

IT IS ASSUMED THAT ALL WORKS ON THIS DRAWING WILL BE CARRIED OUT BY A COMPETENT CONTRACTOR WORKING, WHERE APPROPRIATE, TO AN APPROPRIATE METHOD STATEMENT.

THIS DRAWING IS TO BE USED ONLY FOR THE PURPOSE OF ISSUE THAT IT WAS ISSUED FOR AND IS SUBJECT TO AMENDMENT.

EXCEPTIONAL RISKS RELATING TO THE WORKS ASSOCIATED WITH THIS DRAWING ARE IDENTIFIED BELOW.

CONSTRUCTION

MAINTENANCE / OPERATION / DECOMMISSIONING / DEMOLITION

KEY:

- Site Boundary (Highways Boundary)
- Site Boundary + 2km Buffer
- Site of Special Scientific Interest (SSSI)
- Local Nature Reserve (LNR)

NOTES

1. THIS DRAWING IS TO BE READ IN CONJUNCTION WITH ALL OTHER RELEVANT DOCUMENTATION.
2. DO NOT SCALE FROM THIS DRAWING, USE ONLY PRINTED DIMENSIONS.
3. ALL DIMENSIONS IN MILLIMETRES, ALL CHAINAGES, LEVELS AND COORDINATES ARE IN METRES UNLESS DEFINED OTHERWISE.
4. THIS DRAWING IS TO BE READ IN CONJUNCTION WITH THE PROJECT HEALTH & SAFETY FILE FOR ANY IDENTIFIED POTENTIAL RISKS.
5. CONTAINS OS DATA © CROWN COPYRIGHT AND DATABASE RIGHT 2017

Revision Details	By	Check	Date	Suffix
Site Boundary Revised	GB	CG	19/10/17	P02
First Issue	DM	OP	07/09/17	P01

Purpose of issue: EXTENDED PHASE 1 HABITAT SURVEY REPORT

Client
Highways England
Major Projects
The Cube
199 Wharfeside Street
Birmingham
B1 1RN

Working on behalf of highways england

Project Title

A46 COVENTRY JUNCTION UPGRADE

Drawing Title

FIGURE 2
STATUTORY SITES WITHIN 2KM OF THE PROPOSED SCHEME

Designed	Drawn	Checked	Approved	Date
HP	GB	AR	NT	29/11/2017

Internal Project No.	Suitability
60547444	S0
Scale @ A3	Zone
1:30,000	BINLEY JUNCTION

THIS DOCUMENT HAS BEEN PREPARED PURSUANT TO AND SUBJECT TO THE TERMS OF AECOM'S APPOINTMENT BY ITS CLIENT. AECOM ACCEPTS NO LIABILITY FOR ANY USE OF THIS DOCUMENT OTHER THAN BY ITS ORIGINAL CLIENT OR FOLLOWING AECOM'S EXPRESS AGREEMENT TO SUCH USE, AND ONLY FOR THE PURPOSES FOR WHICH IT WAS PREPARED AND PROVIDED.

Project Office
Royal Court
Basil Close, Chesterfield
Derbyshire. S41 7SL
Tel: (01246) 209221
Fax: (01246) 209229
www.aecom.com

AECOM Infrastructure & Environment UK Limited
Registered in England Registered number: 888328
Registered office: Scott House, Alencon Link, Basingstoke, Hampshire RG21 7PP

Drawing Number	Originator	Volume	Rev
Highways England PIN: HE551486 A46_SW_ZZ	-ACM	-EGN - -DR -LE -00004	P02
Location		Type Role Number	

Plot Date: 29 November 2017 09:21:33
File Name: E:\GIS Management\A46_Ecology_Works\GIS\GIS_Working\02_Maps\Ecology\Ecology Figures\FIGURE 2.mxd

LWS Ref	LWS Site Name	LWS Status	Number
47/37	Binley Little Wood	LWS	1
39/37	Claybrookes Marsh	LWS	2
8/37	Stoke Floods	LWS	3
10/37	Brandon Marsh Sheep Field	LWS	4
17/37	Piles Coppice	LWS	5
01/37	Brandon Wood	LWS	6
92/37	Grassland adjacent to Brandon Wood	LWS	7
45/38Z	Sowe Valley Dorchester Way	LWS	8
15.1/47	New Close and Birchley Wood	LWS	9
226/37	Gainford Rise	LWS	10
02/48	Coombe Abbey	LWS	11
13/37s	River Avon and Tributaries	LWS	12
46/37	Willenhall Wood	LWS	13
42/37	Binley Common Farm Wood	potential site	14
86/37	The Pools, Black Spinney and Long Spinney	potential site	15
91/47Y	Railway Verge	potential site	16
07/37	Coombe Countryside Park West Deer Park	potential site	17
86/37	Grassland	rejected	18
07/37	Coombe Abbey	rejected	19
226/37	Gainford Rise	rejected	20
92/37	Grassland West of Piles Coppice	deferred	21
226/37	Sharman's Tip	destroyed	22

Ecosite	Ecosite Name	Number
92/37	Area between Brandon Wood, Piles Coppice	1
55/37	Big Rough	2
42/37	Binley Common Farm Wood	3
47/37	Binley Little Wood	4
86/37	Black SPinney and Long Spinney	5
16/37	Brandon Lane Verge	6
10/37	Brandon Marsh	7
01/37	Brandon Wood	8
103/37	Brinklow Slag Heap	9
07/37 & 23_47	Coombe Abbey Pool (part SSSI)	10
07/37	Coombe Abbey Pool (Part SSSI)	11
216/37	East of Willenhall Junior School	12
223/37	Field by Caludon Castle School	13
39/37	Herald Way Marsh (part SSSI)	14
226/37	Hungerly Hall Farm	15
91/47Y	London to birmingham Mainline Railway	16
15.1/47	New Close Wood	17
72/47	Old Pools Wood	18
17/37	Piles Coppice	19
40/37U	River Sowe	20
40/37Z	River Sowe	21
45/38Z	River Sowe	22
8/37	River Sowe, Stoke Floods	23
28/37	Ryton and Brandon Gravel Pits	24
95/37	Smite Brook, headwaters and tributaries. Tributary of the River Sowe.	25
221/37	St Bartholomew's Churchyard	26
66/37	The Pools	27
46/37	Willenhall Wood and Meadow	28

Site Boundary (Highways Boundary)
Site Boundary + 0.5km Buffer
Site Boundary + 1km Buffer
Ecosite
Local Wildlife Site (LWS)
Potential LWS
Deferred LWS
Destroyed LWS
Rejected LWS

NOTES

1. THIS DRAWING IS TO BE READ IN CONJUNCTION WITH ALL OTHER RELEVANT DOCUMENTATION.
2. DO NOT SCALE FROM THIS DRAWING, USE ONLY PRINTED DIMENSIONS.
3. ALL DIMENSIONS IN MILLIMETRES, ALL CHAINAGES, LEVELS AND COORDINATES ARE IN METRES UNLESS DEFINED OTHERWISE.
4. THIS DRAWING IS TO BE READ IN CONJUNCTION WITH THE PROJECT HEALTH & SAFETY FILE FOR ANY IDENTIFIED POTENTIAL RISKS.
5. CONTAINS OS DATA © CROWN COPYRIGHT AND DATABASE RIGHT 2017

SAFETY, HEALTH AND ENVIRONMENTAL INFORMATION BOX

IT IS ASSUMED THAT ALL WORKS ON THIS DRAWING WILL BE CARRIED OUT BY A COMPETENT CONTRACTOR WORKING, WHERE APPROPRIATE, TO AN APPROPRIATE METHOD STATEMENT.

THIS DRAWING IS TO BE USED ONLY FOR THE PURPOSE OF ISSUE THAT IT WAS ISSUED FOR AND IS SUBJECT TO AMENDMENT.

EXCEPTIONAL RISKS RELATING TO THE WORKS ASSOCIATED WITH THIS DRAWING ARE IDENTIFIED BELOW.

CONSTRUCTION

MAINTENANCE / OPERATION / DECOMMISSIONING / DEMOLITION

First Issue	DM / OP	07/09/17	P01
Revision Details	By / Check	Date	Suffix

Purpose of issue: EXTENDED PHASE 1 HABITAT SURVEY REPORT

Client
Highways England
Major Projects
The Cube
199 Wharfside Street
Birmingham
B1 1RN

Working on behalf of highways england

Project Title

A46 COVENTRY JUNCTION UPGRADE

Drawing Title

FIGURE 3
NON-STATUTORY DESIGNATED SITES

Designed	Drawn	Checked	Approved	Date
DM	DM	OP	OP	11/12/2017

Internal Project No.	Suitability
60547444	S0
Scale @ A3: 1:20,000	Zone: BINLEY JUNCTION

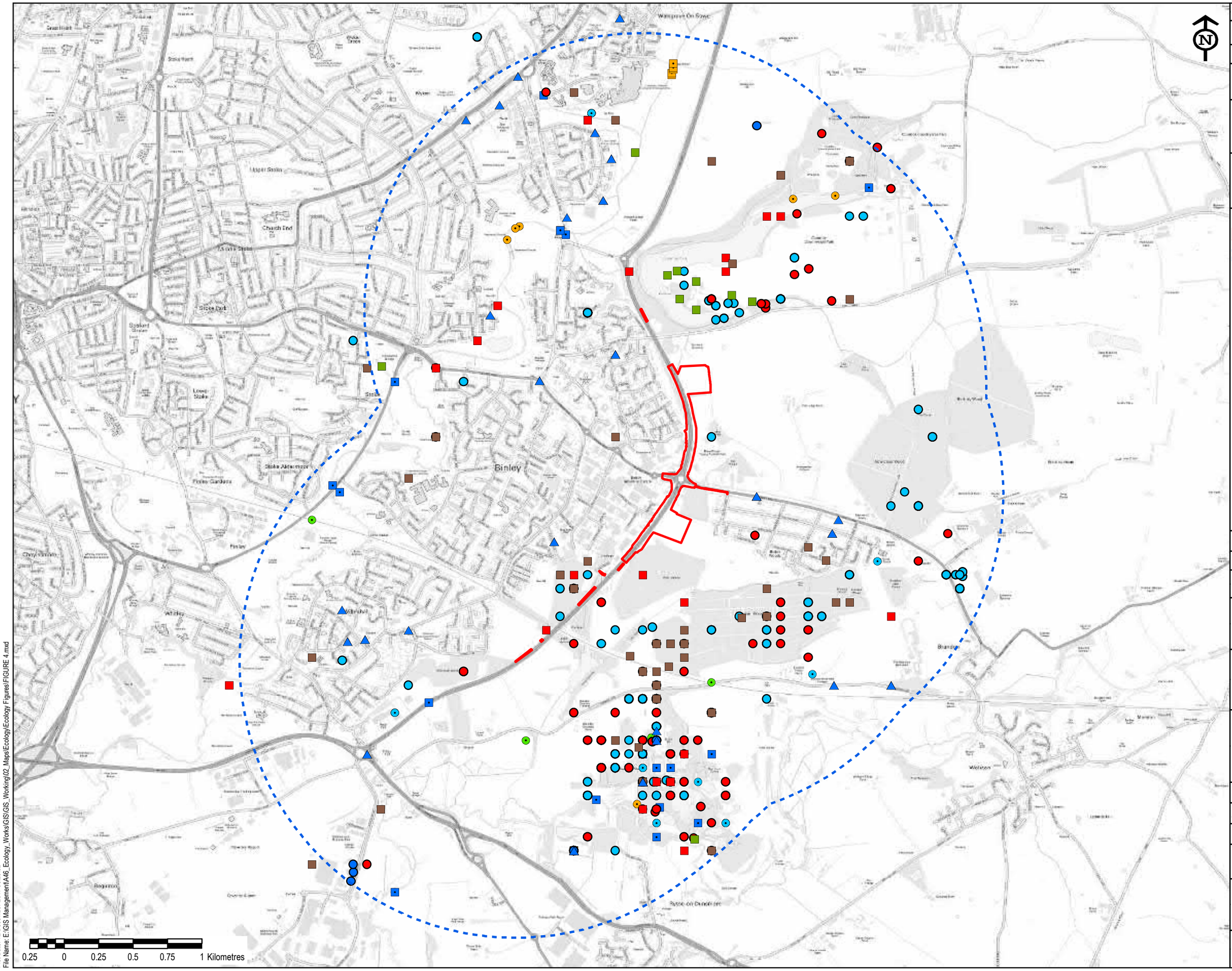
THIS DOCUMENT HAS BEEN PREPARED PURSUANT TO AND SUBJECT TO THE TERMS OF AECOMS APPOINTMENT BY ITS CLIENT. AECOM ACCEPTS NO LIABILITY FOR ANY USE OF THIS DOCUMENT OTHER THAN BY ITS ORIGINAL CLIENT OR FOLLOWING AECOM'S EXPRESS AGREEMENT TO SUCH USE, AND ONLY FOR THE PURPOSES FOR WHICH IT WAS PREPARED AND PROVIDED.

Project Office
Royal Court
Basil Close, Chesterfield
Derbyshire. S41 7SL
Tel: (01246) 209221
Fax: (01246) 209229
www.aecom.com

AECOM Infrastructure & Environment UK Limited
Registered in England Registered number: 880328
Registered office: Scott House, Alencon Link, Basingstoke, Hampshire RG21 7PP

Drawing Number: Highways England PIN	Originator	Volume	Rev
HE551486 A46_SW_ZZ (Location)	-ACM	-EGN -DR -EG -00001 (Type / Role / Number)	P01

Plot Date: 11 December 2017 10:10:03
File Name: E:\GIS Management\A46_Ecology_Works\GIS\GIS_Working\02_Maps\Ecology\Ecology Figures\FIGURE 3.mxd



Plot Date: 12 December 2017 08:26:02
File Name: E:\GIS Management\A46_Ecology_Works\GIS\GIS_Working\02_Maps\Ecology\Ecology Figures\FIGURE 4.mxd

SAFETY, HEALTH AND ENVIRONMENTAL INFORMATION BOX

IT IS ASSUMED THAT ALL WORKS ON THIS DRAWING WILL BE CARRIED OUT BY A COMPETENT CONTRACTOR WORKING, WHERE APPROPRIATE, TO AN APPROPRIATE METHOD STATEMENT.

THIS DRAWING IS TO BE USED ONLY FOR THE PURPOSE OF ISSUE THAT IT WAS ISSUED FOR AND IS SUBJECT TO AMENDMENT.

EXCEPTIONAL RISKS RELATING TO THE WORKS ASSOCIATED WITH THIS DRAWING ARE IDENTIFIED BELOW.

CONSTRUCTION

MAINTENANCE / OPERATION / DECOMMISSIONING / DEMOLITION

KEY:

- Site Boundary (Highways Boundary)
- Site Boundary + 2km Buffer

Protected and notable species records from Warwickshire Ecological Records Centre

- Notable Mammals
- Veteran trees
- Rare plants
- Invasive species
- Invertebrates
- Amphibian
- Reptiles
- Otter
- Water vole
- Black poplar
- Birds
- Barn owl

CONFIDENTIAL

First Issue	DM / OP	07/09/17	P01
Revision Details	By / Check	Date	Suffix

Purpose of issue: EXTENDED PHASE 1 HABITAT SURVEY REPORT

Client
Highways England
Major Projects
The Cube
199 Wharfside Street
Birmingham
B1 1RN

Working on behalf of highways england

Project Title

A46 COVENTRY JUNCTION UPGRADE

Drawing Title

FIGURE 4
RECENT PROTECTED AND NOTABLE SPECIES RECORDS WITHIN 2KM OF THE SCHEME (I.E. ≤10 YEARS)

Designed	Drawn	Checked	Approved	Date
HP	GB	AR	NT	12/12/2017

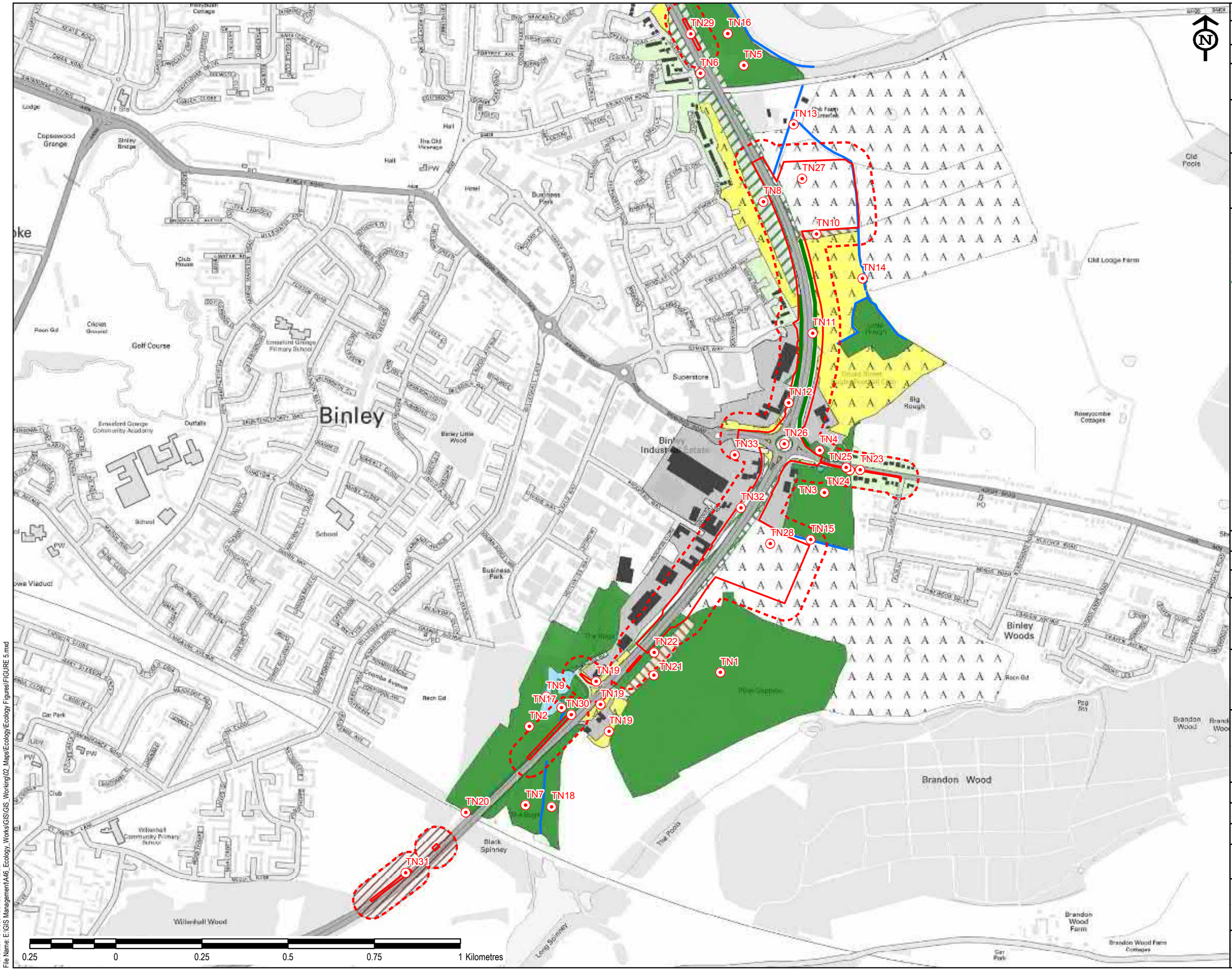
Internal Project No. 60547444	Suitability S0
Scale @ A3 1:25,000	Zone BINLEY JUNCTION

THIS DOCUMENT HAS BEEN PREPARED PURSUANT TO AND SUBJECT TO THE TERMS OF AECOM'S APPOINTMENT BY ITS CLIENT. AECOM ACCEPTS NO LIABILITY FOR ANY USE OF THIS DOCUMENT OTHER THAN BY ITS ORIGINAL CLIENT OR FOLLOWING AECOM'S EXPRESS AGREEMENT TO SUCH USE, AND ONLY FOR THE PURPOSES FOR WHICH IT WAS PREPARED AND PROVIDED.

Project Office
Royal Court
Basil Close, Chesterfield
Derbyshire, S41 7SL
Tel: (01246) 209221
Fax: (01246) 209229
www.aecom.com

AECOM
AECOM Infrastructure & Environment UK Limited
Registered in England Registered number: 880328
Registered office: Scott House, Alencon Link, Basingstoke, Hampshire RG21 7PP

Drawing Number	Originator	Volume	Rev
Highways England PIN HE551486 A46_SW_ZZ Location	-ACM	-EGN - -DR -EG -00001 Type Role Number	P01



SAFETY, HEALTH AND ENVIRONMENTAL INFORMATION BOX

IT IS ASSUMED THAT ALL WORKS ON THIS DRAWING WILL BE CARRIED OUT BY A COMPETENT CONTRACTOR WORKING, WHERE APPROPRIATE, TO AN APPROPRIATE METHOD STATEMENT.

THIS DRAWING IS TO BE USED ONLY FOR THE PURPOSE OF ISSUE THAT IT WAS ISSUED FOR AND IS SUBJECT TO AMENDMENT.

EXCEPTIONAL RISKS RELATING TO THE WORKS ASSOCIATED WITH THIS DRAWING ARE IDENTIFIED BELOW.

CONSTRUCTION

MAINTENANCE / OPERATION / DECOMMISSIONING / DEMOLITION

KEY:

- Site Boundary (Highways Boundary)
- Site Boundary + 50m Buffer
- G2 - Running water
- J2.1.2 - Intact hedge - species-poor
- A1.1.1 - Broadleaved woodland - semi-natural
- A1.1.2 - Broadleaved woodland - plantation
- A2.1 - Scrub - dense/continuous
- C3.1 - Other tall herb and fern - ruderal
- F1 - Swamp
- G1 - Standing water
- J1.1 - Cultivated/disturbed land - arable
- J1.2 - Cultivated/disturbed land - amenity grassland
- J3.6 - Buildings
- J5 - Other Habitat - Hard Standing
- J5 - Other habitat - Private Gardens
- Not accessed land
- Target Note

First Issue	DM / OP	07/09/17	P01	
Revision Details	By / Check	Date	Suffix	

Purpose of issue: EXTENDED PHASE 1 HABITAT SURVEY REPORT

Client
Highways England
Major Projects
The Cube
199 Wharfeside Street
Birmingham
B1 1RN

Working on behalf of highways england

Project Title

A46 COVENTRY JUNCTION UPGRADE

Drawing Title

FIGURE 5
PHASE 1 HABITAT SURVEY

Designed	Drawn	Checked	Approved	Date
HP	GB	AR	NT	13/12/2017

Internal Project No. 60547444	Suitability S0
Scale @ A3 1:10,000	Zone BINLEY JUNCTION

THIS DOCUMENT HAS BEEN PREPARED PURSUANT TO AND SUBJECT TO THE TERMS OF AECOM'S APPOINTMENT BY ITS CLIENT. AECOM ACCEPTS NO LIABILITY FOR ANY USE OF THIS DOCUMENT OTHER THAN BY ITS ORIGINAL CLIENT OR FOLLOWING AECOM'S EXPRESS AGREEMENT TO SUCH USE, AND ONLY FOR THE PURPOSES FOR WHICH IT WAS PREPARED AND PROVIDED.

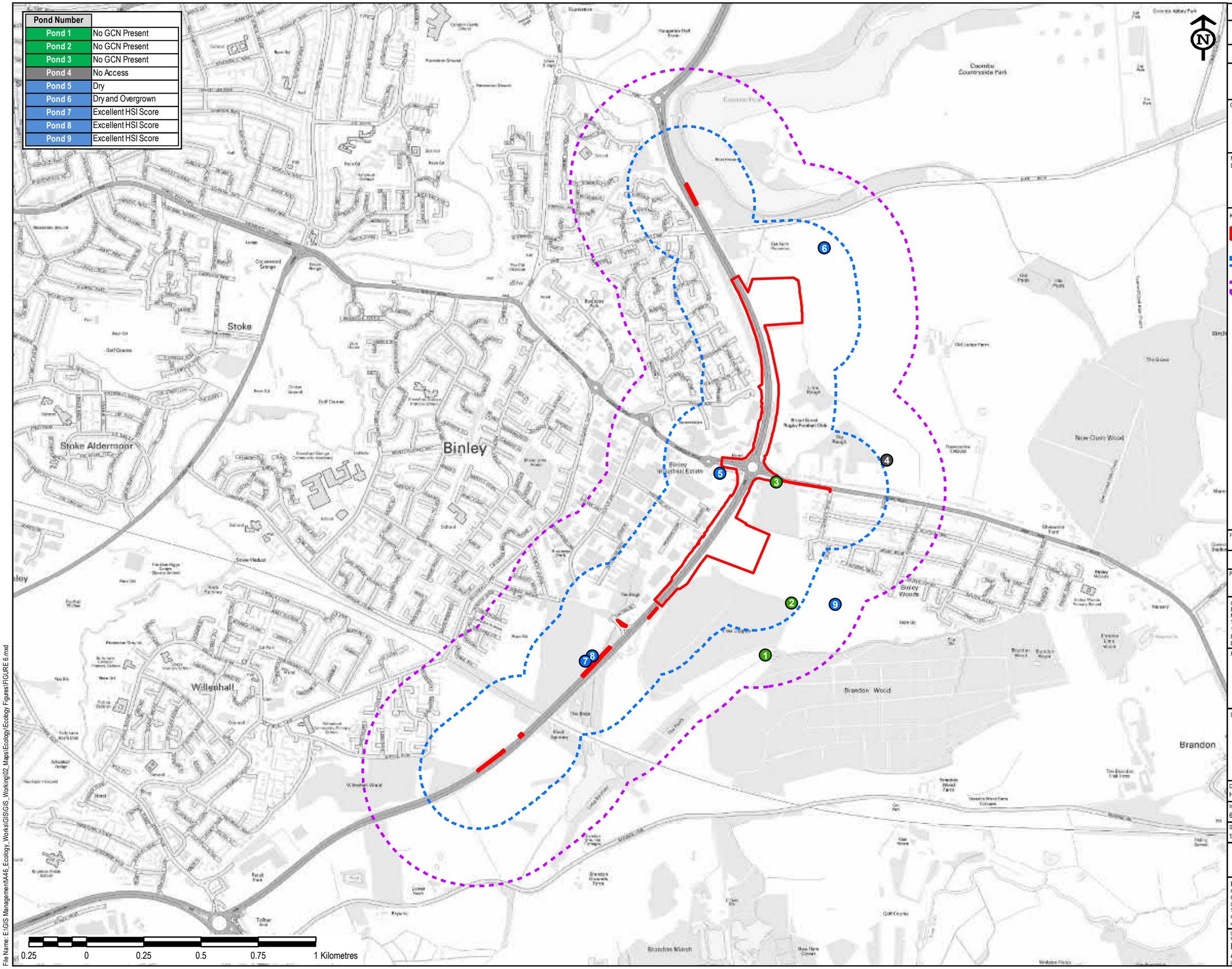
Project Office
Royal Court
Basil Close, Chesterfield
Derbyshire. S41 7SL
Tel: (01246) 209221
Fax: (01246) 209229
www.aecom.com

AECOM
AECOM Infrastructure & Environment UK Limited
Registered in England Registered number: 880328
Registered office: Scott House, Alencon Link, Basingstoke, Hampshire RG21 7PP

Drawing Number	Originator	Volume			Rev
Highways England PIN					
HE551486	-ACM	-EGN	-		P01
A46_SW_ZZ		-DR	-EG	-00001	
Location		Type	Role	Number	

Plot Date: 13 December 2017 16:12:32
File Name: E:\GIS Management\A46_Ecology_Works\GIS\GIS_Working\02_Maps\Ecology\Ecology Figures\FIGURE 5.mxd

Pond Number	
Pond 1	No GCN Present
Pond 2	No GCN Present
Pond 3	No GCN Present
Pond 4	No Access
Pond 5	Dry
Pond 6	Dry and Overgrown
Pond 7	Excellent HSI Score
Pond 8	Excellent HSI Score
Pond 9	Excellent HSI Score



SAFETY, HEALTH AND ENVIRONMENTAL INFORMATION BOX

IT IS ASSUMED THAT ALL WORKS ON THIS DRAWING WILL BE CARRIED OUT BY A COMPETENT CONTRACTOR WORKING, WHERE APPROPRIATE, TO AN APPROPRIATE METHOD STATEMENT.

THIS DRAWING IS TO BE USED ONLY FOR THE PURPOSE OF ISSUE THAT IT WAS ISSUED FOR AND IS SUBJECT TO AMENDMENT.

EXCEPTIONAL RISKS RELATING TO THE WORKS ASSOCIATED WITH THIS DRAWING ARE IDENTIFIED BELOW.

CONSTRUCTION

MAINTENANCE / OPERATION / DECOMMISSIONING / DEMOLITION

KEY:

- Site Boundary (Highways Boundary)
- Site Boundary + 250m Buffer
- Site Boundary + 500m Buffer
- GCN presence / absence survey by Mouchel in 2016 using eDNA water sampling technique
- Habitat Suitability Index (HSI) assessment by AECOM in 2017
- No Access

Revision Details	By	Check	Date	Suffix
First Issue	DM	OP	07/09/17	P01

Purpose of issue: EXTENDED PHASE 1 HABITAT SURVEY REPORT

Client
Highways England
Major Projects
The Cube
199 Wharfside Street
Birmingham
B1 1RN

Working on behalf of: highways england

Project Title

A46 COVENTRY JUNCTION UPGRADE

Drawing Title

FIGURE 6 PONDS WITHIN 500M OF THE PROPOSED SCHEME

Designed	Drawn	Checked	Approved	Date
HP	GB	AR	NT	11/12/2017

Internal Project No.	Suitability
60547444	S0
Scale @ A3: 1:15,000	Zone: BINLEY JUNCTION

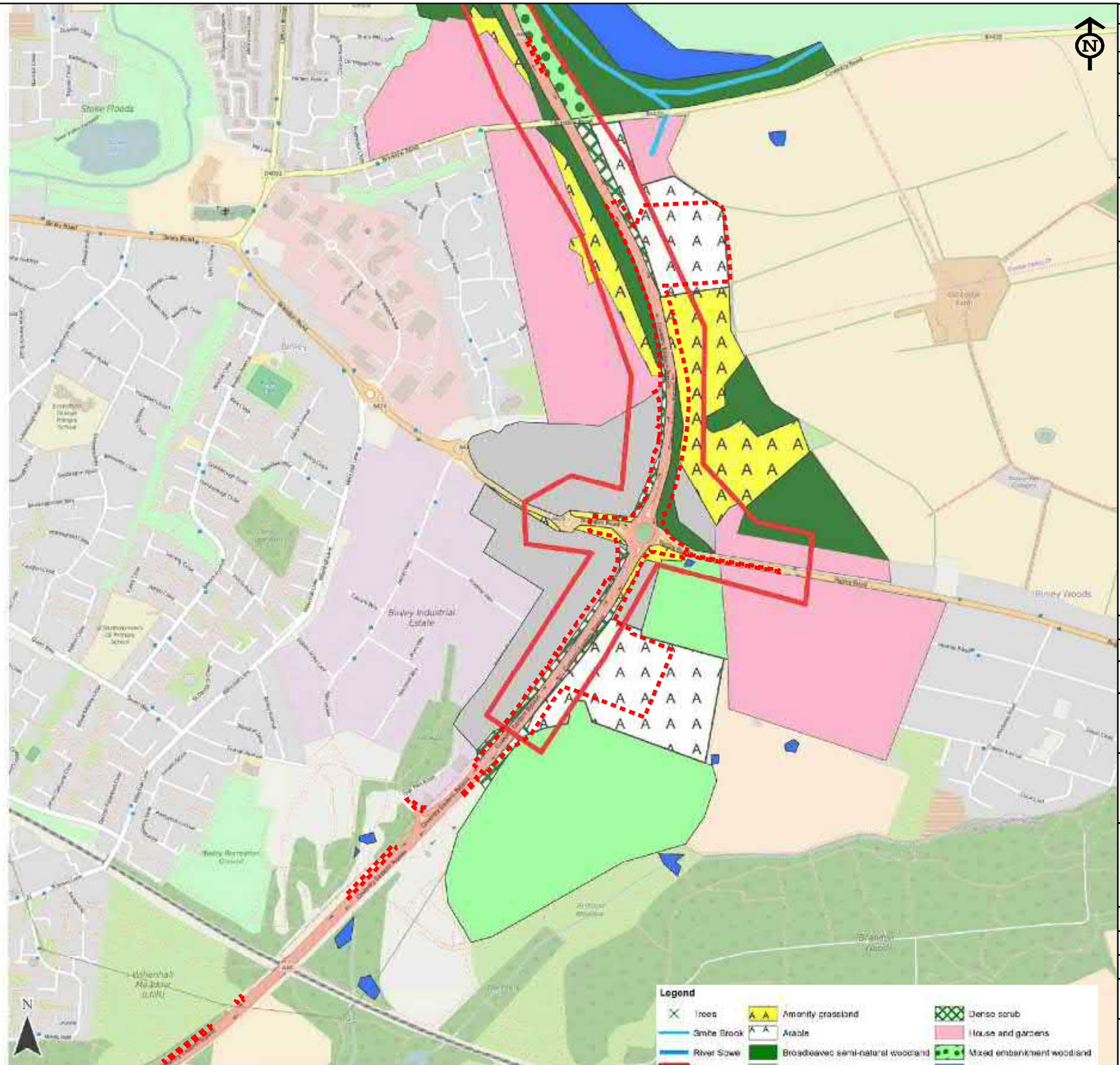
THIS DOCUMENT HAS BEEN PREPARED PURSUANT TO AND SUBJECT TO THE TERMS OF AECOM'S APPOINTMENT BY ITS CLIENT. AECOM ACCEPTS NO LIABILITY FOR ANY USE OF THIS DOCUMENT OTHER THAN BY ITS ORIGINAL CLIENT OR FOLLOWING AECOM'S EXPRESS AGREEMENT TO SUCH USE, AND ONLY FOR THE PURPOSES FOR WHICH IT WAS PREPARED AND PROVIDED.

Project Office
Royal Court
Basil Close, Chesterfield
Derbyshire. S41 7SL
Tel: (01246) 209221
Fax: (01246) 209229
www.aecom.com

AECOM Infrastructure & Environment UK Limited
Registered in England Registered number: 888328
Registered office: Scott House, Alencon Link, Basingstoke, Hampshire RG21 7PP

Drawing Number	Originator	Volume			Rev
Highways England PIN					
HE551486	-ACM	-EGN	-		P01
A46_SW_ZZ		-DR	-EG	-00001	
Location		Type	Role	Number	

Plot Date: 11 December 2017 11:17:50
File Name: E:\GIS Management\A46_Ecology_Works\GIS\GIS_Working\02_Maps\Ecology\Ecology Figures\FIGURE 6.mxd



SAFETY, HEALTH AND ENVIRONMENTAL INFORMATION BOX

IT IS ASSUMED THAT ALL WORKS ON THIS DRAWING WILL BE CARRIED OUT BY A COMPETENT CONTRACTOR WORKING, WHERE APPROPRIATE, TO AN APPROPRIATE METHOD STATEMENT.

THIS DRAWING IS TO BE USED ONLY FOR THE PURPOSE OF ISSUE THAT IT WAS ISSUED FOR AND IS SUBJECT TO AMENDMENT.

EXCEPTIONAL RISKS RELATING TO THE WORKS ASSOCIATED WITH THIS DRAWING ARE IDENTIFIED BELOW.

CONSTRUCTION

MAINTENANCE / OPERATION / DECOMMISSIONING / DEMOLITION

KEY:

Site Boundary (Highways Boundary)

NOTES

1. THIS DRAWING IS TO BE READ IN CONJUNCTION WITH ALL OTHER RELEVANT DOCUMENTATION.
2. DO NOT SCALE FROM THIS DRAWING, USE ONLY PRINTED DIMENSIONS.
3. ALL DIMENSIONS IN MILLIMETRES , ALL CHAINAGES, LEVELS AND COORDINATES ARE IN METRES UNLESS DEFINED OTHERWISE.
4. THIS DRAWING IS TO BE READ IN CONJUNCTION WITH THE PROJECT HEALTH & SAFETY FILE FOR ANY IDENTIFIED POTENTIAL RISKS.
5. CONTAINS OS DATA © CROWN COPYRIGHT AND DATABASE RIGHT 2017

First Issue	DM / OP	07/09/17	P01
Revision Details	By / Check	Date	Suffix

Purpose of issue: EXTENDED PHASE 1 HABITAT SURVEY REPORT

Client
Highways England
Major Projects
The Cube
199 Wharfside Street
Birmingham
B1 1RN

Working on behalf of: highways england

Project Title

A46 COVENTRY JUNCTION UPGRADE

Drawing Title

FIGURE 7
PHASE 1 HABITAT PLAN
MOUCHEL 2016

Designed	Drawn	Checked	Approved	Date
HP	GB	AR	NT	22/11/2017

Internal Project No. 60547444	Suitability S0
Scale @ A3 1:10,000	Zone BINLEY JUNCTION

THIS DOCUMENT HAS BEEN PREPARED PURSUANT TO AND SUBJECT TO THE TERMS OF AECOM'S APPOINTMENT BY ITS CLIENT. AECOM ACCEPTS NO LIABILITY FOR ANY USE OF THIS DOCUMENT OTHER THAN BY ITS ORIGINAL CLIENT OR FOLLOWING AECOM'S EXPRESS AGREEMENT TO SUCH USE, AND ONLY FOR THE PURPOSES FOR WHICH IT WAS PREPARED AND PROVIDED.

Project Office
Royal Court
Basil Close, Chesterfield
Derbyshire, S41 7SL
Tel: (01246) 209221
Fax: (01246) 209229
www.aecom.com

AECOM Infrastructure & Environment UK Limited
Registered in England Registered number: 880328
Registered office: Scott House, Alencon Link, Basingstoke, Hampshire RG21 7PP

Drawing Number	Originator	Volume			Rev
Highways England PIN					
HE551486	-ACM	-EGN	-		P01
A46_SW_ZZ		-DR	-EG	-00001	
Location		Type	Role	Number	

Plot Date: 22 November 2017 16:30:26
File Name: E:\GIS Management\A46_Ecology_Works\GIS\GIS_Working\02_Maps\Ecology\Ecology Figures\FIGURE 7.mxd

Annex B: Bat Habitat Suitability Criteria

The following criteria to determine bat roosting habitat and commuting and foraging habitat suitability was used as part of the extended Phase 1 habitat survey (based on Collins, 2016).

Suitability/ Risk	**Description of roosting habitats**	**Commuting and foraging habitats**
Negligible	Negligible habitat features on site likely to be used by roosting bats.	Negligible habitat features on site likely to be used by commuting or foraging bats.
Low	A structure with one or more potential roost sites that could be used by individual bats opportunistically. However, these potential roost sites do not provide enough space, shelter, protection, appropriate conditions and/or suitable surrounding habitat to be used on a regular basis or by larger numbers of bats (i.e. unlikely to be suitable for maternity or hibernation). A tree of sufficient size and age to contain Potential Roost Features (PRFs) but with none seen from the ground or features seen with only very limited roosting potential.	Habitat that could be used by small numbers of commuting bats such as a gappy hedgerow or unvegetated stream, but isolated, i.e. not very well connected to the surrounding landscape by other habitat. Suitable, but isolated habitat that could be used by small numbers of foraging bats such as a lone tree (not in a parkland situation) or a patch of scrub.
Moderate	A structure or tree with one or more potential roost sites that could be used by bats due to their size, shelter, protection, conditions and surrounding habitat but unlikely to support a roost of high conservation status (with respect to roost type only – the assessments in this table are made irrespective of species conservation status, which is established after presence is confirmed).	Continuous habitat connected to the wider landscape that could be used by bats for commuting such as lines of trees and scrub or linked back gardens. Habitat that is connected to the wider landscape that could be used by bats for foraging such as trees, scrub, grassland or water.
High	A structure or tree with one or more potential roost sites that are obviously suitable for use by larger numbers of bats on a more	Continuous, high-quality habitat that is well connected to the wider landscape that is likely to be used regularly by commuting bats such

	regular basis and potentially for longer periods of time due to their size, shelter, protection, conditions and surrounding habitat.	as river valleys, streams, hedgerows, lines of trees and woodland edge. High-quality habitat that is well connected to the wider landscape that is likely to be used regularly by foraging bats such as broadleaved woodland, tree lined watercourses and grazed parkland. Site is close to and connected to known roosts.

Negligible is used to show that the feature has been surveyed and there is no suitable habitat features for roosting bats. Trees with moderate to high risk and buildings with low to high risk would normally require further more detailed PRF inspection or presence/absence surveys.

Annex C: Target Notes

Legend on Figure 5 Target Note (TN)	Description	Bat Roost Suitability Assessment
TN1	The woodland of Piles Coppice. The canopy of this wood is dominated by common lime (*Tilia x europaea*) with abundant pedunculate oak (*Quercus robur*) and ash (*Fraxinus excelsior*). It had a sparse understorey of hazel (*Corylus avellana*), holly (*Ilex aquifolium*), elm (*Ulmus minor*) and bracken (*Pteridium aquilinum*). This is an area of designated ancient woodland.	**Moderate**
TN2	A large area of broadleaved woodland. This is made up of two distinct areas of woodland; the area near the railway is dominated by sycamore (*Acer pseudoplatanus*) with frequent pedunculate oak, willow (*Salix sp.*), ash and occasional Norway maple (*Acer platanoides*), hawthorn (*Crataegus monogyna*), alder (*Alnus glutinosa*) and abundant silver birch (*Betula pendula*). It has an understorey made up of bramble (*Rubus fruticosus* agg.). The other, nearer the area of swamp, is more indicative of wet woodland with alder and willow becoming abundant with frequent sycamore and occasional silver birch and hawthorn. This area has an understorey made up of frequent bramble and barren brome (*Bromus sterilis*) and occasional common bent (*Agrostis capillaris*).	Not assessed (not considered to be directly impacted by the proposed scheme)
TN3	The ancient woodland of Binley Common Farm Wood. This patch of woodland, which is located adjacent to the proposed scheme boundary, was not accessible at the time of the survey and so was assessed from its edges. It was dominated by sycamore with abundant pedunculated oak and ash, occasional hazel, holly, elm. Its understorey was fairly sparse and choked by ivy with frequent bramble and occasional common nettle (*Urtica dioica*) and herb Robert (*Geranium robertianum*). There are footpaths through the wood used by the public.	**Moderate**
TN4	There were three areas of woodland surrounding the rugby club; these were dominated by ash with an understorey of occasional hawthorn.	Negligible
TN5	Broadleaved semi-natural woodland in Coombe Pool SSSI and Country Park made up of abundant ash, peduculate oak and sycamore, frequent alder and occasional common lime. The understorey was made up of abundant ivy (*Hedera helix*) cover and occasional bramble, nettle and holly. Nearer the road this woodland contained more ornamental species and was characterised by younger trees and shrubs, including hazel and hawthorn (see below).	**Moderate**
	Adjacent to the road this becomes a strip of broadleaved plantation woodland.	Negligible
TN6	Plantation woodland made up of a mix of species including ash, hawthorn, and willow with an understorey of bramble.	Not assessed (not considered to be directly impacted by the proposed

Legend on Figure 5 Target Note (TN)	Description	Bat Roost Suitability Assessment
		scheme)
TN7	Woodland dominated by sycamore, with abundant silver birch, frequent pedunculated oak, ash and willow, occasional Norway maple, hawthorn and alder.	Not assessed (not considered to be directly impacted by the proposed scheme)
TN8	Plantation woodland made up of frequent whitebeam (*Sorbus aria*), hazel, dogwood (*Cornus sanguinea*) and cherry (*Prunus sp.*), occasional dog rose (*Rosa canina* agg.), blackthorn (*Prunus spinosa*) and hawthorn, with a bramble understorey.	Negligible
TN9	Areas of swamp containing Pond 7 & 8 (see Figure 6, Annex A) within the boundary of Herald Way Marsh SSSI and dominated by common reed (*Phragmites australis*). Potentially suitable for great crested newts. Refer to separate Habitat Suitability Index (HSI) assessment.	Not applicable (N/A). No suitable bat roost features to assess.
TN10	Tall ruderal dominated by common nettle and spear thistle (*Cirsium vulgare*).	N/A
TN11	Hedge made up of hawthorn and blackthorn. This was previously mapped as broadleaved woodland by the initial Phase 1 habitat survey.	N/A
TN12	Plantation woodland containing ash, silver birch , Norway maple , European larch (*Larix decidua*), Pedunculate oak, alder and red oak (*Quercus rubra*) with an understorey of bramble. An area of scrub and woodland (mapped in 2016) adjoining the Premier Inn and other commercial buildings was re-classified in 2017 as species-poor hedgerow.	Negligible
TN13-18	Waterbodies and courses with potential to support riparian mammals and aquatic invertebrates.	N/A
	TN14-The drain that runs adjacent to the rugby ground and through site compound 1 had a species-poor hedge associated with it made up of hawthorn and blackthorn. Not accessed thoroughly for survey.	Not assessed (no access available at time of survey)
TN19	Two areas of amenity grassland either side of the A46 dominated by perennial ryegrass (*Lolium perenne*) with occasional ribwort plantain (*Plantago lanceolata*) and dandelion (*Taraxacum officinale* sp.)	N/A
TN20	Railway Line. No access	N/A
TN21	An area of tall ruderal where the woodland has been cleared for the pylons. This area is dominated by bramble, stinging nettle and bracken (*Pteridium aquilinum*). This separates the area of ancient woodland (TN1) from the woodland that borders the A46 (TN22).	N/A
TN22	Broadleaved semi natural woodland made up of pedunculate oak and ash. It had an understorey of scrub including hazel, holly and	Negligible

Legend on Figure 5 Target Note (TN)	Description	Bat Roost Suitability Assessment
	bramble.	
TN23	Proposed footpath widening location surrounded by houses and gardens. No access to houses and gardens.	N/A
TN24	Tree 1. Peduculate oak, 0.6m DBH (Diameter at Breast Height), two trunk cavities at 3m height (one facing east and one facing west) and one split in branch 4.5m high (facing east). Grid ref: SP3896577620.	**Moderate**
TN25	Trees 2,3 and 4: Tree 2: Peduculate oak, 0.2m DBH, no suitable bat roost features. Grid ref: SP 38955 77628. Tree 3: Peduculate oak, 0.2m DBH, no suitable bat roost features. Grid ref: SP 38955 77628. Tree 4: Peduculate oak, 0.2m DBH, no suitable bat roost features. Grid ref: SP 38955 77628.	Negligible
TN26	A46 roundabout - This is dominated by a small area of plantation woodland surrounded by amenity grassland verges. Species unknown but no trees of sufficient age for bat potential. No access, surveyed from roadside.	Negligible
TN27	Arable field – candidate site for construction compound 1. Access was restricted to this area during the Phase 1 surveys and was surveyed from neighbouring land parcels.	N/A
TN28	Arable field – candidate site for construction compound 2. Scrub borders the western extent, adjacent to the A46.	N/A
TN29	Proposed road signage location. Mostly hard standing adjacent to woodland at Coombe Country Park (TN5). No access.	N/A
TN30	Proposed road signage location. Mostly hard standing adjacent to woodland at Herald Way Marsh.	N/A
TN31	Proposed road signage location. Mostly hard standing outside initial site boundary so not assessed. No access.	N/A
TN32	An area of Broadleaved plantation woodland containing pedunculate oak, hazel, European larch (*Larix decidua*) and cherry (*Prunus* sp.) It had and understorey made up of dog rose and bramble. Coniferous species made up less than 10% of the trees.	Negligible
TN33	Pond 5 (Figure 6, Annex A). Dry pond that is sealed by concrete and wooden fence.	N/A

Annex D: Photos

Photo	Notes
	Piles Coppice LWS (TN1)
	Woodland at Herald Way Marsh (TN2)

Photo	Notes
	Woodland at Coombe Country Park (TN5)
	Swamp at Herald Way Marsh (TN9)
	Amenity grassland to the west of the proposed scheme and surrounding habitat. (Adjacent to woodland at TN8)

Photo	Notes
	Rugby ground and surrounding habitats.
	Pond 5 (see Figure 6, Annex A)
	Pond 7 (see Figure 6, Annex A)

Photo	Notes
	Pond 8 (see Figure 6, Annex A)
	Pond 9 (see Figure 6, Annex A)
	The roundabout at the A46 and A428 junction (TN26) (facing north)

Photo	Notes
	The roundabout at the A46/ A428 junction (TN26) (facing west)
	Tall ruderal at Piles Coppice (TN21)
	Hedgerow at Rugby ground (TN11).

Photo	Notes
	Tree 1 at TN24
	Tree 2, 3 & 4 (TN25).

Annex E: HSI Scores

		Pond 7		Pond 8		Pond 9	
		Results	**Scores**	**Results**	**Scores**	**Results**	**Scores**
SI_1	**Location**	A	1.00	A	1.00	A	1.00
SI_2	**Pond area**	650m²	1.00	750m²	0.99	250m²	0.50
SI_3	**Pond drying**	Never	0.90	Never	0.90	Rarely	1.00
SI_4	**Water quality**	Moderate	0.67	Moderate	0.67	Moderate	0.67
SI_5	**Shoreline shade**	50%	1.00	70%	0.8	45%	1.00
SI_6	**Fowl**	Minor	0.67	Minor	0.67	Absent	1.00
SI_7	**Fish**	Possible	0.67	Possible	0.67	Absent	1.00
SI_8	**Pound count**	9	1.00	9	1.00	9	1.00
SI_9	**Terrestrial habitat**	Good	1.00	Good	1.00	Poor	0.33
SI_{10}	**Macrophytes**	70%	1.00	70%	1.00	80%	1.00
HSI			**0.88**		**0.86**		**0.80**
Pond suitability			**Excellent**		**Excellent**		**Excellent**

Appendix 8.2 d

TECHNICAL NOTE

Project:	**A46 Coventry Junction Improvement**				
Title:	**Great Crested Newt Survey Technical Note**				
Doc ID:					
Date:	**June 2018**	Version:	**P01**	Status:	**S0**

Revision	Date	Prepared by	Reviewed by	Approved by
P01	27/06/18	James Coupe	Hannah Procter	Dr Stephanie Harper

1 Introduction

Background

1.1 AECOM Infrastructure and Environment UK Ltd. (AECOM) were commissioned by Highways England in 2017 to undertake an extended Phase 1 habitat survey of a section of the A46 surrounding Binley junction (hereafter referred to as 'the site' or 'proposed scheme') and its immediate surrounds in Coventry, Warwickshire. This was done to reaffirm (i.e. ground truth) ecology work carried out by Mouchel (now WSP) in 2016 as part of the initial PCF stage assessment.

1.2 The extended Phase 1 habitat survey conducted by Mouchel in 2016 identified four ponds (Ponds 1 to 4) within 500m of the proposed scheme with potential to support great crested newt (*Triturus cristatus*). Mouchel undertook Habitat Suitability Index (HSI) assessments and environmental DNA (eDNA) testing on these ponds identified in 2016 (where access could be gained).

1.3 During the extended Phase 1 habitat survey carried out by AECOM in 2017 an additional five ponds (Ponds 5 to 9) were identified due to changes in the boundary of the proposed scheme. These new ponds were subjected to an HSI assessment in autumn 2017 and recommended for an updated HSI and presence/ likely absence great crested newt surveys in spring 2018 (where applicable). Additionally, the ponds previously surveyed in 2016 were recommended for an updated HSI assessment and presence/ likely absence surveys (where applicable) in 2018 to ensure that up to date baseline survey information was available for great crested newts to support the impact assessment, and any potential licence applications, where applicable, in 2018.

1.4 Results of the 2018 great crested newt surveys are documented within this report.

Survey area description

1.5 The landscape within and surrounding the proposed scheme comprised various semi-natural and man-made habitats. It was predominantly urban to the west of the proposed scheme, with a mixture of arable, woodland and recreational land to the east. To the north-east of the scheme is Coombe Country Park and Coombe Pools Site of Special Scientific Interest (SSSI), designated for its ornithological interest; and to the south-west is Herald Way Marsh (Claybrookes Marsh) SSSI / Local Nature

Reserve (LNR), designated for its range of wetland habitats and assemblage of invertebrates.

1.6 The ecological study area, as referred to in this report, encompassed up to 500m form the proposed scheme boundary. Refer to **Figure 1** attached.

Objectives

1.7 The aim of the study was to undertake a survey of all ponds within 500m of the scheme to determine the presence / likely absence of great crested newts. The survey would also inform ecological mitigation measures and ensure compliance with relevant legislation and policy.

2 Legislation and Policy

2.1 Great crested newt is listed on Schedule 5 of the Wildlife and Countryside Act 1981 (as amended) and Schedule 2 of the Conservation of Habitats and Species Regulations 2017 (as amended). This legislation, when taken together, results in a level of protection that prohibits the intentional, deliberate or reckless:

- Killing, injuring, taking or disturbance of great crested newts.
- Damaging, destroying or obstructing any place used by great crested newts for the purposes of breeding, sheltering/protection.
- Selling and/or advertising for sale a great crested newt or any part thereof.

2.2 NOTE: This is a brief summary of the legislation and is not to be regarded as a definitive legal opinion. When dealing with individual cases, the client is advised to consult the full texts of the relevant legislation and obtain further legal advice.

3 Methodology

3.1 The ponds identified for survey are shown on Figure 1 attached and provided in **Table 1** below.

3.2 Note: Pond 6 had been previously ruled out by the extended Phase 1 habitat survey in 2017 as it was dry and confirmed to no longer exist in 2018. Pond 5 had been found to have been previously dry in 2017 but was holding water at the time of the survey in 2018 and so it was included for HSI and eDNA testing.

Table 1: Ponds Identified for Great Crested Newt Survey from Previous Studies and Observations

Pond #	Location (in relation to the proposed scheme boundary)	Pond Recorded in-situ in 2016	Notes	Pond Recorded in-situ in 2017	Notes	Pond Scoped in for Survey in 2018
1	350m to the south-east	✓	Negative eDNA result (2016)	-	Not surveyed in 2017	✓

Pond #	Location (in relation to the proposed scheme boundary)	Pond Recorded in-situ in 2016	Notes	Pond Recorded in-situ in 2017	Notes	Pond Scoped in for Survey in 2018
2	200m to the east	✓	Negative eDNA result (2016)	-	Not surveyed in 2017	✓
3	Adjacent to proposed scheme	✓	Negative eDNA result (2016)	-	Not surveyed in 2017	✓
4	270m to the north-east	?	No access for survey in 2016	?	No access for survey in 2017.	✓
5	40m to the south	×		✓	Recorded as dry	✓ (Pond had water present)
6	240m to the north east	×		✓	Recorded as dry	× (Pond no longer present)
7	40m to the west	×		✓		✓
8	40m to the west	×		✓		✓
9	400m to the east	×		✓		✓

3.3 Ponds within 500m from the proposed route were assessed for their suitability to support great crested newt and other species of amphibian using the standardised Habitat Suitability Index (HSI) (Oldham *et al*., 2000) (summarised in Table 3). The HSI is a mathematical model that incorporates ten suitability indices, all of which are thought to influence the likelihood of presence of great crested newt in a waterbody. The result of an HSI is a score between 0 (unsuitable) and 1 (optimal). The HSI is a tool for assessing the suitability of waterbodies for great crested newt; however, it is not a substitute for surveys. The HSI is calculated using the following formula:

$HSI = (SI_1 \times SI_2 \times SI_3 \times SI_4 \times SI_5 \times SI_6 \times SI_7 \times SI_8 \times SI_9 \times SI_{10})1/10$

Where SI are Suitability Indices, as detailed below in **Table 2**:

Table 2: Habitat Suitability Indices

Suitability Indices	Factor
SI_1	Geographic Location
SI_2	Pond Area
SI_3	Permanence
SI_4	Water Quality
SI_5	Shade
SI_6	Waterfowl
SI_7	Fish
SI_8	Additional Ponds within 1km
SI_9	Terrestrial Habitat
SI_{10}	Macrophyte Cover

3.4 A method for establishing the presence or likely absence of great crested newts through detection of fragments of environmental DNA (eDNA) in waterbodies was approved for use by Natural England in 2014 (Biggs, *et al*., 2014). As potentially only one survey visit is required, this reduces likely disturbance to the ponds relative to traditional field surveys required to establish presence/absence.

3.4.1 Sampling was carried out according to the protocol described in the *Technical advice note for field and laboratory sampling of great crested newt (Triturus cristatus) environmental DNA* (Biggs *et al*, 2014), using the equipment provided by SureScreen, the laboratory undertaking the analysis. Water sampling was undertaken by two AECOM ecologists, with at least one Natural England GCN survey licence holder. The dates, weather conditions and temperatures at the time of pond sampling are shown in Table 3.

Table 3: Dates and Weather Conditions at the Time eDNA Samples were taken

Pond #	Date sampled	Weather conditions at time of sampling	Temperature at time of sampling (°C)
1	16/04/2018	Partly cloudy, still, dry day	14
2	16/04/2018	Partly cloudy, still, dry day	14
3	16/04/2018	Partly cloudy, still, dry day	14
4	17/04/2018	Mostly cloudy, still dry day	13
5	16/04/2018	Partly cloudy, still, dry day	14
6	16/04/2018	Partly cloudy, still, dry day	14
7	16/04/2018	Partly cloudy, still, dry day	14

8	16/04/2108	Partly cloudy, still, dry day	14

3.4.2 Separate sampling kits were provided by SureScreen for each water body. The kits comprised: a sampling ladle, a sealable plastic bag, a pipette, two pairs of latex gloves and six sample bottles each containing absolute ethanol as a fixing agent, sodium acetate and other markers.

3.4.3 The protocol for sampling was as follows:

- Put on first pair of gloves.
- Take sampling ladle and plastic bag.
- Using the ladle, take around 20 full (30ml) ladle samples of water from around the pond edge, first gently agitating the water to stir up the water column, but not too much to avoid disturbing or collecting sediment in the sample.
- Seal the plastic bag and shake to mix the sample.
- Put on new gloves and, taking pipette, put 15ml into each of the six replicated sample bottles.
- Screw the lid tight and then shake to mix the sample with the ethanol.
- Once samples had been taken, they were kept in cool boxes until delivered to the laboratory within two days of sampling.

Limitations

3.5 There were no limitations to this survey.

4 Results

4.1 There had been no change in the HSI score in ponds 1-3 since the surveys undertaken by Mouchel in 2016; the HSI scores of ponds 7-9 are unchanged from the 2017 AECOM surveys. For full details of these surveys please see these reports. The results of the updated HSI surveys and the eDNA testing are summarised below in **Table 4.** No signs of any other UK amphibian species were observed during the 2018 surveys.

Table 4: Results of updated HSI surveys and eDNA testing

Pond #	Description	Photo Reference (see attached Photo Sheet)	HSI Score 2018	eDNA Results
1	Large pond adjacent to woodland	Plate 1	0.75 Good	Negative

Pond #	Description	Photo Reference (see attached Photo Sheet)	HSI Score 2018	eDNA Results
2	Small heavily shaded pond on woodland fringe adjacent to arable land.	Plate 2	0.55 Below Average	Negative
3	Small heavily shaded woodland pond.	Plate 3	0.63 Average	Negative
4	Large heavily shaded pond in arable field.	Plate 4	0.5 Poor	Negative
5	Shallow heavily vegetated pond in a heavily urbanised area.	Plate 5	0.62 Average	Negative
7	Large shaded pond connected to a stream. Pond is dominated by common reed (*Phragmites sp.*)	Plate 6	0.88 Excellent	Negative
8	Large pond dominated by common reed (*Phragmites sp.*)	Plate 7	0.86 Excellent	Negative
9	Heavily vegetated and shaded pond in arable field.	Plate 8	0.80 Excellent	Negative

5 Discussion

5.1 No ponds within 500m of the proposed scheme tested positive for great crested newt using eDNA testing. These ponds do have potential for other UK amphibian species such as common frog (*Rana temporaria*) and smooth newt (*Lissotriton vulgaris*), however no signs of these were observed during the 2018 surveys.

Great crested newts are therefore not considered to be a constraint to the proposed scheme.

6 Photo references



Plate 1: Pond 1



Plate 2: Pond 2



Plate 3: Pond 3



Plate 4: Pond 4



Plate 5: Pond 5



Plate 6: Pond 7



Plate 7: Pond 8



Plate 8: Pond 9

7 HSI calculations

7.1 The HSI scores for ponds 1-3 remain unchanged from the Mouchel 2016 report. For full calculations please see this report

HSI calculation for Pond 4:

Index	Description	HSI Score
Pond Location	A (optimal)	1.00
Pond Approximate Area (m^2)	300	0.60
Pond Permanence	Dries annually	0.10
Water Quality	Moderate	0.67
Percentage Shade	100%	0.20
Waterfowl Presence	Absent	1.00
Fish Presence	Absent	1.00
Ponds within 1km	4-10	1.00
Terrestrial Habitat Quality	Poor	0.33
Percentage Macrophyte Cover	5%	0.35
	HSI Score	0.50

HSI calculation for Pond 5:

Index	Description	HSI Score
Pond Location	A (optimal)	1.00
Pond Approximate Area (m^2)	200	0.40
Pond Permanence	Dries annually	0.10
Water Quality	Moderate	0.67
Percentage Shade	0-60%	1.00
Waterfowl Presence	Absent	1.00
Fish Presence	Absent	1.00
Ponds within 1km	4-10	1.00
Terrestrial Habitat Quality	Poor	0.33
Percentage Macrophyte Cover	60%	0.90
	HSI Score	0.62

7.2 The HSI scores for ponds 7-9 remain unchanged from the AECOM 2017 Phase 1 report. For full calculations please see this report.

8 References

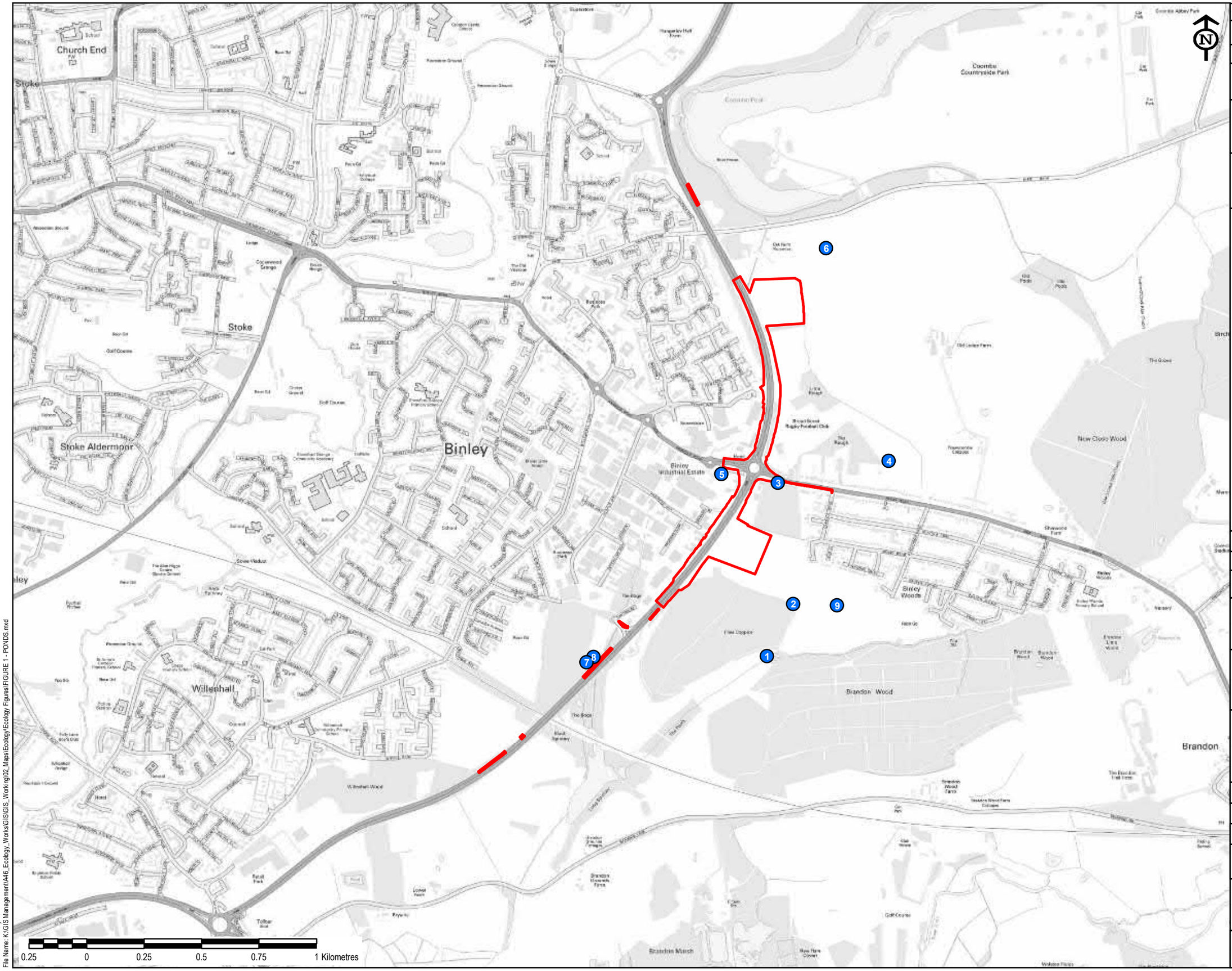
AECOM (2017) Ground Truth Extended Phase 1 Habitat Survey Report

Biggs J, Ewald N, Valentini A, Gaboriaud C, Griffiths RA, Foster J, Wilkinson J, Arnett A, Williams P and Dunn F (2014a) Analytical and methodological development for improved surveillance of the Great Crested Newt. Appendix 5. Technical advice note for field and laboratory sampling of great crested newt (*Triturus cristatus*) environmental DNA. Freshwater Habitats Trust, Oxford

Mouchel (2016c) A46 Coventry Junctions Great Crested Newt Habitat Suitability Report

Oldham R.S., Keeble J., Swan M.J.S. & Jeffcote M. (2000). Evaluating the suitability of habitat for the Great Crested Newt (*Triturus cristatus*). Herpetological Journal 10 (4), 143-155

Figure 1 - Ponds within 500m of the Proposed Scheme



SAFETY, HEALTH AND ENVIRONMENTAL INFORMATION BOX

IT IS ASSUMED THAT ALL WORKS ON THIS DRAWING WILL BE CARRIED OUT BY A COMPETENT CONTRACTOR WORKING, WHERE APPROPRIATE, TO AN APPROPRIATE METHOD STATEMENT.

THIS DRAWING IS TO BE USED ONLY FOR THE PURPOSE OF ISSUE THAT IT WAS ISSUED FOR AND IS SUBJECT TO AMENDMENT.

EXCEPTIONAL RISKS RELATING TO THE WORKS ASSOCIATED WITH THIS DRAWING ARE IDENTIFIED BELOW.

CONSTRUCTION

MAINTENANCE / OPERATION / DECOMMISSIONING / DEMOLITION

KEY:

- Site Boundary (Highways Boundary)
- Site Boundary + 250m Buffer
- Site Boundary + 500m Buffer
- Ponds

First Issue	DM / OP	07/09/17	P01
Revision Details	By / Check	Date	Suffix

Purpose of issue: EXTENDED PHASE 1 HABITAT SURVEY REPORT

Client
Highways England
Major Projects
The Cube
199 Wharfeside Street
Birmingham
B1 1RN

Working on behalf of: highways england

Project Title

A46 COVENTRY JUNCTION UPGRADE

Drawing Title

FIGURE 1
PONDS WITHIN 500M OF THE PROPOSED SCHEME

Designed	Drawn	Checked	Approved	Date
HP	GB	AR	NT	04/07/2018

Internal Project No. 60547444	Suitability S0
Scale @ A3 1:15,000	Zone BINLEY JUNCTION

THIS DOCUMENT HAS BEEN PREPARED PURSUANT TO AND SUBJECT TO THE TERMS OF AECOM'S APPOINTMENT BY ITS CLIENT. AECOM ACCEPTS NO LIABILITY FOR ANY USE OF THIS DOCUMENT OTHER THAN BY ITS ORIGINAL CLIENT OR FOLLOWING AECOM'S EXPRESS AGREEMENT TO SUCH USE, AND ONLY FOR THE PURPOSES FOR WHICH IT WAS PREPARED AND PROVIDED.

Project Office
Royal Court
Basil Close, Chesterfield
Derbyshire. S41 7SL
Tel: (01246) 209221
Fax: (01246) 209229
www.aecom.com

AECOM Infrastructure & Environment UK Limited
Registered in England Registered number: 880328
Registered office: Scott House, Alencon Link, Basingstoke, Hampshire RG21 7PP

Drawing Number	Originator	Volume			Rev
Highways England PIN					
HE551486	-ACM	-EGN	-		P01
A46_SW_ZZ		-DR	-EG	-00001	
Location		Type	Role	Number	

Plot Date: 04 July 2018 09:06:34
File Name: K:\GIS Management\A46_Ecology_Works\GIS\GIS_Working\02_Maps\Ecology\Ecology Figures\FIGURE 1 - PONDS.mxd

Appendix 8.2 e

Great Crested Newt Habitat Suitability Index (HSI) Assessment 2017

1. Introduction

1.1. Background

1.1.1. A great crested newt (*Triturus cristatus*) Habitat Suitability Index (HSI) survey was undertaken in June 2017 for a single pond within the study area of the A46 Coventry Junction Upgrade, at Binley Junction (hereafter referred to as the *proposed scheme*). The pond requiring survey, referred to as 'Pond 4', was previously refused access when surveys were undertaken in June 2016 (note, the pond was named Pond 4 in the previous 2016 report).

1.1.2. The original Phase 1 habitat survey undertaken in January 2016 recommended that further assessment be carried out on seven ponds identified within 500m of the preliminary, Stage 1 proposed scheme boundary to investigate their suitability to support great crested newt and, therefore, whether there is risk of adverse effects on great crested newt from the construction of the scheme (Report reference: HE551486-MOU-EBD-A46_A428-RP-LE-0196 *Extended Phase 1 Habitat Survey Report*).

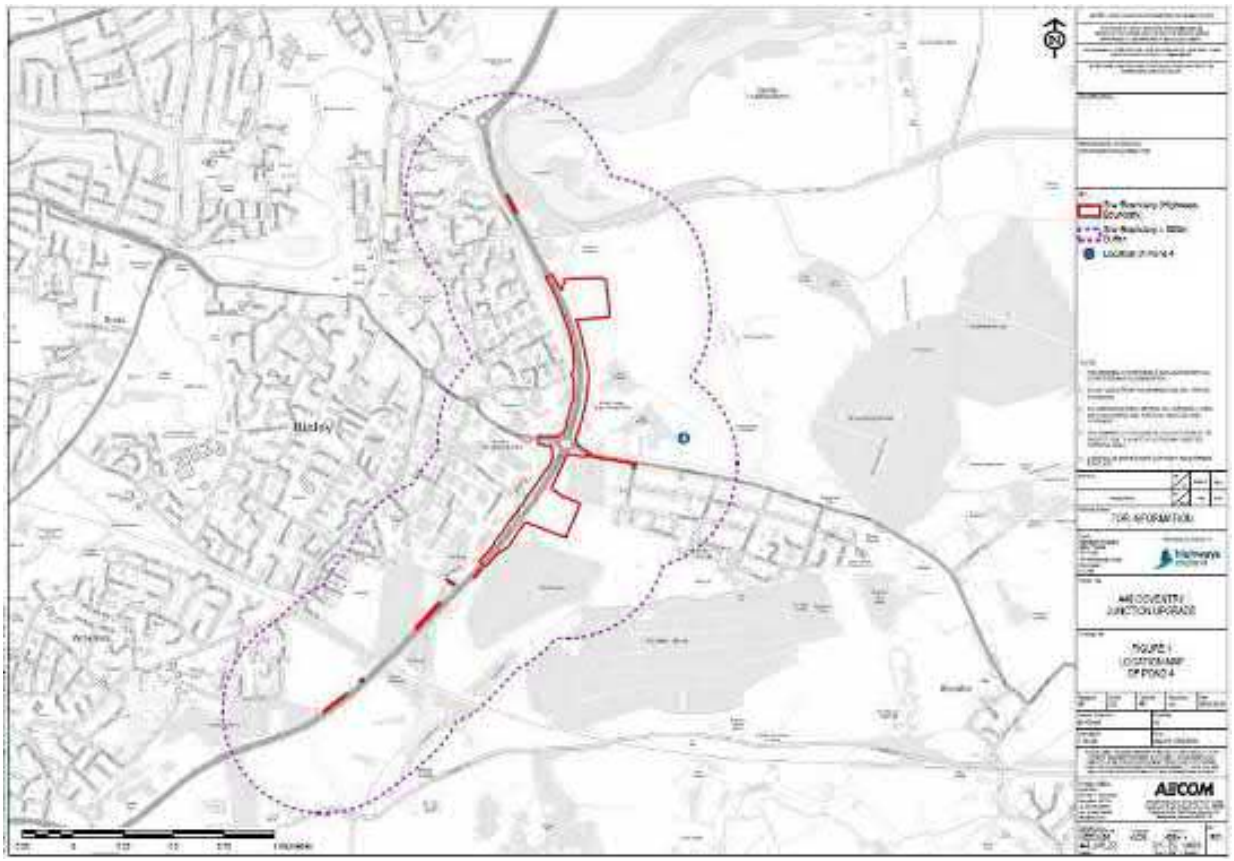
1.1.3. Habitat Suitability Index surveys and environmental DNA (eDNA) testing was subsequently undertaken in June 2016 on six out of the seven ponds to confirm the likely presence or absence of great crested newt (Report reference: HE551486-MOU-EBD-A46_A428-RP-LE-0197 *GCN Habitat Suitability Report*). Pond 4 however could not be accessed at that time and was therefore not assessed in 2016.

1.1.4. Access to Pond 4 was attained in June 2017 and eDNA sampling and Habitat Suitability Index survey completed, to gain baseline information on the likely presence or absence of great crested newt. This would assist with the next stage of assessment for the proposed scheme. The results are presented within this report.

1.2. Site Location

1.2.1. Pond 4 is situated in a rural setting, just north of the Rugby Road, A428, within 500m of the Binley junction on the A46 Coventry Eastern Bypass. The surrounding landscape comprises of semi-natural broad-leaved woodland, arable fields, and a network of drainage channels to the east. Binley Woods village is to the south of Pond 4, along the Rugby Road and with Coventry to the west. Figure 8-2(b)-A Survey Area Map (extracted from the 2016 great crested newt Habitat Suitability Index report) presents the location of Pond 4.

Figure 8-2(b)-A: Location Map of Pond 4



1.3. Objectives

1.3.1. The aim of this study was to appraise the ecological value of Pond 4 for great crested newt, of which the Habitat Suitability Index assessment and eDNA sampling was scheduled to help inform any further survey work. The survey also informs the need for any ecological mitigation measures and ensures compliance with relevant legislation and policy.

2. Legislation and Policy

2.1.1. Great crested newts are protected under European law through Annexes II and IV of the EC Habitats Directive (Council Directive 92/43/EEC). This is implemented into UK law under Regulation 41 of the Conservation of Habitats and Species Regulations, 2010 (as amended) where great crested newt is listed as a European protected species under Schedule 2. Great crested newts are also given full protection in England and Wales under Section 9 of the Wildlife and Countryside Act 1981 (as amended) through their inclusion on Schedule 5.

2.1.2. The aforementioned legislation, when taken together, affords a level of protection that prohibits the intentional, deliberate or reckless:

- Killing, injuring, taking or disturbance of great crested newt
- Damaging, destroying or obstructing any place used by great crested newt for the purposes of breeding or sheltering and protection
- Selling or advertising for sale a great crested newt or any part thereof

- Protection is given to all life stages (for example, adults, sub-adults, larvae, and eggs)

2.1.3. Great crested newts are listed under Section 41 of the Natural Environment and Rural Communities (NERC) Act 2006 as Species of Principal Importance for Conservation in England. Section 40 of the same Act requires that local and regional authorities have regard to the conservation of biodiversity in England, when carrying out their normal functions.

2.1.4. Great crested newts are also listed within the Warwickshire, Coventry and Solihull Local Biodiversity Action Plan (Tanner, 2013) as a priority species for conservation.

2.1.5. The legislation mentions above provides additional information and context on the legislative framework.

3. Methodology

3.1. Habitat Suitability Index (HSI) Assessment

3.1.1. The Habitat Suitability Index is a quantitative assessment of the capacity of a waterbody to support a breeding population of great crested newt conducted by a licenced ecologist in accordance with the method described in Oldham et al. (2000). Ten key suitability indices are used to calculate the Habitat Suitability Index value of a pond, including size, quality of adjacent habitat, fish presence and shade, and it is thought that likely great crested newt presence is influenced by habitat suitability. The Habitat Suitability Index is a numerical index (between 0 and 1), where values close to 0 indicate unsuitable habitat and 1 represents optimal habitat.

3.1.2. Based on the categorisation of Habitat Suitability Index scores, pond suitability for great crested newt is rated as follows:

- < 0.5 = poor
- 0.5 – 0.59 = below average
- 0.6 – 0.69 = average
- 0.7 – 0.79 = good
- > 0.8 = excellent

3.1.3. The survey was scheduled for 23 June 2017.

3.2. Limitations

3.2.1. The system is not sufficiently precise to conclude that any particular waterbody with a high score will support great crested newt or that a waterbody with a low score will not support great crested newt. Oldham et al. (2000) reported that the lowest scoring pond supporting great crested newt in their study was 0.43.

3.2.2. Pond 4 could not be accessed for Habitat Suitability Index assessment in June 2017, as detailed in the Results section of this report. The results of the survey are currently based on anecdotal evidence through verbal dialogue with the tenant farmer that Pond 4 was dry and unsuitable to support great crested newt at the time of the survey.

4. Results

4.1.1. Access to the land was refused by the tenant farmer at the time of the survey. The Habitat Suitability Index survey and eDNA sampling therefore could not be conducted on Pond 4. Anecdotal evidence suggested that the pond was dry; the tenant farmer confirmed that the pond was dry.

5. Discussion

5.1.1. Given the anecdotal evidence provided by the tenant, if Pond 4 was dry in late June, it may be unsuitable to support great crested newt and eDNA sampling for presence or absence of this species would not be an applicable survey technique (at the time of the survey).

5.1.2. Given that access to Pond 4 could not be arranged, a precautionary approach will be adopted in the environmental assessment report, with consideration given to the potential suitability of this pond for great crested newt as well as information pertaining to the presence of great crested newt in the local area and connectivity of the associated ponds (as detailed in Appendix 8-2(j) Great Crested Newt Habitat Suitability Assessment and Environmental DNA (eDNA) Testing Report (Mouchel, 2016)).

Appendix 8.2 f

A46 Coventry Junctions

Great Crested Newt Habitat Suitability Report

17 June 2016

Produced for
Highways England

Prepared by

Mermaid House
2 Puddle Dock
London
EC4V 3DB
UK

T 07500 890253
E katie.jackson@mouchel.com

Document Control Sheet

Project Title A46 Coventry Junctions

Report Title Great Crested Newt Habitat Suitability Report

Revision 1

Status Final

Control Date 17 June 2016

Record of Issue

Issue	Status	Author	Date	Check	Date	Authorised	Date
1	Draft	K. Jackson	17.06.16	A. Bascombe	06.07.16	N. Venema	07.07.16

Distribution

Organisation	Contact	Copies
Mouchel	Joseph Booth	1 PDF

© Mouchel 2017

This Report is presented to Highways England in respect of A46 Coventry Junctions and may not be used or relied on by any other person or by the client in relation to any other matters not covered specifically by the scope of this Report. Notwithstanding anything to the contrary contained in the report, Mouchel Ltd is obliged to exercise reasonable skill, care and diligence in the performance of the services required by Highways England and shall not be liable except to the extent that it has failed to exercise reasonable skill, care and diligence, and this report shall be read and construed accordingly.

This Report has been prepared by Mouchel Ltd. No individual is personally liable in connection with the preparation of this Report. By receiving this Report and acting on it, the client or any other person accepts that no individual is personally liable whether in contract, tort, for breach of statutory duty or otherwise

© Mouchel 2017

Contents

Document Control Sheet ..... **i**

Contents ..... **iii**

Tables ..... **v**

1 Introduction **1**

1.1 Background 1

1.2 Site location 1

1.3 Study rationale and objectives 1

2 Legislative and policy context **2**

2.1 Summary of relevant legislation and policy 2

2.2 Conservation of Habitats and Species Regulations 2010 (as amended) 2

2.3 Wildlife and Countryside Act 1981 (as amended) 2

3 Methodology **3**

3.1 Previous survey work 3

3.2 Site visit 3

3.2.1 Habitat Suitability Assessment 3

3.2.2 eDNA testing 3

3.3 Limitations 4

4 Results **5**

4.1 HSI and eDNA results 5

5 Recommendations **6**

5.1 Overview 6

Appendix 1: Survey area map **8**

Appendix 2: HSI results **9**

© Mouchel 2017

Appendix 3: Site photographs 15

Tables

Table 4-1 HSI scores and eDNA analysis results.....5

1 Introduction

1.1 Background

In January 2016 Mouchel was commissioned by Highways England to undertake an extended Phase 1 Habitat Survey for the proposed improvement works at the Binley and Walsgrave junctions of the A46 in Coventry, West Midlands. Mouchel is currently producing the scheme's options appraisal as part of Highways England Project Control Framework process. Because of this, at the time of this ecological survey (Stage 1), only an outline design for the new junctions was available.

The Phase 1 Habitat Survey recommended that further assessment of the seven ponds identified within 500m of the scheme should be undertaken to investigate their suitability to support breeding Great Crested Newt (GCN) and, therefore, whether these animals might be at risk of adverse effects from the construction of the scheme.

This report presents the results of habitat suitability assessments and environmental DNA (eDNA) testing undertaken in June 2016. The survey area and locations of the ponds are provided in Appendix 1.

The scheme in this report refers to all the options under consideration combined, both for the A46 Binley junction and A46 Walsgrave roundabout.

1.2 Site location

The scheme is situated within a relatively rural setting, and the surrounding landscape comprises various semi-natural and man-made habitats. It is predominantly urban to the west of the A46, with the River Sowe and its tributaries, arable fields, broad leaved semi-natural woodland and a network of drainage channels to the east.

1.3 Study rationale and objectives

The aim of the study was to appraise the ecological value of the survey area for GCN. To achieve this, the following objectives were set:

- Undertake a habitat suitability assessment of all the ponds within 500m of the scheme;
- Undertake eDNA tests at all the ponds within 500m of the scheme to investigate them for the presence of great crested newt DNA; and
- To inform the process of preferred option selection and make recommendations for further survey work and ecological mitigation measures to ensure compliance with relevant biodiversity legislation and policy.

© Mouchel 2017

2 Legislative and policy context

2.1 Summary of relevant legislation and policy

This section summarises the legislation and policy which is relevant, in ecological terms, to this assessment; i.e., legislation relevant to species present or likely to be present within the survey area, and has guided the scope of work undertaken in order to identify likely ecological constraints.

2.2 Conservation of Habitats and Species Regulations 2010 (as amended)

Sites within the Natura 2000 Network and European Protected Species (EPS) highlighted as requiring conservation by all EU Member States are protected in the UK by The Conservation of Habitats and Species Regulations 2010. The EPS are protected from deliberate capture, injury or death, disturbance and destruction of their places of rest or shelter.

2.3 Wildlife and Countryside Act 1981 (as amended)

This is the main piece of legislation which protects animals, plants and, in some cases, their habitats in England. Through its inclusion under Schedule 5 of The Act GCN, their breeding sites and resting places are protected by law.

© Mouchel 2017

3 Methodology

3.1 Previous survey work

Warwickshire Biological Records Centre and ENVIS Species Records kept by Highways England, were consulted for biological records as part of the desk study for the Phase 1 Habitat Survey report.

The online, open source database MAGIC (www.magic.defra.gov.uk) was used to determine if any EPS licences have been issued within the past 10[1] years within 500m of the scheme.

The desk study revealed only one historical record (from 2002) of GCN within 2km of the scheme and that no EPS licences have been issued within the past 10 years within 500m of the scheme for great crested newt.

3.2 Site visit

3.2.1 Habitat Suitability Assessment

A Habitat Suitability Index (HSI) assessment was undertaken at six of the seven ponds by a licensed ecologist in accordance with the method described in Oldham ***et al*** (2000). The HSI score is a method of evaluating the likelihood of a pond supporting a breeding population of GCN. The HSI is a numerical index (between 0 and 1), where values close to 0 indicate unsuitable habitat and 1 represents optimal habitat. The HSI is derived from ten component suitability indices (SI), all of which are factors considered to affect this species (Oldham ***et al.,*** 2000).

HSI scores are considered as follows as an indication of the suitability of a pond to support great crested newts (Oldham ***et al.,*** 2000).

- <0.5 - poor
- 0.5 – 0.59 - below average
- 0.6 – 0.69 - average
- 0.7 – 0.79 - good
- > 0.8 - excellent

3.2.2 eDNA testing

Environmental DNA (eDNA) testing is a new technique that examines water in ponds for the presence of GCN DNA, which is released when these animals are present in the water body. The eDNA can be detected in the water for 7–21 days after the presence of GCN, this period varying according to the detection limits of qPCR and environmental conditions (Biggs ***et al.***, 2014). A methodology for eDNA survey to investigate the presence of GCN in ponds has been developed and approved by Natural England.

[1] Older records have been excluded as they do not necessarily accurately represent current ecological conditions.

© Mouchel 2017

Water samples were taken from six of the seven ponds sent for laboratory analysis to the Food and Environment Research Agency (fera) in accordance with the recommended survey protocol described in the technical advice note for field and laboratory sampling of GCN (***Triturus cristatus***) eDNA (Biggs ***et al.*** 2014) (Appendix 5).

3.3 Limitations

Access was not permitted to Pond 4 for either the habitat assessment or the eDNA testing. This pond was therefore not assessed.

The very steep embankments and width of the reedbeds of Pond 7 resulted in limited access for the eDNA testing at this pond. This restricted the sampling to the eastern end of the pond. It is possible that if water mixing within the pond was inefficient, an eDNA sampling result showing no newt DNA present could be a false negative.

All other ponds were fully accessible. The eDNA results from these ponds are likely to be fully indicative of the current presence/ absence of GCN.

© Mouchel 2017

4 Results

4.1 HSI and eDNA results

The results of HSI assessment and eDNA analysis are presented in Table 4.1. Full details of the HSI assessment are shown in Appendix 2. Photographs of each pond can be found in Appendix 3.

Table 4-1 HSI scores and eDNA analysis results

ID	Grid Reference	HSI score	Pond suitability	eDNA test result
1	SP 38842 76870	0.75	Good	Negative
2	SP 38937 77116	0.55	Below average	Negative
3	SP 38875 77625	0.63	Average	Negative
4	No access	-	-	-
5	SP 38947 80167	0.56	Below average	Negative
6	SP 39326 80257	0.69	Average	Positive
7	SP 39390 80281	0.78	Good	Negative

© Mouchel 2017

5 Recommendations

5.1 Overview

Pond 6 was the only pond that tested positive for the presence of GCN DNA. It is recommended that further survey work is undertaken at this pond during the newt active season (April to June) to confirm the presence of breeding GCN and, if so, to assess the population size. This information will enable an appropriate mitigation strategy to be devised should this pond be affected by the proposed scheme.

Pond 5 and Pond 7 occur in close proximity to Pond 6 (350m and 18m distant, respectively), without significant barriers to GCN movement between them. Therefore, it is possible that GCN present in the area may use these ponds for breeding. Hence, it is recommended that further survey work is undertaken at these two ponds. This work should be undertaken at the same time as the required survey of Pond 6.

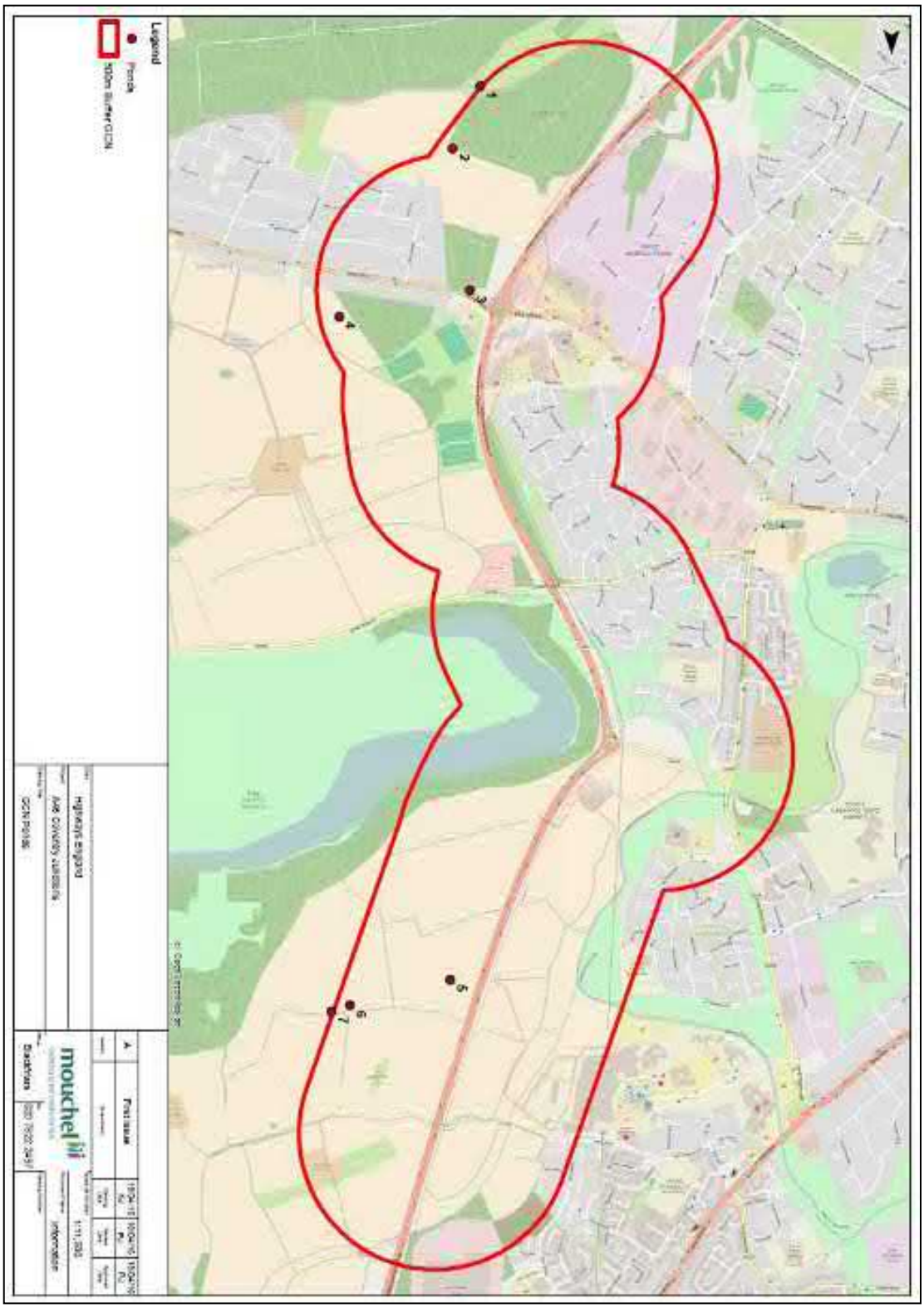
It is recommended that access for Pond 4 is arranged at the same time as the above surveys to allow for the HSI assessment and eDNA testing to be carried out at this pond, which has not been possible at the time of this writing.

© Mouchel 2017

We have used our reasonable endeavours to provide information that is correct sand accurate and have discussed above the reasonable conclusions that can be reached on the basis of the information available. We would recommend that in order to obtain more secure results, the additional work outlined above should be commissioned.

© Mouchel 2017

Appendix 1: Survey area map



© Mouchel 2017

Appendix 2: HSI results

Great Crested Newt Survey			**1. Pond Details**
Project	**A46 Coventry Junctions**		
Project number/reference			
Site			
Pond number/reference	Pond 1		
OS Grid reference	SP 38842 76870		
Location details			
Access instructions	Through Piles Coppice		
Landowner name			
Address/email			
Telephone			
Habitat Suitability Index			**SI value**
SI1. Map location	**A/B/C**	A	1.00
SI2. Surface area	**rectangle/ellipse/irregular**	irregular	
	length (m)		
	width (m)		
	OR estimate (m^2) if irregular	600	
	area (m^2) =	*600*	1.00
SI3. Dessication rate	**never/rarely/sometimes/frequently**	never	0.90
SI4. Water quality	**good/moderate/poor/bad**	moderate	0.67
SI5. Shade	% of margin shaded 1m from bank	30	1.00
SI6. Waterfowl	**absent/minor/major**	minor	0.67
SI7. Fish population	**absent/possible/minor/major**	minor	0.33
SI8. Pond density	number of ponds within 1km	5	1.00
SI9. Terrestrial habitat	**good/moderate/poor/isolated**	good	1.00
SI10. Macrophyte cover	%	10	0.41
***Note:** Guidance in undertaking the HSI is available at www.narrs.org.uk.*		**HSI score =**	**0.75**
HSI calculation formulae adapted from Rob Oldham		**Pond suitability =**	**good**
General description/notes/comments			
possible fishing pond, well flattened areas around edge			

© Mouchel 2017

Great Crested Newt Survey — 1. Pond Details

Project	**A46 Coventry Junctions**
Project number/reference	
Site	
Pond number/reference	Pond 2
OS Grid reference	SP 38937 77116
Location details	
Access instructions	Through Piles Coppice
Landowner name	
Address/email	
Telephone	

Habitat Suitability Index

				SI value
SI1.	Map location	**A/B/C**	A	1.00
SI2.	Surface area	**rectangle/ellipse/irregular**	irregular	
		length (m)		
		width (m)		
		OR estimate (m^2) if irregular	50	
		area (m^2) =	*50*	0.10
SI3.	Dessication rate	**never/rarely/sometimes/frequently**	sometimes	0.50
SI4.	Water quality	**good/moderate/poor/bad**	poor	0.33
SI5.	Shade	% of margin shaded 1m from bank	90	0.40
SI6.	Waterfowl	**absent/minor/major**	absent	1.00
SI7.	Fish population	**absent/possible/minor/major**	absent	1.00
SI8.	Pond density	number of ponds within 1km	4	1.00
SI9.	Terrestrial habitat	**good/moderate/poor/isolated**	good	1.00
SI10.	Macrophyte cover	%	5	0.36

***Note**: Guidance in undertaking the HSI is available at www.narrs.org.uk.*
HSI calculation formulae adapted from Rob Oldham

HSI score = **0.55**

Pond suitability = **below average**

General description/notes/comments

looks to dry out, connected to ancient woodland along one side of pond, arable field to the other

© Mouchel 2017

Great Crested Newt Survey — 1. Pond Details

Project	**A46 Coventry Junctions**
Project number/reference	
Site	
Pond number/reference	Pond 3
OS Grid reference	SP 38875 77625
Location details	Within Binley Wood, off Rugby Road
Access instructions	
Landowner name	Graham Benford
Address/email	
Telephone	01455 209038

Habitat Suitability Index

				SI value
SI1.	Map location	**A/B/C**	A	1.00
SI2.	Surface area	**rectangle/ellipse/irregular**	ellipse	
		length (m)	15	
		width (m)	8	
		OR estimate (m^2) if irregular		
		area (m^2) =	*94.2*	0.19
SI3.	Dessication rate	**never/rarely/sometimes/frequently**	rarely	1.00
SI4.	Water quality	**good/moderate/poor/bad**	moderate	0.67
SI5.	Shade	% of margin shaded 1m from bank	85	0.50
SI6.	Waterfowl	**absent/minor/major**	minor	0.67
SI7.	Fish population	**absent/possible/minor/major**	possible	0.67
SI8.	Pond density	number of ponds within 1km	3	1.00
SI9.	Terrestrial habitat	**good/moderate/poor/isolated**	good	1.00
SI10.	Macrophyte cover	%	5	0.36

***Note**: Guidance in undertaking the HSI is available at www.narrs.org.uk.*
HSI calculation formulae adapted from Rob Oldham

HSI score = **0.63**

Pond suitability = **average**

General description/notes/comments

Pondweed growth over surface of pond

© Mouchel 2017

Great Crested Newt Survey — 1. Pond Details

Project	**A46 Coventry Junctions**
Project number/reference	
Site	
Pond number/reference	Pond 5
OS Grid reference	SP 38947 80167
Location details	Arable field margin
Access instructions	Concrete track
Landowner name	Patrick O'Brein
Address/email	
Telephone	

Habitat Suitability Index

				SI value
SI1.	Map location	**A/B/C**	A	1.00
SI2.	Surface area	**rectangle/ellipse/irregular**	ellipse	
		length (m)	13	
		width (m)	5	
		OR estimate (m^2) if irregular		
		area (m^2) =	*51.025*	0.10
SI3.	Dessication rate	**never/rarely/sometimes/frequently**	sometimes	0.50
SI4.	Water quality	**good/moderate/poor/bad**	moderate	0.67
SI5.	Shade	% of margin shaded 1m from bank	90	0.40
SI6.	Waterfowl	**absent/minor/major**	absent	1.00
SI7.	Fish population	**absent/possible/minor/major**	absent	1.00
SI8.	Pond density	number of ponds within 1km	4	1.00
SI9.	Terrestrial habitat	**good/moderate/poor/isolated**	moderate	0.67
SI10.	Macrophyte cover	%	0	0.31

***Note:** Guidance in undertaking the HSI is available at www.narrs.org.uk.*
HSI calculation formulae adapted from Rob Oldham

HSI score = **0.56**

Pond suitability = **below average**

General description/notes/comments

Willow trees shade out pond and drop leaf litter in, no egg laying material other than dead leaves.

© Mouchel 2017

Great Crested Newt Survey — 1. Pond Details

Project	**A46 Coventry Junctions**
Project number/reference	
Site	
Pond number/reference	Pond 6
OS Grid reference	SP 39326 80257
Location details	Arable field margin
Access instructions	Concrete track
Landowner name	Patrick O'Brein
Address/email	
Telephone	

Habitat Suitability Index

				SI value
SI1.	Map location	**A/B/C**	A	1.00
SI2.	Surface area	**rectangle/ellipse/irregular**	ellipse	
		length (m)	15	
		width (m)	10	
		OR estimate (m^2) if irregular		
		area (m^2) =	*117.75*	0.24
SI3.	Dessication rate	**never/rarely/sometimes/frequently**	rarely	1.00
SI4.	Water quality	**good/moderate/poor/bad**	moderate	0.67
SI5.	Shade	% of margin shaded 1m from bank	10	1.00
SI6.	Waterfowl	**absent/minor/major**	minor	0.67
SI7.	Fish population	**absent/possible/minor/major**	possible	0.67
SI8.	Pond density	number of ponds within 1km	5	1.00
SI9.	Terrestrial habitat	**good/moderate/poor/isolated**	moderate	0.67
SI10.	Macrophyte cover	%	20	0.51

***Note**: Guidance in undertaking the HSI is available at www.narrs.org.uk.*
HSI calculation formulae adapted from Rob Oldham

HSI score = **0.69**

Pond suitability = **average**

General description/notes/comments

Steep banks

© Mouchel 2017

Great Crested Newt Survey — 1. Pond Details

Project	**A46 Coventry Junctions**
Project number/reference	
Site	
Pond number/reference	Pond 7
OS Grid reference	SP 39390 80281
Location details	Arable field margin
Access instructions	Concrete track
Landowner name	Patrick O'Brein
Address/email	
Telephone	Faye O'Brein (spouce), 07984 376523

Habitat Suitability Index

				SI value
SI1.	Map location	**A/B/C**	A	1.00
SI2.	Surface area	**rectangle/ellipse/irregular**	rectangle	
		length (m)	40	
		width (m)	15	
		OR estimate (m^2) if irregular		
		area (m^2) =	*600*	1.00
SI3.	Dessication rate	**never/rarely/sometimes/frequently**	rarely	1.00
SI4.	Water quality	**good/moderate/poor/bad**	moderate	0.67
SI5.	Shade	% of margin shaded 1m from bank	40	1.00
SI6.	Waterfowl	**absent/minor/major**	minor	0.67
SI7.	Fish population	**absent/possible/minor/major**	possible	0.67
SI8.	Pond density	number of ponds within 1km	5	1.00
SI9.	Terrestrial habitat	**good/moderate/poor/isolated**	moderate	0.67
SI10.	Macrophyte cover	%	10	0.41

***Note**: Guidance in undertaking the HSI is available at www.narrs.org.uk.*
HSI calculation formulae adapted from Rob Oldham

HSI score = **0.78**

Pond suitability = **good**

General description/notes/comments

Very steep banks and wide reed bed margins

© Mouchel 2017

Appendix 3: Site photographs

	
Pond 1	Pond 2
	
Pond 3	Pond 5
	
Pond 6	Pond 7

© Mouchel 2017

Appendix 8.2 g

Appendix A: A46 Coventry Junctions Improvements - Bat Activity Surveys 2018

1. INTRODUCTION

1.1 Background

1.1.1 Highways England has commissioned the provision of design services for the A46 Coventry Junctions Upgrade, at Binley Junction, West Midlands (hereafter referred to as 'the proposed scheme'). For full details of the proposed scheme please refer to the A46 Coventry Junctions Upgrade Environmental Assessment Report (HE551486-ACM-EGN-A46_SW_000_Z-RP-LE-0002-C02).

1.1.2 This report has been prepared as an addendum to the Interim Bat Activity Survey Report included within the Environmental Assessment Report in 2018. This report presents the methods and results of bat activity transect surveys undertaken in 2018 which have been undertaken to supplement the 2017 survey data, as not all necessary transect visits could be completed in 2017. The purpose of the bat activity transect surveys was to assess the suitability of the habitats within the proposed scheme to support commuting and foraging bats. Assessments of habitat suitability for bats were undertaken in May 2016 and further refined in 2017 following revisions to the proposed scheme. Habitats present within the proposed scheme were assessed as being of low to moderate habitat suitability for foraging and commuting bats as defined by the current bat survey guidelines (Collins, 2016). One activity transect, together with up to five days automated recording (using static bat detectors), were undertaken per month between August and October 2017. The spring and early summer seasons were not included due to late commission in 2017.

1.1.3 This report presents the methods and results of the 2018 bat surveys and, using data collected in both 2017 and 2018, provides an assessment of the suitability of habitats within the proposed scheme to support commuting and foraging bats.

1.2 Relevant Legislation and Policy

1.2.1 For full details of relevant legislation relating to bats please refer to the Interim Bat Activity Survey Report, presented within the Environmental Assessment Report (HE551486-ACM-EGN-A46_SW_000_Z-RP-LE-0002-C02).

2. METHODOLOGY

2.1 Desk Study

2.1.1 Records of existing bat species within 2km of the proposed scheme was requested from Warwickshire Ecological Records Centre in 2017 and a search for granted European Protected Species Mitigation Licence (EPSML) applications for bats within 2km of the proposed scheme was undertaken using the Multi Agency Geographic Information for the Countryside (MAGIC) website (www.magic.defra.gov.uk).

2.2 Bat Activity Surveys

2.2.1 The number of bat activity surveys required to achieve a reasonable survey effort was assessed in relation to habitat suitability, following the current bat survey guidelines (Collins, 2016). In 2017, the proposed scheme was assigned a moderate value, for further explanation please refer to the Interim Bat Activity Survey Report presented within the Environmental Assessment Report (HE551486-ACM-EGN-A46_SW_000_Z-RP-LE-0002-C02).

2.2.2 Following the surveys undertaken in 2017, the level of survey effort required was re-assessed.

2.2.3 Due to the relatively low number of bats recorded during the surveys conducted by AECOM Infrastructure and Environment Limited ('AECOM') in 2017, and the presence of the existing dual carriageway which did not feature in the initial habitat assessment, it was concluded that the habitat value for bats could be reduced to low from the initial moderate value. This reduced the number of visits necessary to be carried out in 2018 to one per season in accordance with the current bat survey guidelines (Collins 2016) see Table A-1 below. The Autumn visit was covered by the surveys carried out in 2017 on 17th and 18th of August, 6th September and 12th October. A further two visits were carried out in 2018; a Spring visit on 17th April and a Summer visit on 25th June.

2.2.4 For full details of the survey methodologies used including the desk study carried out in 2017, please refer to the Interim Bat Activity Survey Report presented within the Environmental Assessment Report (HE551486-ACM-EGN-A46_SW_000_Z-RP-LE-0002-C02). The same methods described within this report in 2017 were adopted in 2018.

2.2.5 Each transect involved two suitably experienced AECOM ecologists walking a predetermined route, which included a series of 'spot counts' in the most suitable habitats along the route. During the transect and at each 'spot count' for set periods of time (5 minutes), surveyors used bat echolocation detectors to constantly record bat activity, where details of any observed activity such as; species, number, behaviour and bat flight direction was noted. The starting point and direction of the transect was varied during each survey visit in order to ensure different areas of the transect were walked close to dusk.

2.2.6 All the 2018 transects were undertaken at dusk and continued for at least one and a half hours after sunset.

2.2.7 A map of the transect route including 'spot counts' and static locations is provided in Annex A for reference.

Table A-1: Recommended number of bat activity surveys from Table 8.3 in the current bat survey guidelines (Collins, 2016)

Survey Type	Low suitability for bats	Moderate suitability for bats	High suitability for bats
Transect/spot count/timed search surveys	One survey visit per season (spring – April or May, summer – June or July or August, autumn – September or October) in appropriate weather conditions for bats. Further surveys may be required if these survey visits reveal higher levels of bat activity than predicted by the habitat alone.	One survey visit per month (April to October) in appropriate weather conditions for bats. At least one of the surveys should comprise dusk and pre-dawn (or dusk to dawn) within one 24-hour period.	Up to two survey visits per month (April to October) in appropriate weather conditions for bats. At least one of the surveys should comprise dusk and pre-dawn (or dusk to dawn) within one 24-hour period.
AND			
Automated/static bat detector surveys	One location per transect, data to be collected on five consecutive nights per season (spring – April or May, summer – June or July or August, autumn - September or October) in appropriate weather conditions for bats.	Two locations per transect, data to be collected on five consecutive nights per month (April to October) in appropriate weather conditions for bats.	Three locations per transect, data to be collected on five consecutive nights per month (April to October) in appropriate weather conditions for bats.

2.3 Automated Bat Detector Surveys

2.3.1 Static monitoring was undertaken using Wildlife Acoustics SM2BAT+ automated bat detectors, at three locations for a minimum period of five nights in April and June 2018, as per the recommendations shown in Table A-1. This level of survey effort was above the recommended one static monitoring point per transect given in the current bat survey guidelines (Collins 2016) for low value habitats. The increase in survey effort was to provide a more thorough coverage of the linear features and various habitats present within the proposed scheme to support information on bat species assemblage.

2.3.2 The locations of the static monitoring points are shown in Table A-2 below and Annex A: Figure A-1. The echolocation calls detected during the static monitoring were analysed using Analook W software, version 4.2.

Table A-2: Location of static monitoring points and automated survey period.

Location	Grid reference	Survey dates (no. of nights in brackets)	
		April 2018	June 2018
Nature Reserve	SP 38129 76894	Thursday 19 – Wednesday 25 (6 nights)	Monday 25 – Monday 2 (7 nights)
Rugby Club	SP 38870 77880		
Coombe Pool SSSI / Country Park	SP 39625 78747		

2.4 Assessment of Bat Activity

2.4.1 Results of the 2018 bat activity transect surveys and automated bat detector surveys were used to evaluate foraging and commuting bat habitats within the proposed scheme.

2.4.2 The transect and static bat detector data collected were analysed to determine the total number of bat passes for each species or species group (depending on the level of identification possible from the recordings made). This was then used to derive a metric; the Bat Activity Index (hereafter referred to as 'the index') for the relative bat activity at each survey location. This analysis provides an indication of:

- *seasonal variation in species activity and composition at each survey location*
- *relative levels of bat activity across the proposed scheme*
- *important foraging areas and commuting routes*

2.4.3 The index values have been calculated by averaging the number of bat passes per hour over the course of each survey period. Full automated detector results for each season are presented in Annex B for transects and Annex C for static monitoring points. This data was used to calculate the index for each location and gives an indication of bat abundance and activity at a particular location per month.

2.4.4 The term 'pass' is defined as a single file made up of bat pulses of a single species. That is, it may be one bat or many bats in a single file.

2.4.5 No standard guidance is available on what constitutes low, moderate or high bat activity based on number of passes. As such a relative scale is used in this report where:

- *very low activity is less than 2 passes per hour (at each survey location)*
- *low activity is 2 to 25 passes per hour*
- *moderate activity is 26 to 99 passes per hour*
- *high activity is over 100 passes per hour*

2.4.6 However, it must be stressed that this is a purely arbitrary reference of activity with no statistical or evidential basis and purely for comparative use across the proposed scheme, as opposed to comparison with bat records from elsewhere.

2.5 Survey Constraints

2.5.1 As the A46 is a busy high speed road it was not possible to include the existing carriageway, or the verges within the transect route due to health and safety concerns. This was not thought to affect the outcomes of the report, as the transect route was designed to cover as much of the proposed scheme as possible and include all habitat types recorded.

3. RESULTS

3.1 Desk Study

3.1.1 The desk study conducted in 2017 returned existing records for roosts of four bat species; soprano pipistrelle (*Pipistrellus pygmaeus*), common pipistrelle (*Pipistrellus pipistrellus*), brown long-eared bat (*Plecotus auritus*) and Nathusius' pipistrelle (*Pipistrellus nathusii*) and activity records for eight bat species; soprano pipistrelle, common pipistrelle, Nathusius' pipistrelle, brown long-eared bat, serotine bat (*Eptesicus serotinus*), Daubenton's bat (*Myotis daubentonii*), Natterer's bat (*Myotis nattereri*) and noctule bat (*Nyctalus noctula*) within 2km of the proposed scheme. none of the records are located within the proposed scheme.

3.1.2 One granted EPSML for bats was identified approximately 500m east of the proposed scheme and referred to a common pipistrelle and brown long-eared bat roost.

3.1.3 For full details of the desk study results see Interim Bat Activity Survey Report presented within the Environmental Assessment Report (HE551486-ACM-EGN-A46_SW_000_Z-RP-LE-0002-C02).

3.2 Bat Activity Surveys

3.2.1 Full results of the 2018 bat activity surveys are presented in Annex A Figure A-2; and below is a descriptive summary of results.

3.2.2 Despite weather conditions being suitable, no bats were observed or recorded during the April transect survey.

Three species of bat; common pipistrelle, noctule and Nyctalus species (*Nyctalus sp.)* were recorded during the survey undertaken on 25th June 2018. The highest numbers of bat passes were recorded around the Herald Way Marsh Nature Reserve with 65% of bat passes (11 of 17) recorded around this location.

3.2.3 Table A-3 below provides a detailed assessment of the activity across the transect for each survey visit.

Table A-3: Bat Transect Results Summary 2018

Survey month	Weather conditions	Dusk or Dawn & Route or Direction	Bat activity description	Species encountered
Spring Transect Dusk (17th April 2018)	Cool, windy and dry	Dusk A-J	No bats were recorded on this transect.	None
Summer Transect Dusk (25th June 2018)	Warm dry still evening after very hot day.	Dusk J-A	2 bat passes over the roundabout junction, both common pipistrelle (*Pipistrellus pipistrellus*); 4 passes just outside the transect around the loop through Binley Industrial Estate between sections adjacent to the road (3 common pipistrelle and 1 noctule (*Nyctalus noctula*)); and 11 passes in the Herald Way Marsh Nature Reserve (5 noctules, 2 *Nyctalus* species and 4 common pipistrelle).	Common pipistrelle (*Pipistrellus pipistrellus*), noctule (*Nyctalus noctula*) and *Nyctalus* species (*Nyctalus sp.*)

3.3 Automated Detector Surveys

3.3.1 A summary of the results of the automated detector surveys for 2018 is shown below.

3.3.2 Four bat species were recorded in 2018 during the automated detector surveys; common pipistrelle, soprano pipistrelle, noctule and Myotis (*Myotis sp.*) species. Common pipistrelle and soprano pipistrelle can be difficult to separate using a zero crossing file when calls recorded are towards the lower end of the soprano pipistrelle peak frequency and higher end of the common pipistrelle peak frequency. As such any pipistrelle bat with a peak frequency between 49 kHz and 51 kHz has been classified as 'pipistrelle species'.

3.3.3 Table A-4 below shows the number of bat passes for each species.

3.3.4 The highest numbers of bat passes were recorded in Spring at Static Point A (See Annex A, Figure A-1). Relatively few bat passes were recorded in June.

3.3.5 Static Point A monitoring point recorded less than ten passes during the five day monitoring session in Spring and Summer.

3.3.6 It should be noted that usage is difficult to place into context because the automated detectors do not record the numbers of bats present or the direction of movement. However, the automated detectors do provide a useful baseline of bat usage over an extended period of time that cannot reasonably be recorded during transect surveys, which capture a 'snapshot' of bat usage in a particular area at a particular time.

Table A-4: Bat Static Monitoring Results Summary 2018

Month	Weather conditions across survey nights	Detector location	Total number of passes per bat species (over five consecutive nights)					Total number of bat passes
			Common pipistrelle	Soprano pipistrelle	Common /soprano pipistrelle	Noctule	*Myotis* sp.	
Spring (April 2018 Thursday 19 – Wednesday 25)	Dry, minimum temperature 8°C maximum temperature 25°C	Nature Reserve	1069	1357		3		2429
		Rugby Club	58	36	1			
		Country Park	2			23		
Summer (June 2018 Monday 25 – Monday 2)	Dry, minimum temperature 11°C maximum temperature 27°C	Nature Reserve	2				2	67
		Rugby Club	46	6	2			
		Country Park	4	1			4	

3.4 Assessment of Bat Activity

The Bat Activity Index results are presented within

3.4.2 Table A-5 below. Relatively few bat passes were recorded and the index at all locations in April and June are low, apart from the Nature Reserve monitoring point in April which was moderate.

Table A-5: Bat Activity Index

Month	Detector location	Bat Activity Index (bat passes per hour*) *see Appendix D for number of hours used
April 2018 Thursday 19 – Wednesday 25	Nature Reserve	38.11
	Rugby Club	1.49
	Country Park	0.11
June 2018 Monday 25 – Monday 2	Nature Reserve	0.10
	Rugby Club	0.72
	Country Park	0.18

4. DISCUSSION

4.1.1 This section provides a discussion on bat activity using 2017 and 2018 data.

4.1.2 Bat activity transects and static monitoring surveys have been undertaken in August, September and October 2017, and April and June 2018.

4.1.3 Good habitat coverage of the proposed scheme was achieved during the survey period and the level of survey effort is considered sufficient to provide an assessment of bat activity within the proposed scheme.

4.1.4 During the walked transect surveys in both 2017 and 2018, the following species of bats were recorded; common pipistrelle, noctule, *Nyctalus* sp., soprano pipistrelle and *Myotis* sp.

4.1.5 No bats were recorded within the proposed scheme during the walked transect surveys. This was partially due to access constraints to the existing carriageway, which meant that surveys had to be focused largely within the +50m zone beyond the proposed scheme boundary and out of sight of parts of the carriageway. However, this is considered not to have affected the outcomes of the report, as the transect route was designed to cover as much of the proposed scheme as possible and include all habitat types recorded.

4.1.6 A similar bat species assemblage was recorded during the 2017 and 2018 static detector surveys; common pipistrelle, soprano pipistrelle, Myotis sp. and noctule.

4.1.7 The highest number of bat passes was of common pipistrelle and soprano pipistrelle bats with a few passes each by noctule and *Myotis* species bats. The number of bat passes was consistently low; with a maximum of 19 bat passes recorded during any of the survey visits. The highest concentration number of bat passes was recorded around the Broadstreet Rugby Club and roundabout junction and the Herald Way Marsh Nature Reserve.

4.1.8 The Coombe Country Park monitoring point consistently recorded very low indexes of bat activity in 2017 and 2018.

4.1.9 The Rugby club monitoring point recorded very low to low indexes in 2017 and 2018 with the highest number of passes occurring in October 2017.

4.1.10 The Herald Way Marsh Nature Reserve static monitoring point recorded very low to low indexes of bat activity in 2017 and 2018 apart from April 2018 when a Moderate index of activity was recorded.

4.1.11 Habitat loss and land take from the proposed scheme is of limited extent and due to the low habitat value of these habitats to foraging and commuting bats, no significant impacts are anticipated.

5. REFERENCES

AECOM (2018) A46 Coventry Junction Upgrade. Interim Bat Activity Survey Report.

Collins, J (ed.) (2016) Bat surveys for professional ecologists: good practice guidance 3rd ed. Bat Conservation Trust, London

Multi Agency Geographic Information for the Countryside (MAGIC) website (www.magic.defra.gov.uk)

ANNEX A: FIGURES

Figure A-1: Bat Transect Location

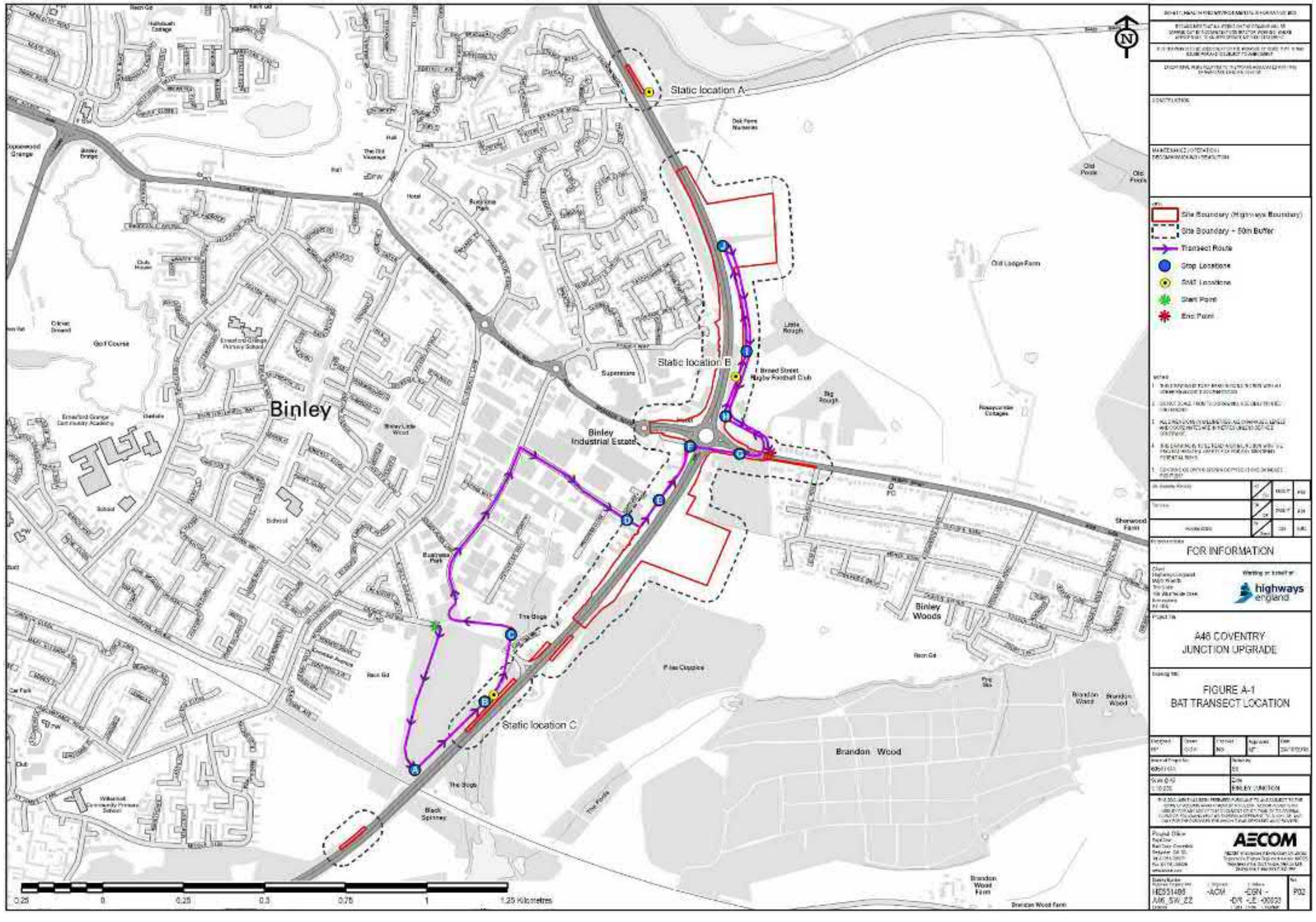
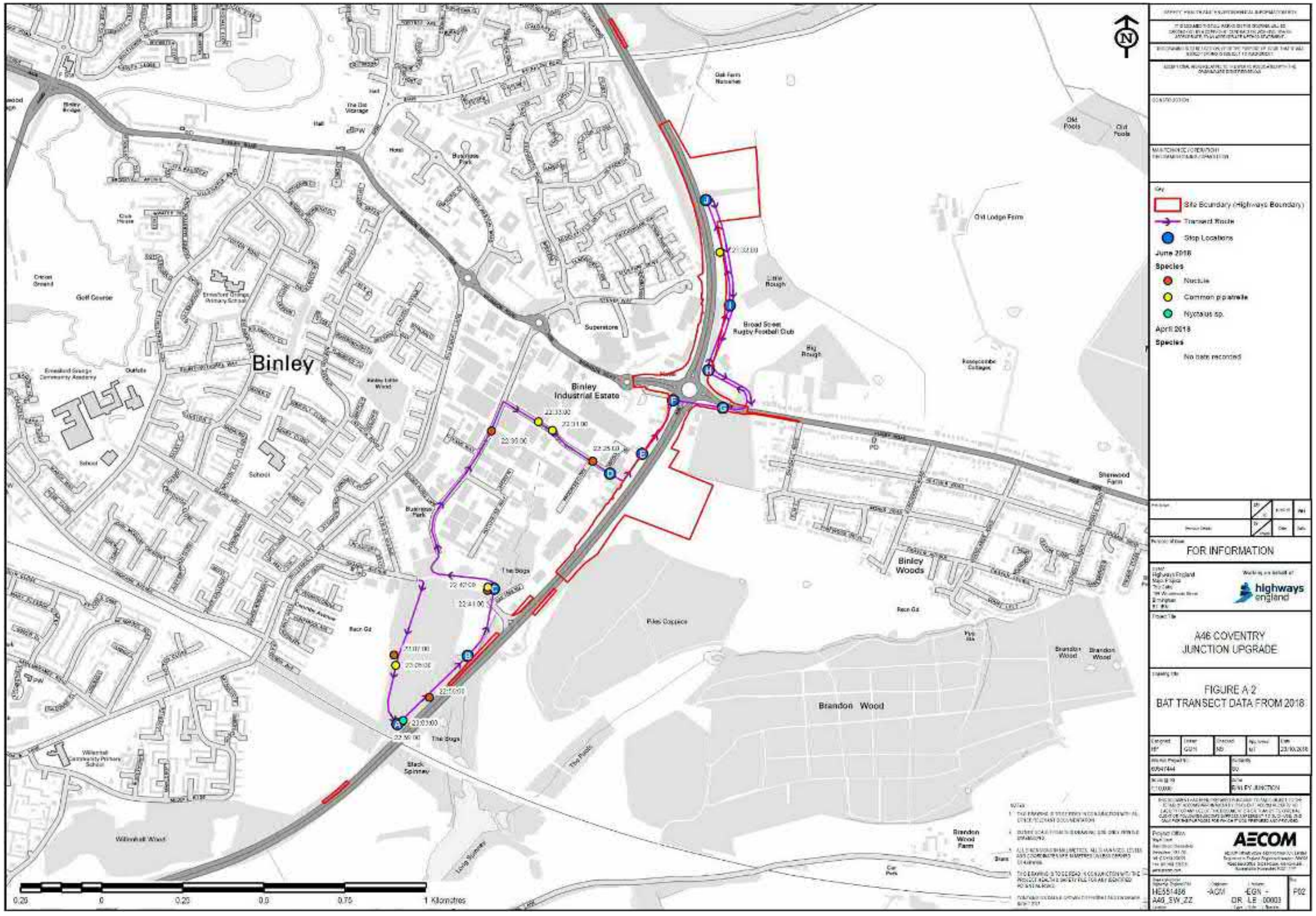


Figure A-2: Bat Transect Data from 2018 Transects



ANNEX B: FULL BAT TRANSECT DATA

i. Spring Dusk Transect

DUSK					
Project Name	A46 Coventry Junctions		**Surveyors**		JC, DH
Survey Location	A46 Coventry Junctions		**Rain (0-5)**		0
Date	17/04/2018		**Wind (0-7)**		3
Start	20:03		**Cloud Cover (0-5)**		0
Sunset	20:18		**Temperature**		12°C
Finish	21:45		**Weather description**		Cool breezy evening
Time	**Species**	**Location (transact points)**	**No. of bat passes**	**Recording (Y/N)**	**Description of behaviour**
Total bat passes			None		

ii. Summer Dusk Transect

DUSK					
Project Name	A46 Coventry Junctions		**Surveyors**		JC, DH
Survey Location	A46 Coventry Junctions		**Rain (0-5)**		0
Date	25/06/2018		**Wind (0-7)**		2
Start	21:17		**Cloud Cover (0-5)**		0
Sunrise	21:32		**Temperature**		23°C
Finish	23:13		**Weather description**		Warm evening after very hot day
Time	**Species**	**Location (transact points)**	**No. of bats**	**Recording (Y/N)**	**Description of behaviour**
21:32	Pipistrelle sp.	Between J-I	1	Y	Heard only, not seen. Brief pass.
21:50	Unknown bat sp.	H-G	1	Y	Heard only, not seen. Brief pass. Possibly just

DUSK					
Project Name	A46 Coventry Junctions		**Surveyors**		JC, DH
Survey Location	A46 Coventry Junctions		**Rain (0-5)**		0
Date	25/06/2018		**Wind (0-7)**		2
Start	21:17		**Cloud Cover (0-5)**		0
Sunrise	21:32		**Temperature**		23°C
Finish	23:13		**Weather description**		Warm evening after very hot day
Time	**Species**	**Location (transact points)**	**No. of bats**	**Recording (Y/N)**	**Description of behaviour**
					noise not a bat
22:25	Possibly noctule	D-C	1	Y	Heard only, not seen. Brief pass.
22:31	Common pipistrelle	D-C	1	Y	Heard only, not seen. Brief pass.
22:33	Common pipistrelle	D-C	1	Y	Heard only, not seen.
22:35	Noctule	D-C	2	Y	Heard only, not seen.
22:41	Noctule	C	1	Y	Heard only, not seen.
22:42	Common pipistrelle	C	1	Y	Heard only, not seen.
22:51	Common pipistrelle	B	1	Y	Heard only, not seen.
22:56	Noctule	B-A	1	Y	Heard only, not seen.
22:59	Noctule	A	1	Y	Heard only, not seen.
23:01	Noctule	A	1	Y	Heard only, not seen.
23:03	Noctule	A	1	Y	Heard only, not seen.
23:05	Common pipistrelle	A-Finish	1	Y	Heard only, not seen.
23:07	Noctule	A-Finish	1	Y	Heard only, not seen.
Total bat passes			16		

ANNEX C: FULL AUTOMATED DETECTOR DATA

i. Static Point A (Country Park): SP 39625 78747

Date	Sunset	Minimum and maximum temp. °C	Species[1]	First bat pass	17:00 18:00	18:00 19:00	19:00 20:00	20:00 - 21:00	21:00 22:00	22:00 23:00	23:00 00:00	00:00 01:00	01:00 02:00	02:00 03:00	03:00 04:00	04:00 05:00	05:00 06:00	Last bat pass	Sunrise	Number of Survey Hours[2]	Total number of bat passes (species specific)	Bat Activity Index (bat passes per hour)[3]	Bat Activity Index (bat passes per hour)[3]
19/04/18	20:11	10/25	NYNO	20:38				1										08:38	05:57	09:46	1	0.10	
20/04/18	20:13	10/20	PIPI	03:59											1			03:59	05:55	09:44	1	0.51	
			NYYNO	20:41				2	1								1	05:22			4		
21/04/18	20:14	9/20	PIPI	00:12								1						00:12	05:53	09:41	1	0.72	0.43
			NYNO	08:39				1				1					4	05:27			6		
22/04/18	20:16	10/18	NYNO	21:07					1								2	05:14	05:51	09:37	3	0.31	
23/04/18	20:18	8/14	None																05:49	09:33			
24/04/18	20:20	9/13	None																05:47	09:29			
25/06/18	21:32	13/28	None																04:45	07:13			
26/06/18	21:32	15/27	None																04:45	07:13			
27/06/18	21:32	11/26	PIPI	02:20												2		02:35	04:46	07:14	2	0.28	
28/06/18	21:32	12/26	MYOTIS	02:24												2		02:57	04:46	07:14	2	0.28	
29/06/18	21:31	11/27	PIPI	02:45										1				02:45	04:47	07:16	1	0.28	0.18
			MYOTIS	01:31									1					01:31			1		
30/06/18	21:31	13/26	PIPY	21:44					1									21:44	04:48	07:17	1	0.14	
01/07/18	21:31	13/28	PIPI	01:50										1				01:50	04:48	07:17	1	0.27	
			MYMO	03:05											1			03:05			1		

1. Key: PIPI: common pipistrelle (Pipistrellus pipistrellus), PIPY: soprano pipistrelle (Pipistrellus pygmaeus), NYNO: noctule bat (Nyctalus noctula), MYOTIS: Myotis species.
2. The number of survey hours corresponds to the length of the night, i.e. the time between sunset and sunrise.

3. The Bat Activity Index of the number of bat passes per hour is calculated from the number of bat passes / number of survey hours (i.e. length of the night in-between sunset and sunrise) for each of the individual survey nights and as an average of the five survey nights making up each monthly survey session.

ii. Static Point B (Rugby Club): SP 38870 77880

Date	Sunset	Minimum and maximum temp. °C	Species[1]	First bat pass	17:00 - 18:00	18:00 19:00	19:00 - 20:00	20:00 - 21:00	21:00 - 22:00	22:00 - 23:00	23:00 - 00:00	00:00 - 01:00	01:00 02:00	02:00 - 03:00	03:00 - 04:00	04:00 - 05:00	05:00 - 06:00	Last bat pass	Sunrise	Number of Survey Hours[2]	Total number of bat passes (species specific)	Bat Activity Index (bat passes per hour)[3]	Bat Activity Index (bat passes per hour)[3]
19/04/18	20:11	10/25	PIPI	20:41				5	9	9	10	7	2				1	05:01	05:57	09:46	43	6.15	1.64
			PIPY	21:23					3		3	1	1	1	2	3	2	05:02			16		
			PIPI/PIPY	21:35					1									21:35			1		
20/04/18	20:13	10/20	PIPI	21:05					5	3								22:55	05:55	09:44	8	1.64	
			PIPY	20:36				4	2			1		1				02:04			8		
21/04/18	20:14	9/20	PIPI	21:07					1					2		1		04:53	05:53	09:41	4	0.52	
			PIPY	21:10							1							21:10			1		
22/04/18	20:16	10/18	PIPI	20:50				1		2								22:20	05:51	09:37	3	1.35	
			PIPY	20:41				2	1	6							1	05:12			10		
23/04/18	20:18	8/14	PIPY	21:22					1									21:22	05:49	09:33	1	0.1	
24/04/18	20:20	9/13	None																05:47	09:29			
25/06/18	21:32	13/28	PIPI	00:14								1	1	1				02:02	04:45	07:13	3	0.55	1.06
			PIPY	02:45										1				02:45			1		
26/06/18	21:32	15/27	PIPI	00:05								1	1	1				02:44	04:45	07:13	3	0.55	
			PIPY	03:31											1			03:31			1		
27/06/18	21:32	11/26	PIPI	22:42						3		2	1	1	1			03:45	04:46	07:14	8	1.24	
			PIPY	23:01							1							23:01			1		
28/06/18	21:32	12/26	PIPI	22:12						2	2	3	1	1				02:34	04:46	07:14	9	1.38	
			PIPY	02:02										1				02:02			1		
			PIPI/PIPY	01:26									1					01:26			1		
29/06/18	21:31	11/27	PIPI	22:41						2		2	2	2	2			03:50	04:47	07:16	10	1.38	

Date	Sunset	Minimum and maximum temp. °C	Species[1]	First bat pass	17:00 - 18:00	18:00 19:00	19:00 - 20:00	20:00 - 21:00	21:00 - 22:00	22:00 - 23:00	23:00 - 00:00	00:00 - 01:00	01:00 02:00	02:00 - 03:00	03:00 - 04:00	04:00 - 05:00	05:00 - 06:00	Last bat pass	Sunrise	Number of Survey Hours[2]	Total number of bat passes (species specific)	Bat Activity Index (bat passes per hour)[3]	Bat Activity Index (bat passes per hour)[3]
30/06/18	21:31	13/26	PIPI	23:22							3	2			2			03:23	04:48	07:17	7	1.24	
			PIPY	02:31										1				02:31			1		
			PIPI/PIPY	03:22											1			03:22			1		
01/07/18	21:31	13/28	PIPI	23:34							1	1	3					01:27	04:48	07:17	5	0.82	
			PIPY	02:40										1				02:40			1		

1. Key: PIPI: common pipistrelle (*Pipistrellus pipistrellus*), PIPY: soprano pipistrelle (*Pipistrellus pygmaeus*), NYNO: noctule bat (*Nyctalus noctula*), MYOTIS: Myotis species.
2. The number of survey hours corresponds to the length of the night, i.e. the time between sunset and sunrise.
3. The Bat Activity Index of the number of bat passes per hour is calculated from the number of bat passes / number of survey hours (i.e. length of the night in-between sunset and sunrise) for each of the individual survey nights and as an average of the five survey nights making up each monthly survey session.

iii. Static Point C (Nature Reserve): SP 38129 76894

Date	Sunset	Minimum and maximum temp. °C	Species[1]	First bat pass	17:00 - 18:00	18:00 - 19:00	19:00 - 20:00	20:00 - 21:00	21:00 - 22:00	22:00 - 23:00	23:00 - 00:00	00:00 - 01:00	01:00 - 02:00	02:00 - 03:00	03:00 - 04:00	04:00 - 05:00	05:00 - 06:00	Last bat pass	Sunrise	Number of Survey Hours[2]	Total number of bat passes (species specific)	Bat Activity Index (bat passes per hour)[3]	Bat Activity Index (bat passes per hour)[3]
19/04/18	20:11	10/25	PIPI	20:33				79	104	88	104	123	25	25	1			03:03	05:57	09:46	549	182.76	42.00
			PIPY	21:23					192	271	301	123	256	88				02:47			1231		
			NYNO	04:50												1	1	05:19			2		
20/04/18	20:13	10/20	PIPI	20:24				3	25	50	17							23:22	05:55	09:44	95	10.87	
			PIPY	22:18						10								22:41			10		
			NYNO	05:05													1	05:05			1		
21/04/18	20:14	9/20	PIPI	20:42				93	133	6	106	29	28	13	3	13	1	05:17	05:53	09:41	425	55.79	
			PIPY	21:00					85		23	7						00:12			115		
22/04/18	20:16	10/18	PIPY	22:07				1										22:07	05:51	09:37	1	0.1	
23/04/18	20:18	8/14	None																05:49	09:33			
24/04/18	20:20	9/13	None																05:47	09:29			
25/06/18	21:32	13/28	None																04:45	07:13			0.1
26/06/18	21:32	15/27	PIPI	03:51											1	1		04:03	04:45	07:13	2	0.42	
			MYOTIS	22:45						1								22:45			1		
27/06/18	21:32	11/26	MYOTIS	01:18									2					01:21	04:46	07:14	2	0.28	
28/06/18	21:32	12/26	None																04:46	07:14			

Date	Sunset	Minimum and maximum temp. °C	Species[1]	First bat pass	17:00 - 18:00	18:00 - 19:00	19:00 - 20:00	20:00 - 21:00	21:00 - 22:00	22:00 - 23:00	23:00 - 00:00	00:00 - 01:00	01:00 - 02:00	02:00 - 03:00	03:00 - 04:00	04:00 - 05:00	05:00 - 06:00	Last bat pass	Sunrise	Number of Survey Hours[2]	Total number of bat passes (species specific)	Bat Activity Index (bat passes per hour)[3]	Bat Activity Index (bat passes per hour)[3]
29/06/18	21:31	11/27	None																04:47	07:16			
30/06/18	21:31	13/26	None																04:48	07:17			
01/07/18	21:31	13/28	None																04:48	07:17			

1. Key: PIPI: common pipistrelle (*Pipistrellus pipistrellus*), PIPY: soprano pipistrelle (*Pipistrellus pygmaeus*), NYNO: noctule bat (*Nyctalus noctula*), MYOTIS: Myotis species.
2. The number of survey hours corresponds to the length of the night, i.e. the time between sunset and sunrise.
3. The Bat Activity Index of the number of bat passes per hour is calculated from the number of bat passes / number of survey hours (i.e. length of the night in-between sunset and sunrise) for each of the individual survey nights and as an average of the five survey nights making up each monthly survey session.

Appendix 8.2h

Interim Bat Activity Survey Report 2017

1. Introduction

1.1 Background and Scope

1.1.1 This Bat activity survey report presents the findings of bat surveys conducted for the A46 Coventry Junction Upgrade (the *proposed scheme*).

1.1.2 The proposed scheme specifically entails grade separation of the existing junction by raising the A46 dual carriageway over the Binley roundabout to a height of approximately 7m above ground level and providing entry and exit slips roads to an at grade gyratory junction. The elevated section of the A46 would utilise a combination of embankments, retaining walls and bridge structures. Local traffic using the A428 will continue to use the revised roundabout with access to and from the A46 without the need for traffic on the A46 to slow down for a roundabout as they do now. As at present, the gyratory would be signalised and the national speed limit will be maintained along the A46.

1.1.3 It is anticipated that the proposed scheme will take approximately two years to build with construction starting in autumn 2019.

1.1.4 In order to assist with the assessment of the proposed scheme's potential environmental effects, a range of environmental surveys has been undertaken to define baseline conditions for bats. The proposed scheme has the potential to directly and indirectly affect bats by disrupting their commuting routes, changing or removing their foraging areas and commuting lines, introducing artificial lighting, vibration and noise associated with construction activities and road infrastructure.

1.1.5 The aim of this study was to assess the suitability of the habitats within the proposed scheme site to support commuting and foraging bats. Assessments of habitat suitability for bats were undertaken in May 2016 and further refined in 2017 following revisions to the proposed scheme. Habitats present within the proposed scheme were assessed as being of low to moderate habitat suitability for foraging and commuting bats as defined by the Bat Conservation Trust (BCT) Survey Guidelines (Collins, 2016). One activity transect together with up to five days automated recording were undertaken per month between August 2017 and October 2017. The spring and early summer seasons were not included due to late commission and will be covered by surveys to be undertaken in 2018, following which this interim report will be updated.

1.2 Study Site

1.2.1 The landscape within and surrounding the proposed scheme comprises various semi-natural and man-made habitats. It is predominantly urban to the west of the proposed scheme, with a mixture of arable, field drains, woodland and recreational land to the east. 245m to the north-east of the proposed scheme is Coombe Country Park and Coombe Pools Site of Special Scientific Interest (SSSI), designated for its ornithological interest; and directly to the south-western boundary is Herald Way Marsh (Claybrookes Marsh) SSSI and Local Nature Reserve (LNR), designated for its range of wetland habitats and assemblage of invertebrates.

1.3 Relevant Legislation and Policy

1.3.1 All UK native bat species and their roosts (whether bats are present or not) are protected under the *Conservation of Habitats and Species Regulations 2017* and under the *Wildlife and Countryside Act 1981* (as amended). Taken together, under both legislations it is an offence to:

- deliberately, intentionally or recklessly capture, injure or kill a bat
- damage/destroy a breeding site or resting place of a bat (this is an offence whether the act is deliberate or not)
- deliberately, intentionally or recklessly disturb a bat
- intentionally or recklessly obstruct access to any structure which a bat uses for shelter or protection

1.3.2 A bat roost is defined under *Her Majesty's Safety Office Conservation of Habitats and Species Regulations 2017* as *"any structure or place, which is used for shelter or protection"* or a *"breeding site or resting place".* As bats commonly use the same roosts at particular times of the year after periods of absence, the roost is protected whether or not bats are resident.

1.3.3 Given the above protection, the potential presence of bats represents a material consideration in the planning process for development. Even where planning permission is not required there is still a legal responsibility placed on the developer to ensure that works with the potential to result in an offence under the above legislation, are undertaken in such a way to avoid offences.

1.3.4 In addition to the above legislation, Section 41 of the Natural Environment and Rural Communities Act (2006) requires the secretary of state to publish and maintain lists of species and types of habitats which are regarded by Natural England to be of *"principal importance"* for the purposes of conserving biodiversity in England. Seven of the UK bat species are included within this list as *priority species* namely, the barbastelle bat (*Barbastella barbastellus*), bechstein's bat (*Myotis bechsteinii*), noctule bat (*Nyctalus noctula*), soprano pipistrelle (*Pipistrellus pygmaeus*), brown long-eared bat (*Plecotus auritus*), greater horseshoe bat (*Rhinolophus ferrumequinum*), and lesser horseshoe bat (*Rhinolophus hipposideros*).

1.3.5 Highways England has set an aspiration through the national Road Investment Strategy that the operation, maintenance, and enhancement of the Strategic Road Network should move to a position that delivers no net loss of biodiversity by 2020; and, in the long term, Highways England should deliver a net gain in biodiversity across its broader range of works.

1.3.6 "*Our Plan to Protect and Increase Biodiversity*" (Highways England, June 2015) was published with the aim to show how it will work with service providers to halt overall biodiversity loss, and maintain and enhance habitats and ecological networks. The government requires Highways England to demonstrate progress against the 2015 Biodiversity Plan, to secure an ongoing annual reduction in the net loss of biodiversity due to its activities. The 2015 Biodiversity Plan provides a general plan to protect and increase biodiversity. The 2015 Biodiversity Plan also supersedes the 2002 Highways Agency (now Highways England) Biodiversity Action Plan (BAP), which still carries some relevance as it lists specific species of conservation concern. Bats are listed in the 2002 Highways Biodiversity Action Plan as priority species. The objectives of this species action plan for bats is to avoid mortality to bats or loss of bat habitat as a result of construction and operation of the network, and to enhance habitats for bats where this can be achieved safely.

2. METHODOLOGY

2.1 Desk Study

2.1.1 A desk study including review of existing data and local records centre searches was undertaken as part of the *Ground Truth Extended Phase I Habitat Survey Report* in 2017; methods and sources of data are presented in the 2017 Phase 1 Report, however relevant records relating to bats are repeated here.

2.2 Bat Activity Surveys

2.2.1 The number of bat activity surveys required to achieve a reasonable survey effort was assessed in relation to habitat suitability, following the published *Survey Guidelines (Collins 2016)*. The habitat suitability for foraging and commuting bats at the proposed scheme was assessed as a combination of moderate and low value. The level of bat activity survey effort required was determined using the criteria outlined in Table 1; a reproduction of Table 8.3 from the *Bat Conservation Trust (BCT) Bat Surveys for Professional Ecologists: Good Practice Guidelines 3rd Edition (Collins, 2016)*. The proposed scheme was assigned a moderate value and applied across the entire extent of the proposed scheme for consistency.

2.2.2 Each transect activity survey involved two suitably experienced ecologists walking a pre-determined transect route which included a series of *spot counts*. The predetermined transect route was designed to take into account as much of the proposed scheme as possible within the framework of available and safe access. The *spot counts* were located at roughly even points along the route and included a broad representation of habitats within the proposed scheme. Along with the transect route, the spot count incorporated a representation of potential flight paths or foraging areas within the proposed scheme. The transect route and spot count locations are shown in Annex A: Figure A-1.

2.2.3 During the walked transect and at each *spot count* for set periods of time (3-5 minutes), surveyors used bat echolocation detectors to constantly record bat activity, with details of any observed bat activity, such as species, number, behaviour, and bat flight direction noted. The starting point and direction of the transect were varied during each survey visit in order to ensure different areas of the transect were walked close to dusk.

2.2.4 Bat activity surveys commenced in August 2017, with one back-to-back dusk and dawn transect survey in one 24 hour period, and then one dusk transect survey per month in September and October 2017. Surveyors carried echolocation detectors Wildlife Acoustics SM2BAT+ or SM4BAT+ to help determine the species present. In accordance with the *Survey Guidelines (Collins, 2016)*, dusk surveys were carried out 15 minutes before sunset for at least 2 hours, and dawn surveys commenced 2 hours before sunrise in favourable weather conditions (that is, not in heavy rain or wind and temperatures above 7°C). The time, location, number, species (where possible) and direction of flight were recorded for each bat pass (discrete burst of echolocation heard, or bat activity observed) encountered during the surveys. The echolocation calls detected were analysed where required using Analook W software, version 4.2.

Table 1: Recommended Number of Bat Activity Surveys from Table 8.3 in the Bat Guidelines (Collins, 2016)

Survey Type	Low suitability for bats	Moderate suitability for bats	High suitability for bats
Transect/spot count/timed search surveys	One survey visit per season (spring – April or May, summer – June or July or August, autumn – September or October) in appropriate weather conditions for bats. Further surveys may be required if these survey visits reveal higher levels of bat activity than predicted by the habitat alone.	One survey visit per month (April to October) in appropriate weather conditions for bats. At least one of the surveys should comprise dusk and pre-dawn (or dusk to dawn) within one 24-hour period.	Up to two survey visits per month (April to October) in appropriate weather conditions for bats. At least one of the surveys should comprise dusk and pre-dawn (or dusk to dawn) within one 24-hour period.
AND			
Automated/static bat detector surveys	One location per transect, data to be collected on five consecutive nights per season (spring – April or May, summer – June or July or August, autumn - September or October) in appropriate weather conditions for bats.	Two locations per transect, data to be collected on five consecutive nights per month (April to October) in appropriate weather conditions for bats.	Three locations per transect, data to be collected on five consecutive nights per month (April to October) in appropriate weather conditions for bats.

2.3 Automated Detector Surveys

2.3.1 Static monitoring was undertaken using Wildlife Acoustics SM2BAT+ automated bat detectors initially at two, and subsequently three, locations for a minimum period of five nights each month from August to October 2017, as per the recommendations shown in Table 1. This level of monitoring in September and October 2017 was above the recommended two static monitoring points per transect given in the Bat Conservation Trust guidelines (Collins 2016) for moderate value habitats. This was to provide a more thorough coverage of the linear features and various habitats present within the proposed scheme to support information on bat species assemblage within the proposed scheme.

2.3.2 The locations of the static monitoring points are shown in Table 2 below and Annex A: Figure A-1. The echolocation calls detected during the static monitoring were analysed using Analook W software, version 4.2.

Table 2: Location of Static Monitoring Points and Automated Survey Period

Location	Grid reference	Survey dates (no. of nights in brackets)		
		August 2017	September 2017	October 2017
Nature Reserve	SP 38129 76894	Thursday 17 – Monday 21	Wednesday 06 – Sunday 10 (5 nights)	Thursday 12 – Monday 16 (5 nights)
Rugby Club	SP 38870 77880			
Coombe Pool SSSI / Country Park	SP 39625 78747	-		

2.4 Evaluation of Commuting and Foraging Habitats for Bats

2.4.1 Results from the bat activity transect surveys and automated bat detector surveys were used to evaluate foraging and commuting bat habitat within the proposed scheme.

2.4.2 The transect and static bat detector data collected were analysed to determine the total number of bat passes for each species or species group (depending on the level of identification possible from the recordings made). This was then used to derive a metric; the Bat Activity Index (hereafter referred to as 'the index') for the relative bat activity at each survey location. This analysis provides an indication of:

- *seasonal variation in species activity and composition at each survey location*
- *relative levels of bat activity across the proposed scheme*
- *important foraging areas and commuting routes*

2.4.3 The index values have been calculated by averaging the number of bat passes per hour over the course of each survey period. Full automated detector results for each season are presented in Annex C for transects and Annex D for static monitoring points. This data was used to calculate the index for each location and gives an indication of bat abundance and activity at a particular location per month.

2.4.4 The term 'pass' is defined as a single file made up of bat pulses of a single species. That is, it may be one bat or many bats in a single file.

2.4.5 No standard guidance is available on what constitutes low, moderate or high bat activity based on number of passes. As such a relative scale is used in this report where:

- *very low activity is less than 2 passes per hour (at each survey location)*
- *low activity is 2 to 25 passes per hour*
- *moderate activity is 26 to 99 passes per hour*
- *high activity is over 100 passes per hour*

However, it must be stressed that this is a purely arbitrary reference of activity with no statistical or evidential basis and purely for comparative use across the proposed scheme, as opposed to comparison with bat records from elsewhere.

2.4.6 The relative ecology and nature conservation value of any bat populations associated with the proposed scheme has been determined using the principles described in *Valuing Bats in Ecological Assessment (Wray et. al., 2010)* (see full method in Annex B). According to *Wray et. al. (2010)*, particular consideration is given to bat distribution and rarity at different geographical levels, value of roosts, commuting and foraging areas; for this evaluation, reference has also been made to:

- *Warwickshire, Coventry and Solihull Local Biodiversity Action Plan, February 2016*
- *UK Mammals: Species Status and Population Trends (Battersby, 2005)*

2.5 Survey Constraints

2.5.1 The required survey effort identified was based on an assessment of moderate habitat suitability within the proposed scheme, which equates to one survey visit and five nights of static monitoring once a month from April to October (see Tables 1 and 2 above). Surveys were commissioned in August and therefore there is no survey data for the spring or early summer period (April to July). Recommendations for further survey work are made within Section 4 of this report.

2.5.2 As the A46 is a busy high speed road it was not possible to include the existing carriageway, or the verges within the transect route due to health and safety concerns. This was not thought to affect the outcomes of the report, as the transect route was designed to cover as much of the proposed scheme as possible and include all habitat types recorded.

2.5.3 During the August transect, the recording equipment failed. Notes of bat passes recorded during the transect, although collected, could not be verified, along with the results from two static monitoring points used to assess bat activity levels during this month.

2.5.4 Since the commencement of this survey work, there have been further minor boundary changes which are not reflected in this report. Any boundary issues will be addressed during the course of further survey work for 2018 and the final bat activity survey report following completion of these surveys.

3. RESULTS

3.1 Desk Study

3.1.1 Full desk study results are given in the *Ground Truth Extended Phase I Habitat Survey Report* (2017). However, relevant records relating to bats are also outlined in this report. One European Protected Species bat licence was identified from the Multi Agency Geographical Information for the Countryside (MAGIC) website; this was granted in 2016, approximately 500m to the east of the proposed scheme.

3.1.2 Warwickshire Ecological Records Centre provided records for bats within 1.24 miles (2km) of the site; these are summarised in Table 3 below; full details are given in the *Ground Truth Extended Phase I Habitat Survey Report (2017)*.

Table 3: Summary of Local Bat Records

Species Group	Species	Number of Recent Records (<10 years)	Location of Nearest Record
Bat roosts	Soprano pipistrelle (*Pipistrellus pygmaeus*)	2	0.8 miles (1.3km) to the south-east
	Common pipistrelle (*Pipistrellus pipistrellus*)	2	0.8 miles (1.3km) to the south-east
	Brown long-eared bat (*Plecotus auritus*)	4	0.15 miles (0.25km) to the east
	Nathusius's Pipistrelle (*Pipistrellus nathusii*)	1	0.8 miles (1.3km) to the south-east
Bat activity	Soprano pipistrelle	8	0.8 miles (1.3km) to the south-east
	Common pipistrelle	15	0.06 miles (0.1km) to the east
	Nathusius's Pipistrelle	2	0.43 miles (0.7km) to the east
	Brown long-eared bat	2	0.8 miles (1.3km) to the south-east
	Serotine bat (*Eptesicus serotinus*)	1	0.75 (1.2km) to the south
	Daubenton's bat (*Myotis daubentonii*)	6	0.8 miles (1.3km) to the south-east

Species Group	Species	Number of Recent Records (<10 years)	Location of Nearest Record
	Natterer's bat (*Myotis nattereri*)	1	1.05 (1.7km) to the north
	Noctule bat (*Nyctalus noctula*)	12	0.62 miles (1km) to the south

3.2 Bat Activity Survey

3.2.1 Full results of the bat activity surveys are presented in Annex C; and below is a descriptive summary of results.

3.2.2 The highest number of bat passes along the transect was 19 recorded on 6 September 2017. Four species; common pipistrelle, soprano pipistrelle, *Nyctalus* species and *Myotis species* (and one marked as unknown) were recorded across the three surveys. The highest number of bat passes was recorded around the Broadstreet Rugby Club with 65% of bat passes (26 of 40) recorded around this location. Table 4 below provides a detailed assessment of the activity across the transect for each survey visit.

Table 4: Bat Transect Results Summary

Survey month	Dusk or Dawn & Route or Direction	Bat activity description	Species encountered
August dusk	Dusk A-J	9 bat passes, all but one from pipistrelle bats, with activity concentrated towards the end of the transect around the Rugby Club Ground.	Common pipistrelle, soprano pipistrelle, *Nyctalus* species.
August dawn	Dawn J-A	6 bat passes around the Rugby Club (*Nyctalus* species and common pipistrelle) and over the roundabout junction (one unknown species); 2 soprano pipistrelles off the route around the loop through the business park between sections adjacent to the road.	Common pipistrelle, soprano pipistrelle, *Nyctalus* species & unknown.
September	Dusk J-A	9 soprano pipistrelles, 2 common pipistrelles and a noctule bat pass around the Rugby Club; 3 common pipistrelles through the centre of the proposed scheme and off the route around the business park; and 4 common pipistrelles around the nature reserve.	Common pipistrelle, soprano pipistrelle, noctule.
October	Dusk A-J	4 soprano pipistrelle passes and 2 *Myotis* species passes around	Soprano pipistrelle, *Myotis* species.

Survey month	Dusk or Dawn & Route or Direction	Bat activity description	Species encountered
		the Rugby Club Ground.	

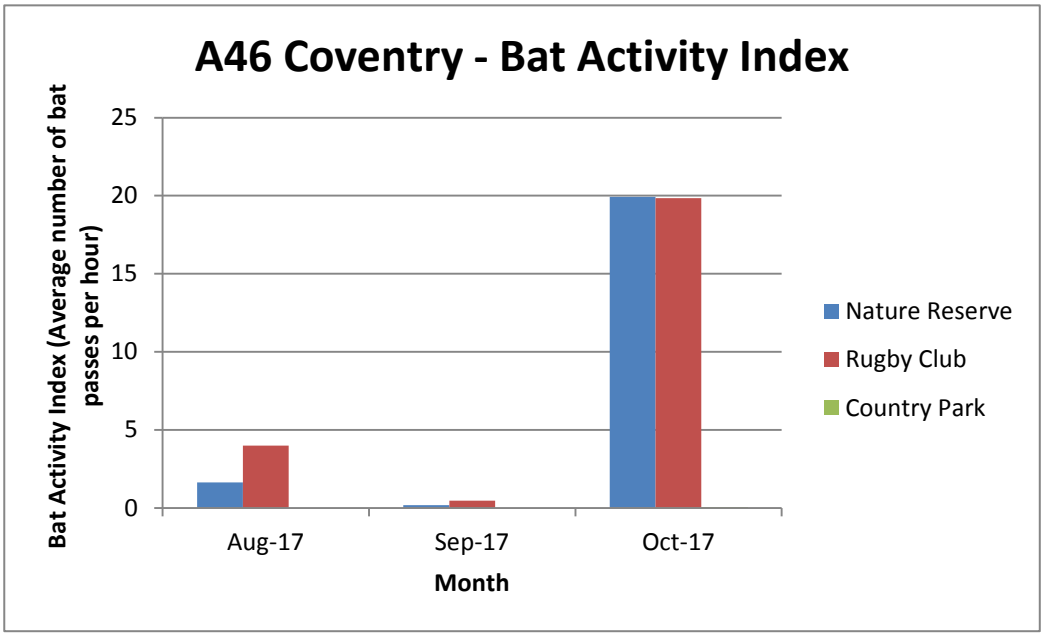
3.3 Automated Detector Surveys

3.3.1 The results of the automated detector surveys and the index are shown below and in Annex C; which shows the complete automated data.

3.3.2 Four species, or species groups, of bats were recorded; common pipistrelle, soprano pipistrelle, noctule and *Myotis* species bats. Table 5 below shows the number of each species of bat recorded and the mean number of bat passes per hour at each of the 2 or 3 static monitoring locations.

3.3.3 Relatively few bat passes were recorded and the index at all static detector locations in August and September, as well as at the country park (virtually no passes per hour) in October, was very low. At the nature reserve and rugby club monitoring points in October, the index was low, as shown in Chart 1 below.

Chart 1: A46 Coventry Bat Activity Index



3.3.4 The country park monitoring point recorded only three bat passes during the five-day monitoring session in October, with no passes recorded in September (access had not been confirmed to enable the deployment of the static detector prior to September, so no August data was available for this monitoring point).

3.3.5 A higher number of bat passes, although still equating to a Low index, were recorded in October at both the nature reserve and rugby club monitoring points. October accounted for 93.6% of all bat passes recorded at the nature reserve monitoring point and 86.2% of all bat passes recorded at the rugby club monitoring point through the survey period. Of this, two night's accounted for most of the bat activity; with the night of the 14 to 15 October 2017 accounting for 74.4% of bat passes recorded at the nature reserve monitoring point and 79.7% of bat passes recorded at the rugby club monitoring point; the night of the 12 to 13 October accounted for almost all the remaining bat passes at each of these two sites, 18.4% and 19.6% respectively.

3.3.6 For the nature reserve and rugby club monitoring points, the number of bat passes per hour was fairly constant throughout the nights. The following bat activity was recorded:

Nature Reserve

- an occasional single bat pass during the first half hour after sunset
- two individual common pipistrelles and one noctule bat in October

Rugby Club

- one occasion in October, at the rugby club, when six common pipistrelle bat passes were recorded within the first half hour after sunset
- a single soprano pipistrelle on four nights in August
- one soprano pipistrelle in October
- a single common pipistrelle once in August and once in October
- one noctule bat on one night in October at the Rugby Club site.

Table 5: Bat Static Monitoring Results Summary

Month	Detector location	Total number of passes per bat species (over five consecutive nights)					Total number of bat passes	Bat Activity Index (bat passes per hour*) *see Appendix D for number of hours used
		Common pipistrelle	Soprano pipistrelle	Common /soprano pipistrelle	Noctule	*Myotis* sp.		
August 2017 Thursday 17 – Monday 21	Nature Reserve	76		2		1	79	1.64
	Rugby Club	87	103	1	1	1	192	4.00
September 2017 Wednesday 6 – Sunday 10	Nature Reserve	11					11	0.17
	Rugby Club	9	20	1			30	0.47
	Country Park						0	0
October 2017 Wednesday 12 – Sunday 16	Nature Reserve	1051	222	10	38	4	1325	19.92
	Rugby Club	1048	222	10	38	4	1322	19.85
	Country Park	3					3	0.05

3.4 Assessment of Bat Activity

3.4.1 The values of the commuting and foraging bats recorded across each transect based on the methodology in *Wray et. al. (2000)* is presented in Tables 6 and 7 below for each species.

3.4.2 The recorded values of the three transects assessed the proposed scheme as providing local value for bats.

Table 6: Commuting Values per Species

Species	National Rarity	Number of bats	Site or Nearby Roost Potential	Type & Complexity of Linear Features	Total Score	Value
Common pipistrelle	2	10	4	3	19	Local
Soprano pipistrelle	2	10	4	3	19	Local
Nyctalus species & Noctule bat	5	5	4	3	17	Local
Myotis species	5	5	4	3	17	Local

Table 7: Foraging Values per Species

Species	National Rarity	Number of bats	Site or Nearby Roost Potential	Type & Complexity of Linear Features	Total Score	Value
Common pipistrelle	2	10	4	3	19	Local
Soprano pipistrelle	2	10	4	3	19	Local
Nyctalus species & Noctule bat	5	5	4	3	17	Local
Myotis species	5	5	4	3	17	Local

4. DISCUSSION

4.1.1 Bat activity transects and static monitoring surveys have been undertaken over the months August 2017, September 2017, and October 2017. The scope of works to assess the potential impacts on bat foraging and commuting habitat is based on achieving a reasonable survey effort in relation to habitat suitability, where habitat suitability has been assessed, overall, as moderate. A moderate value of habitat suitability corresponds to one survey visit per month from April to October (*Collins, 2016*).

4.1.2 This interim report of bat activity surveys undertaken to date was based on good coverage of the proposed scheme site being achieved by one walked transect route covering available sections close to the carriageway, supplemented by two static monitoring points in August and three in September and October located within 50m of the proposed scheme. This coverage by three static monitoring points during September and October is one more than recommended in the Bat Conservation Trust guidelines (*Collins, 2016*) and provides data for an additional location along the proposed scheme.

4.1.3 During the walked transect surveys, four species or species groups of bats were recorded; the majority of bat passes were either common or soprano pipistrelle, with a few passes each by noctule and *Myotis* species bats. The number of bat passes was consistently low; with a maximum of 19 bat passes recorded during any of the three survey visits. The highest number of bat passes was recorded around the Broadstreet Rugby Club with 65% of bat passes (26 of 40 in all three surveys) recorded around this location.

4.1.4 During the walked transect surveys no bats were recorded within the proposed scheme site. Although this was due partially to access constraints to the existing carriageway, which meant that surveys had to be focused largely within the 50m beyond the proposed scheme boundary and out of sight of parts of the carriageway. However, this is considered not to have affected the outcomes of the report, as the transect route was designed to cover as much of the proposed scheme as possible and include all habitat types recorded.

4.1.5 Results from the static monitoring surveys recorded the same four species or species groups of bats recorded during the walked transect surveys. The distribution of bat passes recorded during the surveys was variable between both individual static monitoring points (locations) and during each survey phase (that is between different nights), with nights of moderate, low, very low, or no activity recorded at the same monitoring locations.

4.1.6 The country park monitoring point recorded only three bat passes during the five-day monitoring in October (and none in September) and can be considered of very low importance during autumn for either foraging or commuting bats.

4.1.7 Relatively higher levels of bat activity were recorded in October at both the nature reserve and rugby club monitoring points, with October accounting for 93.6% of all bat passes recorded at the nature reserve monitoring point and 86.2% of all bat passes recorded at the rugby club monitoring point. The numbers of bat passes during these five nights of monitoring was highly variable with about 80% of all activity on one night (up to 1,000 bat passes and equivalent to 79 bat passes per hour) and nearly all the remaining 20% of activity in another single night and either no activity or just one bat pass on the other three nights.

4.1.8 Few bat passes were recorded within the first 30 minutes after sunset during any of the three static monitoring surveys. Such bat passes might be indicative of nearby roost sites, especially for the most commonly encountered species (common pipistrelle) recorded at the proposed scheme. On only one occasion, in October at the rugby club monitoring point, was there more than one bat pass recorded during the first 30 minutes after sunset, when six common pipistrelle bat passes were recorded.

4.1.9 Habitat loss and land take from the proposed scheme is of limited extent and the existence of an already busy dual carriageway and associated road network would be expected to restrict the values of adjacent habitats for bats. Recent research has shown that major roads reduce bat activity and species diversity over more than 0.62 miles (1km) either side of the road *(Berthinussen & Altringham, 2012).*

4.1.10 The bat activity surveys recorded bat passes, including pipistrelle and noctule bat passes, at points close to 50m from the proposed scheme. This would suggest that the bats that have been recorded are habituated to the current level of disturbance from the existing road.

4.1.11 However, there is the potential for indirect impacts on the bats that are using the area from noise and lighting impacts resulting from the proposed scheme, including temporary impacts from works compounds and the works themselves. For this to be adequately assessed, it is recommended that the bat activity surveys, walked transects, and static monitoring be undertaken for the spring and summer periods in 2018. Given the relatively low levels of bat activity recorded during the surveys in 2017, it is concluded that the habitat value for bats can be reduced to low from the initial moderate value and as such, survey effort reduced to one survey each season (spring and summer) in-line with *Survey Guidelines (Collins 2016)*. The presence of the existing dual carriageway contributes to the downgrading of this value as this does not feature within the original assessment of habitat suitability and is known to negatively affect bat use of adjacent sites (*e.g. Berthinussen & Altringham, 2012*).

5. REFERENCES

AECOM (2017) A46 Coventry Junction Upgrade. Ground Truth Extended Phase 1 Habitat Survey Report.

Battersby. J. (Ed) & Tracking Mammals Partnership. (2005) UK Mammals Species Status and Population Trends. First Report by the Tracking Mammals Partnership. Joint Nature Conservation Committee/Tracking Mammals Partnership, Peterborough.

Berthinussen A and Altringham JD. (2012) The effects of a major road on bat activity and diversity. Journal of Applied Ecology. 49, 82-89

Collins, J (ed.) (2016) Bat surveys for professional ecologists: good practice guidance 3rd ed. Bat Conservation Trust, London

Highways England (2015) Our plan to protect and increase biodiversity. Highways England.

HMSO (2017) Conservation of Habitats and Species Regulations 2017. London: HMSO

Mouchel (2016) Mouchel A46 Coventry Junctions Report Title Preliminary Roost and Habitat Assessment Report June 2016

Warwickshire, Coventry and Solihull Local Biodiversity Action Plan. Draft revised Plan February 2016. Bats. http://www.warwickshirewildlifetrust.org.uk/sites/default/files/files/Bats-February 2016.pdf

Wray, S. Wells, D, Long, E Mitchell-Jones, T (2010) Valuing Bats in Ecological Impact Assessment. CIEEM In Practice Issue 70 (December 2010)

ANNEX A - FIGURES

Figure A-1 – Bat Transect Location

SAFETY, HEALTH AND ENVIRONMENTAL INFORMATION BOX

IT IS ASSUMED THAT ALL WORKS ON THIS DRAWING WILL BE CARRIED OUT BY A COMPETENT CONTRACTOR WORKING, WHERE APPROPRIATE, TO AN APPROPRIATE METHOD STATEMENT.

THIS DRAWING IS TO BE USED ONLY FOR THE PURPOSE OF ISSUE THAT IT WAS ISSUED FOR AND IS SUBJECT TO AMENDMENT.

EXCEPTIONAL RISKS RELATING TO THE WORKS ASSOCIATED WITH THIS DRAWING ARE IDENTIFIED BELOW.

CONSTRUCTION

MAINTENANCE / OPERATION / DECOMMISSIONING / DEMOLITION

KEY:

- Site Boundary (Highways Boundary)
- Site Boundary + 50m Buffer
- Transect Route
- Stop Locations
- SM2 Locations
- Start Point
- End Point

NOTES

1. THIS DRAWING IS TO BE READ IN CONJUNCTION WITH ALL OTHER RELEVANT DOCUMENTATION.
2. DO NOT SCALE FROM THIS DRAWING, USE ONLY PRINTED DIMENSIONS.
3. ALL DIMENSIONS IN MILLIMETRES, ALL CHAINAGES, LEVELS AND COORDINATES ARE IN METRES UNLESS DEFINED OTHERWISE.
4. THIS DRAWING IS TO BE READ IN CONJUNCTION WITH THE PROJECT HEALTH & SAFETY FILE FOR ANY IDENTIFIED POTENTIAL RISKS.
5. CONTAINS OS DATA © CROWN COPYRIGHT AND DATABASE RIGHT 2017

Site Boundary Revised	GB / CG	19/10/17	P02
First Issue	DM / OP	07/09/17	P01
Revision Details	By / Check	Date	Suffix

Purpose of issue: FOR INFORMATION

Client: Highways England, Major Projects, The Cube, 199 Wharfeside Street, Birmingham, B1 1RN

Working on behalf of: highways england

Project Title: A46 COVENTRY JUNCTION UPGRADE

Drawing Title: FIGURE A-1 BAT TRANSECT LOCATION

Designed	Drawn	Checked	Approved	Date
HP	GB	AR	NT	01/11/2017

Internal Project No. 60547444	Suitability S0
Scale @ A3 1:10,000	Zone BINLEY JUNCTION

THIS DOCUMENT HAS BEEN PREPARED PURSUANT TO AND SUBJECT TO THE TERMS OF AECOM'S APPOINTMENT BY ITS CLIENT. AECOM ACCEPTS NO LIABILITY FOR ANY USE OF THIS DOCUMENT OTHER THAN BY ITS ORIGINAL CLIENT OR FOLLOWING AECOM'S EXPRESS AGREEMENT TO SUCH USE, AND ONLY FOR THE PURPOSES FOR WHICH IT WAS PREPARED AND PROVIDED.

Project Office
Royal Court
Basil Close, Chesterfield
Derbyshire, S41 7SL
Tel: (01246) 209221
Fax: (01246) 209229
www.aecom.com

AECOM Infrastructure & Environment UK Limited
Registered in England Registered number: 880328
Registered office: Scott House, Alencon Link, Basingstoke, Hampshire RG21 7PP

Drawing Number	Originator	Volume			Rev
Highways England PIN					
HE551486	-ACM	-EGN	-		P02
A46_SW_ZZ		-DR	-LE	-00003	
Location		Type	Role	Number	

0.25 0 0.25 0.5 0.75 1 1.25 Kilometres

Plot Date: 01 November 2017 09:27:27
File Name: E:\GIS Management\A46_Ecology_Works\GIS\GIS_Working\02_Maps\Ecology\FIGURE 2 - BAT SURVEY.mxd

ANNEX B - FORAGING AND COMMUTING VALUE (WRAY ET AL 2010)

Table B-1: Categorising bats by distribution and rarity

Rarity within range	England
Rarest (popn. Under 10,000)	Greater horseshoe; Bechstein's ; Alcathoe; Greater mouse-eared; Barbastelle; Grey long eared
Rarer (popn. 10,000 – 100,000)	Lesser horseshoe; Whiskered; Brandt's; Daubenton's; Natterer's; Leisler's; Noctule; Nathusius' pipistrelle; Serotine
Common (popn. Over 100,000)	Common pipistrelle; Soprano pipistrelle; Brown long-eared

Table B-2: Scoring system for valuing commuting and foraging bats

Geographic frame of reference	Score
Site	1 – 10
Local	11 – 20
County	21 – 30
Regional	31 – 40
National/UK	41 – 50
International	>50

Table B-3: Valuing commuting routes

Species	Number of bats	Roosts/potential roosts nearby	Type and complexity of linear features
Common (2)	Individual bats (5)	None (1)	Absence of (other) linear features (1)
-	-	Small number (3)	Un-vegetated fences and large field sizes (2)
Rarer (5)	Small number of bats (10)	Moderate number/Not known (4)	Walls, gappy or flailed hedgerows, isolated well grown hedgerows, and moderate field sizes (3)
-	-	Large number of roosts, or close to a SSSI for the species (5)	Well-grown and well-connected hedgerows, small field sizes (4)
Rarest (20)	Large number of bats (20)	Close to or within a SAC for the species (20)	Complex network of mature well-established hedgerows, small fields and rivers/streams (5)

Table B-4: Valuing foraging routes

Species	Number of bats	Roosts/potential roosts nearby	Foraging habitat characteristics

Common (2)	Individual bats (5)	None (1)	Industrial or other site without established vegetation (1)
-	-	Small number (3)	Suburban areas or intensive arable land (2)
Rarer (5)	Small number of bats (10)	Moderate number/Not known (4)	Isolated woodland patches, less intensive arable and/or small towns and villages (3)
-	-	Large number of roosts, or close to a SSSI for the species (5)	Larger or connected woodland blocks, mixed agriculture, and small villages/hamlets (4)
Rarest (20)	Large number of bats (20)	Close to or within a SAC for the species (20)	Mosaic of pasture, woodlands and wetland areas (5)

ANNEX C - FULL BAT TRANSECT DATA

i. August Dusk Transect

DUSK					
Project Name	A46 Coventry Junctions		Surveyors		JC, KL
Survey Location	A46 Coventry Junctions		Rain (0-5)		0
Date	17/08/2017		Wind (0-7)		1
Start	20:12		Cloud Cover (0-5)		5
Sunset	20:28		Temperature		18°c
Finish	22:13		Weather description		Warm clear evening.
Time	Species	Location (transact points)	No. of bat passes	Recording (Y/N)	Description of behaviour
20:54	Common pipistrelle	Between C-D	1	N	Heard only, not seen.
21:19	Common pipistrelle	E	1	N	Heard only, not seen. Foraging
21:46	Common pipistrelle	H	1	N	Heard only, not seen. Commuting
21:49	Soprano pipistrelle	H-I	1	N	Heard only, not seen. Commuting
21:53	Common pipistrelle	I	1	N	Heard only, not seen. Commuting
21:59	*Nyctalus* species	I-J	1	N	Heard only, not seen.
22:01	Soprano pipistrelle	I-J	1	N	Heard only, not seen.
22:03	Common pipistrelle	J	1	N	Heard only, not seen.
22:06	Soprano pipistrelle	J	1	N	Heard only, not seen.
		Total bat passes	9		

ii. August Dawn Transect

DAWN					
Project Name	A46 Coventry Junctions		Surveyors		JC, KL
Survey Location	A46 Coventry Junctions		Rain (0-5)		0
Date	18/08/2017		Wind (0-7)		2
Start	04:05		Cloud Cover (0-5)		4
Sunrise	05:53		Temperature		18°c
Finish	06:07		Weather description		Still cloudy morning, some rain during the night after dry evening survey
Time	Species	Location (transact points)	No. of bats	Recording (Y/N)	Description of behaviour
04:38	*Nyctalus*	Between H-G	1	N	Heard only, not

	species				seen.
04:43	Common pipistrelle	G	1	N	Heard only, not seen.
04:47	Unknown	G-F	1	N	Heard only, not seen.
05:21	Soprano pipistrelle	D-C	1	N	Heard only, not seen.
05:26	Soprano pipistrelle	D-C	1	N	Heard only, not seen.
05:29	Common pipistrelle	C	1	N	Heard only, not seen.
Total bat passes			6		

iii. September Transect

DUSK					
Project Name	A46 Coventry Junctions		Surveyors		JC, KL
Survey Location	A46 Coventry Junctions		Rain (0-5)		0
Date	06/09/2017		Wind (0-7)		0
Start	19:27		Cloud Cover (0-5)		4
Sunset	19:43		Temperature		14°c
Finish	21:34		Weather description		Warm, still clear evening.
Time	Species	Location (transact points)	No. of bats	Recording (Y/N)	Description of behaviour
19:58	Soprano pipistrelle	-	1	Y	-
20:02	Soprano pipistrelle	-	1	Y	-
20:04	Soprano pipistrelle	-	1	Y	-
20:05	Soprano pipistrelle	-	1	Y	Several passes
20:07	Soprano pipistrelle	H	1	Y	Commuting several passes.
20:08	Soprano pipistrelle	-	1	Y	Several passes
20:09	Soprano pipistrelle	-	1	Y	-
20:10	Soprano pipistrelle	-	1	Y	-
20:13	Noctule	H-G	1	Y	Commuting.
20:17	Soprano pipistrelle	G	1	Y	Commuting.
20:19	Common pipistrelle	GI	1	Y	Commuting.
20:20	Common pipistrelle	-	1	Y	-
20:48	Common pipistrelle	-	1	Y	-
20:58	Common pipistrelle	-	1	Y	-

21:06	Common pipistrelle	-	1	Y	-
21:12	Common pipistrelle	B	1	Y	Commuting.
21:18	Common pipistrelle	B-A	1	Y	Commuting.
21:29	Common pipistrelle	A-end point	1	Y	Socialising.
21:31	Common pipistrelle	A-end point	1	Y	Commuting. Two passes
Total bat passes			19		

iv. October Transect

DUSK					
Project Name	A46 Coventry Junctions		Surveyors		JC, KL
Survey Location	A46 Coventry Junctions		Rain (0-5)		0
Date	12/10/2017		Wind (0-7)		3
Start	18:04		Cloud Cover (0-5)		3
Sunset	18:19		Temperature		14°c
Finish	20:00		Weather description		Cool & breezy evening.
Time	Species	Location (transact points)	No. of bats	Recording (Y/N)	Description of behaviour
19:18	Soprano pipistrelle	G	1	Y	Heard only, not seen.
19:21	Soprano pipistrelle	-	1	Y	-
19:22	*Myotis* species	-	1	Y	-
19:29	Soprano pipistrelle	-	1	Y	-
19:32	Soprano pipistrelle	H-I	1	Y	Heard only, not seen. Commuting
19:39	*Myotis* species	I	1	Y	Heard only, not seen.
Total bat passes			6		

ANNEX D - AUTOMATED BAT DETECTOR RAW DATA

Nature Reserve: SP 38129 76894

Date	Sunset	Minimum and maximum temp. °C	Species[1]	First bat pass	17:00 - 18:00	18:00 - 19:00	19:00 - 20:00	20:00 - 21:00	21:00 - 22:00	22:00 - 23:00	23:00 - 00:00	00:00 - 01:00	01:00 - 02:00	02:00 - 03:00	03:00 - 04:00	04:00 - 05:00	05:00 - 06:00	Last bat pass	Sunrise	Number of Survey Hours[2]	Total number of bat passes (species specific)	Bat Activity Index (bat passes per hour)[3]	Bat Activity Index (bat passes per hour)[3]
17/08/17	20:26	15/20	PIPI	21:12					3		6		3	2	3			03:17	05:55	09:29	17	1.79	
18/08/17	20:24	12/16	PIPI	22:46						2	6							23:25	05:56	09:32	8	0.84	
19/08/17	20:22	12/16	PIPI	21:59					1	1	14	1	3	6				02:46	05:58	09:36	26	2.71	
20/08/17	20:20	12/16	PIPI	23:54							1	1	3					01:58	06:00	09:40	5	0.62	1.64
			PIPI/PIPY	01:17									1					01:17			1		
21/08/17	20:17	15/19	PIPI	21:33					2		1	9	3	3	1		1	05:25	05:55	09:44	20	2.26	
			PIPI/PIPY	23:57							1							23:57			1		
			MYOTIS	05:03													1	05:03			1		
06/09/17	19:41	12/18	PIPI	20:45				2	1	1								22:36	06:28	12:47	4	0.31	
07/09/17	19:39	14/17	None																06:29	12:50	0	0	
08/09/17	19:36	11/15	PIPI	20:38				1	5									21:47	06:31	12:55	6	0.46	0.17
09/09/17	19:34	10/14	PIPI	20:41				1										20:41	06:33	12:59	1	0.08	
10/09/17	19:32	12/15	None																06:34	13:02	0	0	
12/10/17	18:17	12/18	PIPI	18:40		1	108	139	3							2		04:14	07:29	13:20	253	19.62	
			PIPY	18:56		1	3											19:02			4		
			MYOTIS	19:33			1											19:33			1		
			NYNO	19:49			1											19:49			1		19.92
13/10/17	18:15	15/18	PIPI	19:24			1								3	4	1	05:16	07:30	13:25	9	0.83	
			NYNO	17:47	1	1												18:06			2		
14/10/17	18:12	11/17	PIPI	18:38		29	141	70	5	52	166	128	182	15				02:14	07:32	13:33	788	79.05	

Date	Sunset	Minimum and maximum temp. °C	Species[1]	First bat pass	17:00 - 18:00	18:00 - 19:00	19:00 - 20:00	20:00 - 21:00	21:00 - 22:00	22:00 - 23:00	23:00 - 00:00	00:00 - 01:00	01:00 - 02:00	02:00 - 03:00	03:00 - 04:00	04:00 - 05:00	05:00 - 06:00	Last bat pass	Sunrise	Number of Survey Hours[2]	Total number of bat passes (species specific)	Bat Activity Index (bat passes per hour)[3]	Bat Activity Index (bat passes per hour)[3]
			PIPY	19:05			44		22	26	21	48	43	14				02:15			218		
			PIPI/PIPY	00:11								10						00:36			10		
			NYNO	19:37			10		3	3	11	3	5					01:59			35		
			MYOTIS	22:13						1	1	1						00:13			3		
15/10/17	18:10	12/16	PIPI	22:35						1								22:35	07:34	13:40	1	0.07	
16/10/17	18:08	11/16	None															-	07:36	13:47	0	0	

1. Key: PIPI: common pipistrelle (*Pipistrellus pipistrellus*), PIPY: soprano pipistrelle (*Pipistrellus pygmaeus*), NYNO: noctule bat (*Nyctalus noctula*), MYOTIS: *Myotis* species.
2. The number of survey hours corresponds to the length of the night, i.e. the time between sunset and sunrise.
3. The Bat Activity Index of the number of bat passes per hour is calculated from the number of bat passes / number of survey hours (i.e. length of the night in-between sunset and sunrise) for each of the individual survey nights and as an average of the five survey nights making up each monthly survey session.

Rugby Club SP 38870 77880

Date	Sunset	Minimum and maximum temp. °C	Species[1]	First bat pass	17:00 - 18:00	18:00 - 19:00	19:00 - 20:00	20:00 - 21:00	21:00 - 22:00	22:00 - 23:00	23:00 - 00:00	00:00 - 01:00	01:00 - 02:00	02:00 – 03:00	03:00 – 04:00	04:00 – 05:00	05:00 – 06:00	06:00 – 07:00	Last bat pass	Sunrise	Survey Hours	Total number of bat passes (species specific)	Bat Activity Index (bat passes per hour)[3]	Bat Activity Index (bat passes per hour)[3]
17/08/17	20:26	18/22	PIPI	21:20					2	6	5	1	2		3	3	1		05:09	05:55	09:29	23	4.43	4.00
			PIPY	20:33				1	2	3	1	2	2		1	3	4		05:28			19		
18/08/17	20:24	14/17	PIPI	22:45						1			1						01:22	05:56	09:32	5	1.05	
			PIPY	21:46					1		1	1		1	1				03:43			5		
19/08/17	20:22	16/18	PIPI	21:14					6	16	8	2	4	1	1	2			04:25	05:58	09:36	40	8.85	
			PIPY	20:45				9	7	3	3	2	8	4	2	4	2		05:16			44		

Date	Sunset	Minimum and maximum temp. °C	Species[1]	First bat pass	17:00 - 18:00	18:00 - 19:00	19:00 - 20:00	20:00 - 21:00	21:00 - 22:00	22:00 - 23:00	23:00 - 00:00	00:00 - 01:00	01:00 - 02:00	02:00 – 03:00	03:00 – 04:00	04:00 – 05:00	05:00 – 06:00	06:00 – 07:00	Last bat pass	Sunrise	Survey Hours	Total number of bat passes (species specific)	Bat Activity Index (bat passes per hour)[3]	Bat Activity Index (bat passes per hour)[3]
			MYOTIS	22:54						1									22:54			1		
20/08/17	20:20	16/18	PIPI	21:32					1			1	3						01:54	06:00	09:40	5	1.97	
			PIPY	20:43				1		1		3	5	1	1		1		05:11			13		
			NYNO	00:42								1							00:42			1		
21/08/17	20:17	20/20	PIPI	20:43				1	2			3	5	3					02:56	06:01	09:44	14	3.70	
			PIPY	20:33				1	3			5	6	7					02:56			22		
06/09/17	19:41	12/18	PIPI	21:01					1										21:01	06:28	12:47	1	1.21	0.55
			PIPY	20:05				8	1	1				1					02:04			11		
			PIPI/PIPY	21:37					1										01:37			1		
07/09/17	19:39	14/17	None																-	06:29	12:50	0	0	
08/09/17	19:36	11/15	PIPI	21:11					1		1								23:26	06:31	12:55	2	0.55	
			PIPY	20:03				3									1		05:40			4		
09/09/17	19:34	10/14	PIPI	20:16				1		2	1								23:44	06:33	12:59	4	0.73	
			PIPY	20:05				3					1						01:41			4		
10/09/17	19:32	12/15	PIPI	21:33					2										21:53	06:34	13:02	2	0.27	
			PIPY	21:32					1										21:32			1		

Date	Sunset	Minimum and maximum temp. °C	Species[1]	First bat pass	17:00 - 18:00	18:00 - 19:00	19:00 - 20:00	20:00 - 21:00	21:00 - 22:00	22:00 - 23:00	23:00 - 00:00	00:00 - 01:00	01:00 - 02:00	02:00 – 03:00	03:00 – 04:00	04:00 – 05:00	05:00 – 06:00	06:00 – 07:00	Last bat pass	Sunrise	Survey Hours	Total number of bat passes (species specific)	Bat Activity Index (bat passes per hour)[3]	Bat Activity Index (bat passes per hour)[3]
12/10/17	18:17	12/16	PIPI	18:40		1	106	139	3							2			04:14	07:29	13:20	253	19.62	19.85
			PIPY	18:56		1	3												19:02			4		
			NYNO	19:49			1												19:49			1		
			MYOTIS	19:33			1												19:33			1		
13/10/17	18:15	17/19	PIPI	19:24			1								3	1	1		05:16	07:30	13:25	7	0.60	
			NYNO	17:47	1	1													18:06			2		
14/10/17	18:12	13/17	PIPI	18:38		29	140	70	5	52	165	128	179	14					02:15	07:32	13:33	788	79.05	
			PIPY	19:05			47		22	26	20	49	41	14					02:14			218		
			PIPI/PIPY	00:11								10							00:36			10		
			NYNO	19:37			10		3	2	10	3	3						01:59			35		
			MYOTIS	22:13						1	1	1							00:13			3		
15/10/17	18:10	15/16	None																-	07:34	13:40	0	0	
16/10/17	18:08	12/16	None																-	07:36	13:47	0	0	

1. Key: PIPI: common pipistrelle (*Pipistrellus pipistrellus*), PIPY: soprano pipistrelle (*Pipistrellus pygmaeus*), NYNO: noctule bat (*Nyctalus noctula*), MYOTIS: *Myotis* species.
2. The number of survey hours corresponds to the length of the night, i.e. the time between sunset and sunrise.
3. The Bat Activity Index of the number of bat passes per hour is calculated from the number of bat passes / number of survey hours (i.e. length of the night in-between sunset and sunrise) for each of the individual survey nights and as an average of the five survey nights making up each monthly survey session.

Country Park SP 39625 78747

Date	Sunset	Minimum and maximum temp. °C	Species[1]	First bat pass	19:00 - 20:00	20:00 - 21:00	21:00 - 22:00	22:00 - 23:00	23:00 - 00:00	00:00 - 01:00	01:00 - 02:00	02:00 – 03:00	03:00 – 04:00	04:00 – 05:00	05:00 – 06:00	06:00 – 07:00	Last bat pass	Sunrise	Survey Hours	Total number of bat passes (species specific)	Bat Activity Index (bat passes per hour)[3]	Bat Activity Index (bat passes per hour)[3]
06/09/17	19:41	12/18	none	-													-	06:28	12.78	0	0	0
07/09/17	19:39	14/17	none	-													-	06:29	12.83	0	0	
08/09/17	19:36	11/15	none	-													-	06:31	12.92	0	0	
09/09/17	19:34	10/14	none	-													-	06:33	12.98	0	0	
10/09/17	19:32	12/15	none	-													-	06:34	13.03	0	0	
12/10/17	18:17	12/15	PIPI	04:25										2			04:26	07:29	13.20	2	0.15	0.05
13/10/17	18:15	16/18	none	-													-	07:30	13.25	0	0	
14/10/17	18:12	13/18	none	-													-	07:32	13.33	0	0	
15/10/17	18:10	14/16	PIPI	22:35				1									22:35	07:34	13.40	1	0.07	

Date	Sunset	Minimum and maximum temp. °C	Species[1]	First bat pass	19:00 - 20:00	20:00 - 21:00	21:00 - 22:00	22:00 - 23:00	23:00 - 00:00	00:00 - 01:00	01:00 - 02:00	02:00 – 03:00	03:00 – 04:00	04:00 – 05:00	05:00 – 06:00	06:00 – 07:00	Last bat pass	Sunrise	Survey Hours	Total number of bat passes (species specific)	Bat Activity Index (bat passes per hour)[3]	Bat Activity Index (bat passes per hour)[3]
16/10/17	18:08	12/16	none															07:36	13.47	0	0	

1. Key: PIPI: common pipistrelle (*Pipistrellus pipistrellus*), PIPY: soprano pipistrelle (*Pipistrellus pygmaeus*), NYNO: noctule bat (*Nyctalus noctula*), MYOTIS: *Myotis* species.
2. The number of survey hours corresponds to the length of the night, i.e. the time between sunset and sunrise.
3. The Bat Activity Index of the number of bat passes per hour is calculated from the number of bat passes / number of survey hours (i.e. length of the night in-between sunset and sunrise) for each of the individual survey nights and as an average of the five survey nights making up each monthly survey session

Appendix 8.2 i

PCF Stage 4 Deliverable for Highways England

Ornithological Walkover Report

A46 Coventry Junctions Upgrade

October 2019

This page is left intentionally blank

A46 Coventry Junction Upgrade

Ornithological Walkover Report

Report No: HE551486-ACM-EGN-A46_SW_000_Z-RP-LE-0020
P02 S3
October 2019

Revision	Current Status	Date	Prepared By	Reviewed By	Approved By
P01	S3	13.09.19	Alan Bull	Neil Gates	Matt Oakley
P02	S3	06.10.19	Alan Bull	Helen Yesugey	John Waterman

AECOM Infrastructure & Environment UK Limited ("AECOM") has prepared this Report for the sole use of Highways England ("Client") in accordance with the terms and conditions of appointment. No other warranty, expressed or implied, is made as to the professional advice included in this Report or any other services provided by AECOM. This Report may not be relied upon by any other party without the prior and express written agreement of AECOM.

Where any conclusions and recommendations contained in this Report are based upon information provided by others, it has been assumed that all relevant information has been provided by those parties and that such information is accurate. Any such information obtained by AECOM has not been independently verified by AECOM, unless otherwise stated in the Report. AECOM accepts no liability for any inaccurate conclusions, assumptions or actions taken resulting from any inaccurate information supplied to AECOM from others.

The methodology adopted and the sources of information used by AECOM in providing its services are outlined in this Report. The work described in this Report was undertaken between July 2019 and September 2019 and is based on the conditions encountered and the information available during the said period of time. The scope of this Report and the services are accordingly factually limited by these circumstances. AECOM disclaim any undertaking or obligation to advise any person of any change in any matter affecting the Report, which may come or be brought to AECOM's attention after the date of the Report. © This Report is the copyright of AECOM. Any unauthorised reproduction or usage by any person other than the addressee is strictly prohibited.

SCHEDULE OF REVISIONS

Revisions Issued Since Publication

Report Revision Number	Revision Date	Paragraphs amended
P02	06/10/19	Minor edits following internal review

Standard codes for suitability models and documents See BS1192:2007 Table 5 for further details					
Revision	Status	Description	Revision	Status	Description
P01.01 etc. to Pnn.nn etc.	S0	Initial status or WIP	P01.1 etc. to Pnn.nn etc.	D1	Costing
P01.01 to Pnn.nn	S1	Co-ordination	P01.1 etc. to Pnn.nn etc.	D2	Tender
P01 to Pnn	S2	Information	P01.1 etc. to Pnn.nn etc.	D3	Contractor Design
P01 to Pnn	S3	Review & Comment	P01.1 etc. to Pnn.nn etc	D4	Manufacture/ Procurement
P01 to Pnn	S4	Stage Approval	C01 to Cnn	A1, A2 etc	Approved and accepted as stage complete
P01 to Pnn	S5	Manufacture	P01.01 etc. to Pnn.nn etc.	B1, B2 etc	Partially signed-off:
P01 to Pnn	S6	PIM Authorization	C01 to Cnn	CR	As Construction Record
P01 to Pnn	S7	AIM Authorization			

Contents

1. INTRODUCTION....1
1.1 Background....1
1.2 Proposed Scheme Description....1
1.3 Survey Area Description....2
1.4 Objectives....2
1.5 Legislation and policy....2
2. METHODOLOGY....5
2.1 Field survey....5
2.2 Desk Study....5
2.3 Assessment Criteria....5
2.4 Survey Limitations....5
3. RESULTS AND EVALUATION....6
3.1 Results....6
3.2 Desk Study....6
3.3 Habitat description and potential to support protected or notable bird species....7
4. DISCUSSION....10

Appendices

APPENDIX A FIGURES

List of Tables

Table 1: Combe Pool SSSI non-breeding interest species....6

1. INTRODUCTION

1.1 Background

1.1.1 In June 2017, AECOM were commissioned by Highways England to undertake an ornithological walkover survey of the proposed A46 Coventry Junctions Upgrade at Binley junction (hereafter referred to as the Proposed Scheme) plus a 250m buffer zone from the Proposed Scheme boundary (hereafter referred to as the Survey Area). New road sign locations to the north and south of the Proposed Scheme were also considered for their potential impacts, where applicable. Impacts on birds were scoped out of the initial PCF Stage 1 assessment in 2016[1]. Following review of this assessment, an ornithological walkover survey was subsequently recommended by AECOM in 2017[2] to assess the habitats present and likelihood of protected and notable[3] bird species recorded in the wider landscape (from desk study records) to be present within the survey area.

1.1.2 The 2017 survey considered that the Proposed Scheme was unlikely to impact upon any birds present within the surrounding habitat and did not make any recommendations for further survey, based on the minimal (and insignificant) amounts of breeding and non-breeding habitat being lost and the temporary nature of the works. The Chartered Institute of Ecology and Environmental Management (CIEEM) recently produced guidance on the validity of ecological reports and surveys[4] which advises a report / survey is likely to be valid in most cases between 12 and 18 months except for where a site may offer existing or new features which could be used by a mobile species within a short timeframe. As such, to ensure the validity of survey data to support the Environmental Assessment Report, an updated ornithological walkover and desk study was conducted in July 2019 to reappraise the habitat on site and in the survey area and determine whether any changes to site conditions would necessitate the need for further ornithological surveys. Results of the July 2019 ornithological walkover survey and desk study are presented in this report; and any changes since the 2017 survey noted in the discussion.

1.2 Proposed Scheme Description

1.2.1 The proposed upgrade of the A46 Binley junction is part of the Department for Transport (DfT) Road Investment Strategy (RIS) to be developed by Highways England during the period 2015 to 2020.

1.2.2 The proposal constitutes an upgrade scheme on the A46, a dual carriageway, at Binley Junction, and aims to improve capacity and reduce congestion. The proposals comprise the grade separation of the Binley junction by raising the A46 dual carriageway over the A428 Rugby Road, with entry and exit slip roads leading to an at-grade gyratory junction. The length of the proposed scheme is approximately 1

[1] Mouchel (2016), A46 Coventry Junctions, Extended Phase 1 Habitat Survey Report. Prepared for Highways England.
[2] AECOM (2017), A46 Binley Junction, Coventry, Scoping Report, DRAFT Unpublished. Prepared for Highways England.
[3] All bird species are protected under the Wildlife and Countryside Act 1981, however those listed under Schedule 1 are further protected from disturbance. Notable bird species are those listed as Species of Principal Importance in England Under Section 41 of the Natural Environment and Rural Communities Act 2006 and those listed as Birds of Conservation Concern (see Section 1.5)
[4] CIEEM (2019). *Advice Note on the Lifespan of Ecological Report & Surveys*. Chartered Institute of Ecology and Environmental Management, Winchester.

mile, centred on the A46 Binley junction. The land required for the proposed scheme is approximately 11.6 ha in size. This includes temporary land take for construction camps, laydown, and worker facilities. The Proposed Scheme boundary is shown in Plate 1.

1.3 Survey Area Description

1.3.1 The landscape within and surrounding the Survey Area comprises various semi-natural and man-made habitats. It is predominantly urban to the west of the Proposed Scheme, with a mixture of arable, woodland and recreational land to the east. To the north-east of the Proposed Scheme is Coombe Country Park and Combe Pool Site of Special Scientific Interest (SSSI), designated for its ornithological interest; and to the south-west is Herald Way Marsh (Claybrookes Marsh) SSSI / Local Nature Reserve (LNR), designated for its range of wetland habitats and assemblage of invertebrates.

1.3.2 For the purpose of the ornithological walkover, the survey area (see Plate 1) was defined to include the Proposed Scheme red-line boundary and a 'zone of potential impact', which included all areas within 250m of the Proposed Scheme red-line boundary. For the purposes of identifying ornithological receptors potentially at risk, 250m was considered appropriate, when taking into account the following:

- The Proposed Scheme will involve the upgrading of existing junctions. This means that any birds already present in the vicinity of the Proposed Scheme are currently subjected to existing traffic movements and associated disturbances;
- The footprint of the Proposed Scheme is likely to result in only minimal direct loss of habitats of potential suitability to birds; and
- Beyond 250m it is considered that any construction related impacts and increases in operational disturbance will be minimal.

1.3.3 A small section of Combe Pool SSSI is within the survey area (area of woodland), but the main waterbody is outside of the 250m buffer.

1.4 Objectives

1.4.1 The objectives of the walkover survey were to:

- provide an updated assessment of the suitability, quality and importance of habitats within the Survey Area for protected and notable bird species, and/or those associated with Combe Pool SSSI; and,
- evaluate the necessity for further ornithological surveys to inform the impact assessment process.

1.5 Legislation and policy

1.5.1 The legislative provisions for the protection of wild birds in the UK are contained primarily in sections 1-7 of the Wildlife and Countryside Act (WCA) 1981 (as amended). Under the WCA, a wild bird is defined as any bird of a species that occurs in a wild state as a resident or a visitor to the European Territory of any member state.

1.5.2 When breeding, all birds, their nest, eggs and nestlings are afforded protection under the WCA 1981, as updated by the Countryside Right of Way Act 2000. Therefore, during the bird breeding season (typically March-August inclusive) it is an offence to:

- intentionally kill, injure or take any wild bird;

- intentionally take, damage or destroy the nest of any wild bird while it is in use or being built; and
- intentionally take or destroy the eggs of any wild bird.

1.5.3 Additionally, special penalties exist for offences related to species listed on Schedule 1 of the WCA, for which there are additional offences for disturbing these birds at their nest, or their dependent young. Schedule 1 birds cannot be intentionally or recklessly disturbed when nesting and there are increased penalties for doing so. No licences are available for disturbance during a development even in circumstances where that development is fully authorised by consents such as a valid planning permission.

1.5.4 The Natural Environment and Rural Communities (NERC) list of Species of Principal Importance is used to guide decision-makers such as public bodies, including local and regional authorities, in implementing their duty under section 40 of the NERC Act 2006; under Section 40 every public authority (e.g. a local authority or local planning authority) must, in exercising its functions, have regard, so far as is consistent with the proper exercise of those functions, to the purpose of conserving biodiversity. In addition, with regard to those species on the list of Species of Principal Importance prepared under section 41 (S41), the Secretary of State must:

- *"(a) take such steps as appear to the Secretary of State to be reasonably practicable to further the conservation of the living organisms and types of habitat included in any list published under this section, or*
- *(b) promote the taking by others of such steps."*

1.5.5 Species listed on the Birds of Conservation Concern (BoCC) Red List (Eaton et al, 2015)[5] are those that have declined in numbers by 50% over the last 25 years, those that have shown an historical population decline between 1800 and 1995 and species that are of global conservation concern. There are 67 species on the Red List that are of the most urgent conservation concern.

1.5.6 Species listed on the BoCC Amber List, of which there are currently 96, include those that have shown a moderate decline in numbers (25%-49%) over the last 25 years and those with total populations of less than 300 breeding pairs. Also included are those species which represent a significant proportion (greater than 20%) of the European breeding or wintering population, those for which at least 50% of the British population is limited to 10 sites or less, and those of unfavourable conservation status in Europe.

1.5.7 The remaining species are placed on the Green List, indicating that they are currently of low conservation priority. These species still receive full protection through the provisions of the Wildlife and Countryside Act 1981, as amended.

1.5.8 The UK Biodiversity Action Plan (UKBAP) was launched in 1994 and established a framework and criteria for identifying species and habitat types of conservation concern. From this list, action plans for priority species of conservation concern were published, and have subsequently been amended and updated for the species now included on Section 41 of the NERC Act.

[5] Eaton MA, Aebischer NJ, Brown AF, Hearn RD, Lock L, Musgrove AJ, Noble DG, Stroud DA and Gregory RD (2015) Birds of Conservation Concern 4: the population status of birds in the United Kingdom, Channel Islands and Isle of Man. British Birds 108, 708–746.

1.5.9 Species listed as priority bird species in Warwickshire[6] have also been considered for assessment. These are:

- Barn Owl *Tyto alba*;
- Bittern *Botaurus stellaris*;
- Farmland Birds (grey partridge *Perdix perdix*, skylark *Alauda arvensis*, tree Sparrow *Passer montanus*, corn bunting *Emberiza calandra*, turtle dove *Streptopelia turtur*, linnet *Linaria cannabina*, yellowhammer *Emberiza citrinella*, reed bunting *Emberiza schoeniclus* and yellow wagtail *Motacilla flava*);
- Lapwing *Vanellus vanellus*;
- Snipe *Gallinago gallinago*; and
- Song thrush *Turdus philomelos*.

[6] Warwickshire Wildlife Trust Local Biodiversity Action Plan

2. METHODOLOGY

2.1 Field survey

2.1.1 The ornithological walkover survey was undertaken by an experienced Ornithologist and Natural England Class 1 Barn Owl licence holder on 10th July 2019 between 07:00 and 11:30. The survey involved a walkover of the Survey Area (see Figure 1), accessing all areas of the Survey Area to within 100m[7], recording breeding bird species present and habitat associations, where access allowed. The survey visit also included the wider Coombe Country Park and Combe Pool SSSI, to the north-east of the Proposed Scheme.

2.2 Desk Study

2.2.1 A data search was undertaken through Warwickshire Ecological Records Centre to identify protected / notable bird species potentially relevant to the Proposed Scheme, recorded within 2 km of the Proposed Scheme and within the last ten years.

2.2.2 Waterbirds within Coombe Country Park are counted monthly as part of the Wetland Bird Survey (WeBS) coordinated 'core' count survey. This survey involves monthly counts of waterbodies and wetlands within the UK to monitor non-breeding populations of waterbirds within the UK and the scheme aims to assess population sizes, determine trends in numbers and distribution, and identify important sites for waterbirds (Frost et al. 2019[8]; relevant data obtained online for 2014/15).

2.3 Assessment Criteria

2.3.1 The field survey considered the likelihood for any protected or notable bird species to occur within the Survey Area. This was assessed on the basis of the habitat present within the Survey Area, together with knowledge of each species' ecology and geographical range. Where it is acknowledged that there is suitable habitat for protected or notable bird species to occur within the Survey Area, the relative importance of the species or assemblage is considered in relation to the Proposed Scheme and professional judgement applied, taking into account the species' legislative protection, conservation status and relative national, regional and local abundance, to determine whether there is a requirement to undertake further surveys.

2.4 Survey Limitations

2.4.1 The ornithological walkover survey provides a snapshot recording the bird species present at the time of the survey and an evaluation of the species that are likely to be present within the Survey Area during the breeding and non-breeding season, through an assessment of the habitats present. It should be used to identify whether there is a requirement for further, more detailed ornithological surveys.

[7] The survey area is 250m, however every part of the survey area to within 100m i.e. birds visible or audible at 100m distance from the surveyor, within the survey area, were recorded (even if the ground wasn't walked),

[8] Frost, T.M., Austin, G.E., Calbrade, Mellan, H.J., Hearn, R.D., Stroud, D.A., Wotton, S.R. and Balmer, D.E. 2019. Waterbirds in the UK 2017/18: The Wetland Bird Survey. BTO/RSPB/JNCC. Thetford. "Contains Wetland Bird Survey (WeBS) data from Waterbirds in the UK 2017/18 © copyright and database right 2019. WeBS is a partnership jointly funded by the BTO, RSPB and JNCC, in association with WWT, with fieldwork conducted by volunteers."

3. RESULTS AND EVALUATION

3.1 Results

3.1.1 The results of the ornithological walkover survey consider the habitats present within the Survey Area in the context of their suitability to support protected and notable bird species that, if considered present, may require further survey to determine whether they pose a constraint on the Proposed Scheme.

3.1.2 The potential for protected and notable bird species to be present within the Survey Area is considered in the context of the potential for direct and indirect impacts of the Proposed Scheme on bird populations during both construction and operation. Such impacts include those associated with noise disturbance, visual disturbance, any additional lighting and habitat degradation through surface runoff, dust deposition and exhaust pollutants.

3.2 Desk Study

3.2.1 The data search returned records of 65 notable species recorded within the last ten years and within 2 km of the Proposed Scheme. Five records of barn owl were returned from the data search, including a record of breeding barn owl at Brandon Marsh Nature Reserve, c 1 km south-east of the Proposed Scheme.

3.2.2 Species cited as interest features in winter on the SSSI citation for Combe Pool SSSI are provided in Table 1 along with the most recent five-year peak mean WeBS count and the 1% threshold criteria used for determining populations of national importance (Musgrove et. *Al*, 2013[9]).

Table 1: Combe Pool SSSI non-breeding interest species

Species	Five-year peak mean for Coombe Country Park (WeBS) 2009/2010 – 2014/2015	Great Britain 1% Winter Threshold
Tufted Duck *Aythya fuligula*	199	1100
Pochard *Aythya ferina*	58	380
Shoveler *Anas clypeata*	38	180
Great Crested Grebe *Podiceps cristatus*	21	190
Black-headed Gull *Chroicocephalus ridibundus*	344	22,000
Common Gull *Larus canus*	15	7,000
Lesser Black-backed Gull *Larus fuscus*	4	1,200
Herring Gull *Larus argentatus*	6	7,300
Great Black-backed Gull *Larus marinus*	2	760
Kingfisher *Alcedo atthis*	5	n/a

[9] Musgrove A., et al. 2013. Population estimates of birds in Great Britain and the United Kingdom. *British Birds* 106, 64-100.

3.3 Habitat description and potential to support protected or notable bird species

Combe Pool SSSI

3.3.1 Combe Pool SSSI, is located approximately 247m to the north-east of the Proposed Scheme boundary. The SSSI is cited for holding one of the largest heronries in Warwickshire; breeding protected bird species (including kingfisher and water rail *Rallus aquaticus*); for its importance to wintering wildfowl, including shoveler and tufted duck[10]; and for the woodland areas supporting a diverse breeding bird community and winter roosting site.

3.3.2 The large area of reed—fringed open water, with a small section of reedbed in the south-eastern corner, is bordered by mature broad-leaved trees and scrub. Species recorded within these habitats in July 2019 included reed warbler *Acrocephalus scirpaceus* (3), blackcap *Sylvia atricapilla* (10), stock dove *Columba oenas* (1) and chiffchaff *Phylloscopus collybita* (2).

3.3.3 At the time of the survey, species observed on Combe Pool included kingfisher (1), mallard Anas platyrhynchos (c.10), grey heron *Ardea cinerea* (2), little egret *Egretta garzetta* and mute swan *Cygnus olor* (2). Breeding species (confirmed from sightings of nests or family parties) on Combe Pool included great crested grebe (3 pairs) and coot *Fulica atra* (4 pairs). The distribution of these waterbirds was widespread across the open water.

3.3.4 The WeBS data indicate that none of the SSSI cited waterbird species are currently occurring at levels within the SSSI which approach the 1% threshold for national importance[11]. Specific thresholds for determining county importance have not been set, although a Site of Importance for Nature Conservation (SINC) in Warwickshire can be designated if it supports '*a significant proportion of the Warwickshire population' of a particular species*[12]. There is no recent county avifauna (i.e. within the last ten years) from which to derive county populations of bird species and the annual reports of bird occurrences within the county are detailed within the broader West Midlands region. However, based on professional opinion it is considered likely that some of the waterbird species occurring within the SSSI may have populations, at least, approaching county importance.

3.3.5 The heronry is located on the middle southern side of the main waterbody in an area of broad-leaved woodland. The heronry and main waterbody are located in the well-used Country Park and also close to the existing road network and urban areas. Based on the site visit it is considered that any birds present within the SSSI are likely to be habituated to noise and human activity.

[10] https://designatedsites.naturalengland.org.uk/SiteDetail.aspx?SiteCode=S1001242&SiteName=&countyCode=43&responsiblePerson=&SeaArea=&IFCAArea accessed July 2019

[11] The 1% criterion is used to assess the importance of wetlands. A wetland is considered internationally important if it regularly supports 1% of a species biogeographic (in this case NW Europe) population (Wetlands International 2016). A wetland in Britain is considered of national importance for a species' biogeographic population if it regularly supports 1% of the total numbers in Britain (Frost *et al*. 2016)

[12] Warwickshire Wildlife Trust (2013) Guidance for the Selection of Local Wildlife Sites in Warwickshire, Coventry and Solihull. Warwickshire County Council, Warwick.

Trees and buildings with potential to support breeding Barn Owl

3.3.6 Trees and buildings within the survey area were assessed for their potential to support roosting and breeding barn owl, based on guidance as detailed by Shawyer: *Barn Owl Tyto alba Survey Methodology and Techniques for use in Ecological Assessment*[13].

3.3.7 No mature trees with a trunk diameter of sufficient girth and with a cavity of sufficient quality to support barn owl (e.g. provide a roosting or nesting platform), were recorded within the Survey Area.

3.3.8 No buildings with features that could support roosting or breeding barn owl, such as agricultural buildings and structures with access to the interior were recorded within the Survey Area.

3.3.9 No barn owl nest boxes were recorded within the survey area.

Arable farmland

3.3.10 This habitat type is located on the eastern side of the A46, with a small field compartment to the south of Oak Farm nurseries and a larger compartment to the immediate south of Binley Wood (see Plate 1). Species reliant on this habitat that were recorded during the walkover survey in July 2019 included single dunnock *Prunella modularis* and yellowhammer *Emberiza citrinella*. Although, it is likely that small numbers of notable farmland bird species are likely to occur within the Survey Area, based on the quality and extent of habitat present it is unlikely that these populations are significant (i.e. occurring in numbers well below any number approaching 1% of the National or County populations). Loss of breeding habitat through the Proposed Scheme will also be minimal and any construction disturbance temporary.

3.3.11 The arable fields within the Survey Area, adjacent to the existing A46, are considered too small and too enclosed by existing development to support important numbers of golden plover *Pluvialis apricaria*, lapwing *Vanellus* or other wildfowl and waders that forage within arable farmland in winter. Such species prefer large, open, undisturbed farmland.

3.3.12 The limited grass margins within the Survey Area, located around the arable fields and along the verges of the current A46 are narrow in width and of low quality, indicating that these fields are unlikely to attract foraging barn owl and therefore foraging barn owl are considered unlikely to occur adjacent to the existing A46. Furthermore, the habitat quality along the western section of the current A46 is largely industrial and offers little suitability for foraging barn owl. Therefore this species is unlikely to forage alongside or cross the current A46 and the risk of collision with traffic is currently considered minimal. It is therefore considered that barn owl, if present in the wider area, would not be significantly impacted by any upgrades to the A46 through noise, lighting, visual disturbance, or collision. Surveys of the wider landscape following the methodology for road/rail schemes is not required with a view to the above, e.g. surveys 1.5km from the scheme.

3.3.13 The grass margins (road verges) of the current A46 are narrow (less than 5 metres) and offer low quality habitat that would currently be used by foraging barn owl. It is

[13] https://cieem.net/resource/barn-owl-survey-methodology-and-techniques-for-use-in-ecological-assessment/ (accessed July 2019)

recommended that the junction upgrades do not include such grassland verge habitat within any landscaping proposals as these habitats may attract foraging Barn Owl to the Proposed Scheme, which may be present in the wider area, and therefore any risk of Barn Owl collision with traffic, along the upgraded road, would be increased.

Amenity grassland

3.3.14 The areas of amenity grassland within the Survey Area include Broadstreet Rugby football club to the east of the existing A46 and a narrow strip on the north-western side of the A46. These areas of amenity grassland contain low quality habitat and are considered unsuitable for large numbers of non-breeding and breeding birds, notwithstanding the peripheral scrub habitat that is considered likely to support small numbers of common and widespread bird species in the summer and winter. Small numbers (<10) of urban bird species were recorded within this habitat during the walkover survey in July 2019, including pied wagtail *Motacilla alba*, robin *Erithacus rubecula*, dunnock, blackbird *Turdus merula* and song thrush *Turdus philomelos*.

Industrial areas and buildings

3.3.15 These areas, predominantly to the west of the A46, are likely to support small numbers of urban bird species. Species recorded in small numbers (<10) during the walkover survey in July 2019 included House Sparrow *Passer domesticus*, Starling *Sturnus vulgaris* and Pied Wagtail. These species are likely to already be habituated to noise and disturbances associated with current industrial operations and from the A46.

Broad-leaved woodland

3.3.16 Areas of broad-leaved woodland are well distributed within the 250 m buffer of the Proposed Scheme, with woodland blocks along the southern side of Combe Pool SSSI, at Little Rough (near Broadstreet rugby club), at Binley Wood, Piles Coppice and at Herald Way Marsh (Claybrook Marsh) SSSI / LNR. Species recorded in small numbers (<10) within these habitats during the walkover survey included marsh tit *Poecile palustris*, dunnock, song thrush and common urban bird species such as chiffchaff, wren *Troglodytes* and robin.

3.3.17 These habitats have the potential to support good numbers of breeding and wintering bird species reliant on these habitats, although it is considered that no species will be present within these habitats in any nationally significant numbers. Although species may be present within this habitat in numbers of potential county importance, it is considered that the Proposed Scheme is unlikely to impact on species breeding or wintering within these habitats, as any impacts are likely to be minimal in extent (habitat loss) or temporary (noise, lighting, visual disturbance).

4. DISCUSSION

4.1.1 The majority of the Combe Pool SSSI, including the main waterbody which supports wintering populations of waterbirds, is outside the considered 'zone of potential impact' of the Proposed Scheme and set within a well-used Country Park with regular human activity. Although there may be waterbird populations present within the SSSI of at least county importance, given that the waterbody and associated assemblages of waterbirds are, at their closest, 250m from the Proposed Scheme and that the waterbody is also screened through existing broad-leaved woodland, which is minimally 130m in width, it is considered unlikely that impacts to these species and the assemblage will arise from the Proposed Scheme.

4.1.2 Additionally, the heronry present within the SSSI is over 400m from the Proposed Scheme and screened from / by broad-leaved trees and scrub. Therefore, it is considered unlikely that significant impacts on both breeding and non-breeding birds associated with the SSSI will occur.

4.1.3 Taking into account the above information it is not considered necessary to undertake further ornithological surveys of Combe Pool SSSI to inform the impact assessment process and the likelihood of significant impacts to birds associated with the SSSI can be scoped out.

4.1.4 The habitats present within the Survey Area, whilst likely to support small breeding and wintering populations of notable species, such as farmland birds, are neither of an extent or quality to support significant populations. Coupled with the Proposed Scheme only resulting in minimal (and insignificant) amounts of breeding and non-breeding habitat being lost and any construction disturbance being temporary, it is considered unlikely that any species present within the habitats noted will be significantly impacted by the Proposed Scheme.

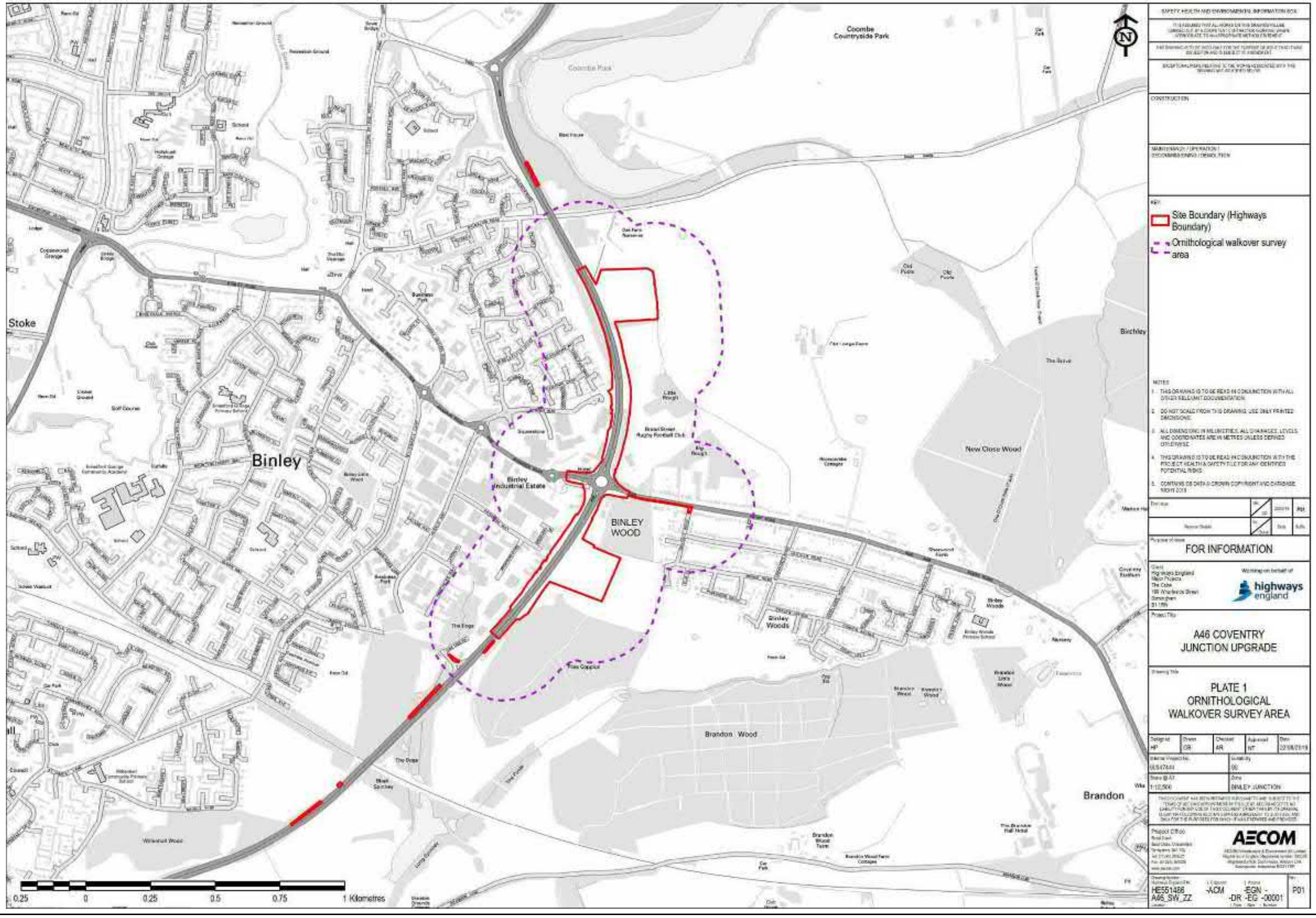
4.1.5 Based on the data search and assessment of habitats present within the survey area, it is considered unlikely that barn owl would use the survey area for foraging and in particular, areas in close proximity to the existing road carriageway and Proposed Scheme. No trees, buildings or nest boxes were recorded within the survey area that could support breeding barn owl.

4.1.6 Overall, the ornithological walkover survey in 2019 confirmed that the habitats within the Proposed Scheme boundary have not changed since 2017 and no new or different ornithological constraints have been identified during this survey. Based on the findings of this survey it is considered that no further detailed ornithological surveys are required to inform the impact assessment process.

4.1.7 It is recommended that, if no construction works have commenced within two years from the date of this survey (i.e. by July 2021), that the walkover survey is repeated to appraise the site and confirm that the site conditions have not changed since 2019.

Appendix A Figures

Figure 1: Proposed Scheme boundary and ornithological walkover survey areas


Coombe Countryside Park
Coombe Park
Stoke
Binley
Binley Industrial Estate
BINLEY WOOD
Binley Woods
Brandon Wood
New Close Wood
Birchley
Brandon
Whitmore Wood
Site Boundary (Highways Boundary)
Ornithological walkover survey area
FOR INFORMATION
A46 COVENTRY JUNCTION UPGRADE
PLATE 1
ORNITHOLOGICAL WALKOVER SURVEY AREA
BINLEY JUNCTION
AECOM
HE551486-ACM-EGN-A46_SW_ZZ-DR-EG-00001
P01
0.25 0 0.25 0.5 0.75 1 Kilometres

Appendix 8.2 j

PCF Stage 4 Deliverable for Highways England

Badger Survey Report

A46 Coventry Junctions Upgrade

September 2019

This page is left intentionally blank

A46 Coventry Junction Upgrade

Badger Survey Report

Report No: HE551486-ACM-EGN-A46_SW_000_Z-RP-LE-0025
P01 S3
September 2019

Revision	Current Status	Date	Prepared By	Reviewed By	Approved By
P01	S3	13.09.19	Joshua Waggott & Matthew White	Hannah Procter & Oliver Barnett	John Waterman

AECOM Infrastructure & Environment UK Limited ("AECOM") has prepared this Report for the sole use of Highways England ("Client") in accordance with the terms and conditions of appointment. No other warranty, expressed or implied, is made as to the professional advice included in this Report or any other services provided by AECOM. This Report may not be relied upon by any other party without the prior and express written agreement of AECOM.

Where any conclusions and recommendations contained in this Report are based upon information provided by others, it has been assumed that all relevant information has been provided by those parties and that such information is accurate. Any such information obtained by AECOM has not been independently verified by AECOM, unless otherwise stated in the Report. AECOM accepts no liability for any inaccurate conclusions, assumptions or actions taken resulting from any inaccurate information supplied to AECOM from others.

The methodology adopted and the sources of information used by AECOM in providing its services are outlined in this Report. The work described in this Report was undertaken between July 2019 and September 2019 and is based on the conditions encountered and the information available during the said period of time. The scope of this Report and the services are accordingly factually limited by these circumstances. AECOM disclaim any undertaking or obligation to advise any person of any change in any matter affecting the Report, which may come or be brought to AECOM's attention after the date of the Report. © This Report is the copyright of AECOM. Any unauthorised reproduction or usage by any person other than the addressee is strictly prohibited.

SCHEDULE OF REVISIONS

Revisions Issued Since Publication

Report Revision Number	Revision Date	Paragraphs amended
P01	13/09/2019	

Standard codes for suitability models and documents See BS1192:2007 Table 5 for further details					
Revision	Status	Description	Revision	Status	Description
P01.01 etc. to Pnn.nn etc.	S0	Initial status or WIP	P01.1 etc. to Pnn.nn etc.	D1	Costing
P01.01 to Pnn.nn	S1	Co-ordination	P01.1 etc. to Pnn.nn etc.	D2	Tender
P01 to Pnn	S2	Information	P01.1 etc. to Pnn.nn etc.	D3	Contractor Design
P01 to Pnn	S3	Review & Comment	P01.1 etc. to Pnn.nn etc	D4	Manufacture/ Procurement
P01 to Pnn	S4	Stage Approval	C01 to Cnn	A1, A2 etc	Approved and accepted as stage complete
P01 to Pnn	S5	Manufacture	P01.01 etc. to Pnn.nn etc.	B1, B2 etc	Partially signed-off:
P01 to Pnn	S6	PIM Authorization	C01 to Cnn	CR	As Construction Record
P01 to Pnn	S7	AIM Authorization			

Contents

1 INTRODUCTION 1
1.1 Background 1
1.2 Project Description 1
1.3 Site Description 2
1.4 Aims and Objectives 2
2 LEGISLATION AND POLICY 3
3 METHODS 4
3.2 Survey Limitations 5
4 RESULTS 6
5 DISCUSSION & CONCLUSIONS 7
6 REFERENCES 8

Appendices

APPENDIX A FIGURE 1 – SITE LOCATION
APPENDIX B BADGER SIGNS FOUND DURING 2019 SURVEY

List of Tables

Table 1: Definitions of types of badger sett 4

1 INTRODUCTION

1.1 Background

1.1.1 Highways England commissioned the provision of design services of a section of the A46 surrounding Binley junction (hereafter referred to as the 'Proposed Scheme') and its immediate surrounds in Coventry, Warwickshire.

1.1.2 These services included an extended Phase 1 habitat survey, undertaken in 2016 (Mouchel 2016) as part of the initial Project Control Framework (PCF) stage assessment and then repeated in 2017 to reaffirm (*i.e.* 'ground-truth') the ecology work (AECOM 2017) with an updated Phase 1 habitat survey conducted in 2019 (AECOM 2019).

1.1.3 These surveys identified potential habitat suitable for badgers (*Meles meles*) on site. Therefore, a separate badger survey was conducted in 2017 (AECOM 2017) which found no setts or confirmed active field signs of badgers within close proximity (*i.e.* ≤50m) of the Proposed Scheme.

1.1.4 In 2019 surveys were commissioned to update the ecological baseline associated with the Proposed Scheme. These included an update to the badger survey to determine if there have been any changes on site with regards to badger activity.

1.2 Project Description

1.2.1 The Proposed Scheme comprises an upgrade to the A46 Binley junction (see Figure 1 Site Location, Appendix A). Specifically, it entails grade separation of the existing junction by raising the A46 dual carriageway over the A428 Rugby Road and providing entry and exit slip roads to an at grade gyratory junction.

1.2.2 The length of the Proposed Scheme is 0.96 mile or 1.55 km. The four A46 slip roads would tie into the existing circulatory carriageway. The east to west A428 Rugby Road arms would not be significantly affected by the Proposed Scheme. It is proposed that the existing east-west footpath to the south of the junction will be retained by widening the footpath along the A428 to Oakdale Road. This includes a slight modification to the existing toucan crossing to conform with the modifications to the junction configuration. The footway will be widened but will retain, as close as possible, its existing alignment. The thin eastern portion of the Proposed Scheme, which extends along Rugby Road, will include footpath widening so as to improve access for non-motorised users.

1.2.3 Other key physical design aspects of the Proposed Scheme include:

- Re-surfacing of the existing circulatory carriageway with line markings consistent with the Proposed Scheme and existing A428 roads;
- Lighting, including the existing roundabout and new lighting along the verges of the slip roads, central reserve of the main-line and circulatory central island;
- New road signs with modification of the existing advance direction signs due to the new junction rearrangement; and
- Maintaining the existing drainage infrastructure as much as possible.

1.2.4 Earthworks will be required at some of the infrastructure locations and will generally require steepening of slopes with cut and fill to be a gradient of one vertical unit for every two horizontal units; where this is not possible, retaining solutions including reinforced earth retaining walls are proposed.

1.3 Site Description

1.3.1 The landscape within and surrounding the Proposed Scheme boundary (the Site) comprises various semi-natural and man-made habitats. The extent of the Proposed Scheme boundary is shown in Figure 1, Appendix A. The Proposed Scheme area itself comprises the A46 road, with associated road verges, hedgerows, woodland, amenity grassland and arable farmland. It is predominantly urban to the west of the Proposed Scheme boundary, with a mixture of arable, field drains, woodland and recreational land to the east. To the north-east of the Site is Coombe Country Park and Combe Pools Site of Special Scientific Interest (SSSI), designated for its ornithological interest; and to the south-west is Herald Way Marsh (Claybrookes Marsh) SSSI and Local Nature Reserve (LNR), designated for its range of wetland habitats and assemblage of invertebrates.

1.4 Aims and Objectives

1.4.1 The aims and objectives of the badger survey undertaken in 2019 were to:

- Update the results of the 2017 badger surveys;
- Identify badger setts and field signs within the survey area; and
- Inform ecological mitigation measures and ensure compliance with relevant legislation and policy.

2 LEGISLATION AND POLICY

2.1.1 The main legislation protecting badgers in the UK is the Protection of Badgers Act 1992.

2.1.2 The Protection of Badgers Act 1992 includes several offences potentially applicable to development activities. The act makes it an offence to intentionally or recklessly interfere with a badger sett by:

- damaging a badger sett or any part of it;
- destroying a badger sett;
- obstructing access to, or any entrance of, a badger sett;
- causing a dog to enter a badger sett; and
- disturbing a badger when it is occupying a badger sett.

2.1.3 Deliberate actions resulting in, or likely to result in, the killing, injuring or take of badgers may also constitute offences under the act.

2.1.4 Natural England has also emphasised in the same guidance that for an offence to be committed the disturbance must have adverse consequences for the badgers concerned.

3 METHODS

3.1.1 The badger survey was undertaken by two ecologists on 17 September 2019 to inspect whether there were signs of badger activity within the Proposed Scheme and 50m buffer. This involved walking through grassland, along hedgerows, and through other habitats with potential to support badgers, pausing to collate information on signs of activity. The locations of badger field signs were captured in the field using a GPS device with a 6m accuracy.

3.1.2 The following evidence of badger activity (field signs) were sought during the survey with the objective of recording these where found:

- Potential setts – Comprise of several excavated tunnels and chambers and outside of each hole there is often a large quantity of excavated material which may also contain old bedding and fur;
- Excavations and 'push-unders' – Badgers will often excavate shallow depressions under fencing and push the fencing up to enable them to slide underneath;
- Footprints;
- Dung pits – Found along their territory boundaries and near inhabited setts. Dung pits grouped together are termed latrines;
- Scratching posts – Trees situated near the entrance of a sett may be used by badgers as scratching posts;
- Feeding evidence – These may include 'snuffle holes', where the badger is chasing retreating worms, excavated depressions where the badger has been searching for insects, and remains of arable crops, taken by badger; and
- Badger trails – Often left when badgers are dragging bedding from gathering areas to their sett.

3.1.3 Where badger setts were found an attempt was made to classify them according to the sett categories given in the survey method published by the Mammal Society (Harris *et al*. 1989). This classification is summarised in Table 1.

Table 1: Definitions of types of badger sett

Sett type	Defintion
Main	Normally in continuous use and usually used for breeding. They generally include a large number of entrance holes with significant amounts of earth spoil piled around the surrounding ground. The holes and surrounding area generally show strong signs of current active use, including well used paths and sett entrances.
Annex	Usually quite close to a main sett, normally less than 150m away. They are usually clearly linked to the nearby main sett by well-worn paths. They often have multiple holes, not all of which may appear active but some holes may show signs of recent activity at most times of year. At larger annex setts there is likely to be a considerable accumulation of spoil around the sett area.
Subsidiary	Setts with only a small number of holes (generally less than 5) at some distance from a main sett (usually at least 50m away) and often without obvious linking paths. The holes can be very variable in signs of usage and are often much less consistently in use than those of main or annex setts. Generally, however, they show signs of recent use. They tend to be repeatedly used and accumulations of spoil – often including digging from the current year – are usually present.

Sett type	Defintion
Outlier	Usually consist of a single or double entrance or hole but may occasionally have more. Generally, they have only a small accumulation of spoil at the hole entrance and are not clearly linked to other setts by worn trails. They are usually only used sporadically and may show little evidence of very recent use. Outliers may be occupied by foxes or rabbits when not in use.

3.1.4 When undertaking a badger survey it is important to determine whether each sett identified is active or inactive as this informs the level of legal protection afforded to the setts and the badgers that occupy them. The setts identified should be categorised as active or disused with reference to the guidance issued by Natural England (Natural England 2009). A sett does not have to be currently occupied to remain active, and a lack of recent activity is not the same as disuse. Therefore, decisions need to be based on the balance of available evidence in the field which was recorded during the survey.

3.2 Survey Limitations

3.2.1 There were no limitations to the survey and full land access was gained to enable the surveys to take place.

4 RESULTS

4.1.1 No active badger field signs or active setts were identified within the Proposed Scheme or in close proximity (*i.e.* ≤ 50m) to the Proposed Scheme boundary during the course of the survey.

4.1.2 A number of inactive badger setts and other mammal holes (rabbit holes) were identified further away, over 50m from the Proposed Scheme boundary. Details of these can be found in Appendix A.

5 DISCUSSION & CONCLUSIONS

5.1.1 No active badger setts were identified within or in close proximity (*i.e* ≤50m) of the Proposed Scheme boundary during the 2019 badger survey. These findings align with those of the 2017 badger survey.

5.1.2 Given the above, it is concluded that the Proposed Scheme is unlikely to impact any existing badger populations in the area. The land take required for the Proposed Scheme would not require closure of any badger setts and construction is not expected to result in disturbance of any badgers. However, there is habitat present on and within 50 m of the Proposed Scheme boundary which is suitable for potential badger sett creation in the future. Therefore, given the mobility of the species and historical use of the site by badger, it is recommended that a pre-construction badger survey is conducted by an Ecological Clerk of Works (ECoW) no more than a week in advance of pre-construction work to identify any change in the status of badger within or adjacent to the Proposed Scheme boundary. If an active badger sett is found to be present and likely to be destroyed or disturbed, a method statement and licence is likely to be required. Licences can be applied for at any time, but a licence for development will not normally be issued unless full planning permission has been granted. The closure of setts under licence is normally only permitted during July to November (Natural England 2019).

6 REFERENCES

AECOM (2017) A46 Coventry Junction Upgrade. Badger Technical Note.

AECOM (2017) A46 Coventry Junction Upgrade. Ground Truth Extended Phase 1 Habitat Survey Report.

AECOM (2019) A46 Coventry Junction Upgrade. Phase 1 Habitat Survey Report.

Harris S., Cresswell P. & Jefferies, D (1989) Surveying Badgers. An Occasional Publication of the Mammal Society No. 9.

Mouchel (2016) A46 Coventry Junctions Extended Phase 1 Habitat Report.

Natural England (2009) Interpretation of 'disturbance' in relation to badgers occupying a sett.
http://webarchive.nationalarchives.gov.uk/20140605121600/http://www.naturalengland.org.uk/Images/WMLG16_tcm6-11814.pdf

Natural England (2019) Badgers: Protection and Licenses. Retrieved from: https://www.gov.uk/guidance/badgers-protection-surveys-and-licences
30th September 2019.

Appendix A Figure 1 – Site Location


Binley
Binley Industrial Estate
Binley Woods
Brandon Wood
Site Boundary (Highways Boundary)
FOR INFORMATION
A46 COVENTRY
JUNCTION UPGRADE
FIGURE 1-1
SITE LOCATION PLAN
highways england
AECOM
0.25
0
0.25
0.5
0.75
1 Kilometres

Appendix B Badger signs found during 2019 survey

Hole ref	Photo	Grid reference	Distance from Proposed Scheme boundary (m)	Description
1		SP3878477513	75	Old disused mammal hole. Large enough to be a badger sett entrance. Possible disused outlier sett. In-active. No signs of recent activity and some recent leaf litter in the hole.

Hole ref	Photo	Grid reference	Distance from Proposed Scheme boundary (m)	Description
2		SP3880477574	60	Collapsed small mammal hole. Inactive.

Hole ref	Photo	Grid reference	Distance from Proposed Scheme boundary (m)	Description
3		SP3835576999	70	Single mammal entrance hole. Showing signs of rabbit occupation. Choked with leaf litter and many rabbit droppings in entrance way. May have historically been excavated by badger initially, however no field signs to show this is occupied by badger currently.

Hole ref	Photo	Grid reference	Distance from Proposed Scheme boundary (m)	Description
4		SP3837777030	60	Single mammal entrance hole. Choked with leaf litter and not currently occupied by any species. Could have initially been excavated by badger: a possible old outlier sett entrance.

Appendix 8.2 k

Badger Survey 2017

1. Introduction

1.1. Background

1.1.1. The extended Phase 1 habitat survey of the A46 Coventry Junction Upgrade site (hereafter referred to as *proposed scheme site*) conducted in 2016 identified potential habitat suitable for badgers (*Meles meles*) on site. Therefore, during the ground truth Phase 1 habitat survey in 2017, particular attention was paid to the presence of field signs which would indicate the presence of badger on site including active setts, disused setts, latrines, scrapes, paths through vegetation, and hair.

1.1.2. Dense vegetation prevented the badger survey being carried out effectively during the Phase 1 habitat survey conducted in September 2017. Additionally, the 2017 updated desk study highlighted records of badger casualties on the A46 and historical records of badger setts on and within 500m of the proposed scheme site. The site was therefore revisited on 3 November 2017, once vegetation had sufficiently died-back so any badger signs would be more visible. The results of this revisited survey are presented in this technical note.

1.2. Description of the Site and Surrounds

1.2.1. The landscape within and surrounding the proposed scheme comprised various semi-natural and man-made habitats. It is predominantly urban to the west of the proposed scheme, with a mixture of arable, woodland, and recreational land to the east. The Coombe Country Park and Coombe Pools Site of Special Scientific Interest (SSSI), located approximately 245m north-east, is designated for its ornithological interest; and adjacent to the south-west is Herald Way Marsh (Claybrookes Marsh) SSSI / Local Nature Reserve (LNR), designated for its range of wetland habitats and assemblage of invertebrates.

1.3. Objectives

1.3.1. The aim of the study was to undertake a survey to determine whether there were any signs of badger use or activity within the proposed scheme site and surrounding 50m. The survey would also inform ecological mitigation measures and ensure compliance with relevant legislation and policy. The survey focussed on all the woodlands on site that were too heavily vegetated to investigate during previous site visits. These included Binley Common Farm Wood, Pilings Coppice, and the woodlands associated with Coombe Country Park and Herald Way Marsh.

2. Legislation and Policy

2.1.1. Badgers are protected under UK law by the Protection of Badgers Act (1992). Under this law it is an offence to:

- Wilfully kill, injure or take a badger (or attempt to do so)
- Cruelly ill-treat a badger
- Dig for a badger
- Intentionally or recklessly damage or destroy a badger sett, or obstruct access to it
- Cause a dog to enter a badger sett
- Disturb a badger when it is occupying a sett

2.1.2. The legislation noted above provides a more detailed explanation of the legislative context.

3. Methodology

3.1. Introduction

3.1.1. A site walkover of all areas of woodland up to 50m from the proposed scheme was conducted on 3 November 2017 to search for the presence of field signs which would indicate the presence of badger on site including active setts, disused setts, latrines, scrapes, paths through vegetation, hair, footprints, and excavations (that is, shallow depressions under fencing pushing the fencing up to enable them to slide through).

3.1.2. A desk based search of historical records was carried out for the proposed scheme site and surrounding 50m. The locations of known historical badger setts within 500m were also visited to determine whether they were still active. These records were provided by Warwickshire Ecological Records Centre. However, they are not included in this technical note due to the confidential nature of badger records and can be provided separately and confidentially on request.

3.2. Limitations

3.2.1. The following areas could not be accessed on 3 November 2017:

- One of the historical badger records located more than 250m to the south-west of proposed scheme. The identified sett was located on National Rail land which could not be accessed due to landowner restrictions and safety concerns
- Two badger setts at Coombe Country Park, for which records exist, located more than 250m to the north-east of the proposed scheme. The setts were located within a private property which could not be accessed

3.2.2. The discussion section of this note details how these limitations were addressed.

4. Results

4.1.1. Potential badger field signs were recorded at the following locations:

- A push through located under a railway fence that borders recreation ground near Herald Way Marsh (SP 37685 76760) (see Figure 8-2(e)-A). This was large enough to have been created or used by a badger. However, no hair or other badger field signs were found
- A push through made in wire fence on the fringe of Pilings Coppice (SP 38928 77071) (see Figure 8-2(e)-B). This was also large enough to have been created or used by badger. However, no hair or other badger field signs were found

4.1.2. No other signs or potential signs of badger activity were found during the survey and the badger setts were no longer present at the historical sett locations visited.

Figure 8-2(e)-A: Push Through Located under Railway Fence that Borders Recreation Ground near Herald Way Marsh (SP 37685 76760)



Figure 8-2(e)-B: Push through made in Wire Fence on the Fringe of Pilings Coppice (SP 38928 77071) located 430m from the Proposed Scheme



5. Discussion

5.1.1. No setts (active or disused) were found within close proximity (that is, less than 50m) of the proposed scheme during the site visit. Additionally the badger setts identified from historical records within 500m, which were visited were found to be no longer present.

Potential field signs of commuting badger were recorded at Herald Way Marsh and Pilings Coppice in the form of breaches under fences; however, no other field signs (for example, badger hair or footprints) were recorded in these locations.

5.1.2. The areas that were not accessed are not considered to be a limitation as the historical records at both Coombe Country Park and on the railway embankment to the south west of proposed scheme are located more than 250m from the proposed scheme site boundary. Even if badger setts are active at these locations, construction work is unlikely to disturb them and there will not be any significant foraging habitat loss for these animals.

5.1.3. Given the above, it is concluded that the proposed scheme is unlikely to impact any existing badger population in the area. The land take required for the proposed scheme would not require closure of any badger setts and construction is not expected to result in disturbance of any badgers. However, there is habitat present on and within 50m of the proposed scheme which is suitable for potential badger sett creation in the future. Therefore, given the mobility of the species and historical use of the site by badger, it is proposed that a preconstruction badger survey is conducted by an Ecological Clerk of Works (ECoW) to identify any change in the status of badger within or adjacent to the scheme boundary approximately six months before construction. If an active badger sett is found to be present and likely to be destroyed or disturbed, a protected species licence is likely to be required. Licences can be applied for at any time, but normally after planning permission or a Highways Act licence has been issued. The closure of setts under a protected species licence is normally only permitted during July to November, inclusive.

5.1.4. Road mortality of badger is not considered likely to increase due to the proposed scheme given the localised nature of the works along an already busy stretch of dual carriageway and the lack of badger activity recorded within proximity of the proposed scheme.

Appendix 8.2 I

PCF Stage 4 Deliverable for Highways England

Water Vole and Otter Survey Report

A46 Coventry Junctions Upgrade

September 2019

This page is left intentionally blank

A46 Coventry Junction Upgrade

Water Vole and Otter Survey Report

Report No: HE551486-ACM-EGN-A46_SW_000_Z-RP-LE-0019
P04 S3
September 2019

Revision	Current Status	Date	Prepared By	Reviewed By	Approved By
P04	S3	16.09.19	Alan Bull	Matt Oakley	John Waterman

AECOM Infrastructure & Environment UK Limited ("AECOM") has prepared this Report for the sole use of Highways England ("Client") in accordance with the terms and conditions of appointment. No other warranty, expressed or implied, is made as to the professional advice included in this Report or any other services provided by AECOM. This Report may not be relied upon by any other party without the prior and express written agreement of AECOM.

Where any conclusions and recommendations contained in this Report are based upon information provided by others, it has been assumed that all relevant information has been provided by those parties and that such information is accurate. Any such information obtained by AECOM has not been independently verified by AECOM, unless otherwise stated in the Report. AECOM accepts no liability for any inaccurate conclusions, assumptions or actions taken resulting from any inaccurate information supplied to AECOM from others.

The methodology adopted and the sources of information used by AECOM in providing its services are outlined in this Report. The work described in this Report was undertaken between July 2019 and September 2019 and is based on the conditions encountered and the information available during the said period of time. The scope of this Report and the services are accordingly factually limited by these circumstances. AECOM disclaim any undertaking or obligation to advise any person of any change in any matter affecting the Report, which may come or be brought to AECOM's attention after the date of the Report. © This Report is the copyright of AECOM. Any unauthorised reproduction or usage by any person other than the addressee is strictly prohibited.

SCHEDULE OF REVISIONS

Revisions Issued Since Publication

Report Revision Number	Revision Date	Paragraphs amended
P4	16/09/2019	

Standard codes for suitability models and documents See BS1192:2007 Table 5 for further details					
Revision	Status	Description	Revision	Status	Description
P01.01 etc. to Pnn.nn etc.	S0	Initial status or WIP	P01.1 etc. to Pnn.nn etc.	D1	Costing
P01.01 to Pnn.nn	S1	Co-ordination	P01.1 etc. to Pnn.nn etc.	D2	Tender
P01 to Pnn	S2	Information	P01.1 etc. to Pnn.nn etc.	D3	Contractor Design
P01 to Pnn	S3	Review & Comment	P01.1 etc. to Pnn.nn etc.	D4	Manufacture/ Procurement
P01 to Pnn	S4	Stage Approval	C01 to Cnn	A1, A2 etc	Approved and accepted as stage complete
P01 to Pnn	S5	Manufacture	P01.01 etc. to Pnn.nn etc.	B1, B2 etc	Partially signed-off:
P01 to Pnn	S6	PIM Authorization	C01 to Cnn	CR	As Construction Record
P01 to Pnn	S7	AIM Authorization			

CONTENTS

1. Introduction 1
1.1 Background and Scope of Works 1
1.2 Project Description 1

2. Water Vole and Otter Legislation 3
2.1 Legislative Framework 3
2.2 Natural England Licences 3

3. Methods 4
3.1 Survey Area 4
3.2 Water Vole Survey Method 4
3.3 Otter Survey Method 5
3.4 Limitations 6

4. Results and Evaluation 7
4.1 Water Vole and Otter 7

5. Conclusions and Recommendations 10
5.1 Water Vole 10
5.2 Otter 10

6. References 12

Appendices

Appendix A Watercourse and waterbody characteristics

Appendix B Photographs

Appendix C Surveyed watercourses for Water Vole and Otter

List of Tables

Table 1: Estimating Populations of Water Vole (Dean et al., 2016) 5

1. INTRODUCTION

1.1 Background and Scope of Works

1.1.1 The A46 Coventry Junctions Upgrade (hereafter referred to as the Proposed Scheme) is located north of Tollbar End junction and south of Walsgrave junction, running along the eastern boundary of the city of Coventry. The Proposed Scheme is situated within both Coventry City Council and Rugby Borough Council local planning administrative areas, which are parts of the West Midlands Metropolitan Borough and Warwickshire County Council respectively.

1.1.2 The Proposed Scheme is an upgrade to the A46 Binley junction involving the grade separation of Binley junction by raising the A46 dual carriageway over the A428 Rugby Road and providing entry and exit slip roads to an at-grade circulatory (gyratory) signalised junction.

1.1.3 In June 2017, AECOM was commissioned by Highways England to undertake surveys of riparian mammals, notably water vole (*Arvicola amphibius*) and otter (*Lutra lutra*), for the Proposed Scheme, focussing on watercourses within 50 m of the footprint of the Proposed Scheme (hereafter referred to as the Site) and watercourses within 200m with hydrological links to the Site (the area of which surveys were undertaken is referred to as the Survey Area). These surveys, undertaken in September 2017, did not find any evidence of water vole or otter within the Survey Area.

1.1.4 The desk study identified the nearest recent records (i.e. within the last 10 years) of water vole were from Brandon Marsh, which is c.1km south-west of the Proposed Scheme. The closest, most recent record of otter to the Proposed Scheme was from Smite Brook, in 2007.

1.1.5 Owing to the validity of data after a two-year period, AECOM was instructed in June 2019 to repeat the riparian mammal survey to identify the presence, or likely absence of water vole and otter which, if present, may constrain the works or influence the design and implementation of the Proposed Scheme.

1.2 Project Description

1.2.1 The length of the Proposed Scheme is 0.96 mile, or 1.55km. The four A46 slip roads would tie into the existing circulatory carriageway. The east to west A428 Rugby Road arms would not be significantly affected by the Proposed Scheme. It is proposed that the existing east-west footpath to the south of the junction will be retained by widening the footpath along the A428 to Oakdale Road. This includes a slight modification to the existing toucan crossing as to conform with the modifications to the junction configuration. The footway will be widened but will retain, as close as possible, its existing alignment. The thin eastern portion of the Proposed Scheme, which extends along Rugby Road, will include footpath widening to improve access for non-motorised users.

1.2.2 Other key physical design aspects of the Proposed Scheme include:

- re-surfacing of the existing circulatory carriageway with line markings consistent with the proposed scheme and existing A428 roads;
- lighting, including the existing roundabout and new lighting along the verges of the slip roads, central reserve of the main-line and circulatory central island;

- new road signs with modification of the existing advance direction signs due to the new junction rearrangement; and
- maintaining the existing drainage infrastructure as much as possible.

1.2.3 Earthworks will be required at some of the infrastructure locations and will generally require steepening of slopes with cut and fill to be a gradient of one vertical unit for every two horizontal units. Where this is not possible, retaining solutions including reinforced earth retaining walls are proposed.

2. WATER VOLE AND OTTER LEGISLATION

2.1 Legislative Framework

2.1.1 Otter and water vole are both fully protected under Schedule 5 of the Wildlife & Countryside Act 1981 (as amended). They are afforded protection under Section 9 parts 9 (1), (2), (4) and (5) of the Act, making it an offence to:

- intentionally kill, injure or take these species;
- possess or control live or dead individuals of these species or their derivatives;
- intentionally or recklessly damage, destroy or obstruct access to any structure or place used for their shelter or protection;
- intentionally or recklessly disturb these species whilst occupying a structure or place of shelter used for that purpose;
- sell these species or offer or expose for sale or transport for sale; and
- publish or cause to be published any advertisement which conveys the buying or selling of these species.

2.1.2 Otter is also classified under the Habitats Directive (92/43/EEC) as a species requiring strict protection in Europe. In the UK this is enabled by The Conservation of Habitats and Species and Planning (Various Amendments) (England and Wales) Regulations 2018.

2.1.3 Otter is also included in the following international legislation / conventions:

- Appendix II and IV of the Habitats Directive, Appendix II of the Bern Convention and Appendix I of CITES; and
- Globally threatened on the IUCN/WCMC Red Data List.

2.1.4 Otter and water vole are identified as a Priority Species under Section 41 of the Natural Environment and Rural Communities (NERC) Act 2006. They are both recognised as Local Biodiversity Action Plan (LBAP) priority species (Warwickshire Wildlife Trust, 2014 / 2015).

2.2 Natural England Licences

2.2.1 A licence is required from Natural England to intentionally damage or destroy burrows or displace water voles from their burrows for lawful development. Any operations that may impact upon otters or their places of rest or shelter will require a Natural England European Protected Species (EPS) licence.

3. METHODS

3.1 Survey Area

3.1.1 The watercourses and waterbodies surveyed for water vole and otter were (in reference to those marked on Figure 3.1, appendix C):

1. Smite Brook;
2. Combe Pool Site of Special Scientific Interest (SSSI) / Coombe Country Park;
3. Oak Farm Nurseries Drain;
4. Field drains to east of rugby fields;
5. Field drain south of Binley wood;
6. Herald Way Marsh (Claybrookes Marsh) SSSI and Local Nature Reserve (LNR) waterbodies; and
7. Drain to south of Claybrookes Marsh.

3.1.2 The water vole and otter survey was undertaken on 10th July 2019 by AECOM qualified Ecologists and on 5th September 2019.

3.2 Water Vole Survey Method

3.2.1 Water voles typically inhabit watercourses (such as slow-moving streams, ditches, dykes and rivers) and waterbodies (such as marshes, lakes and ponds), feeding mostly on waterside vegetation. They are active in daylight hours and leave several indications of their presence and these signs can be used to identify the presence of water vole and, by quantifying the presence of some signs, can be used to estimate the population size.

3.2.2 The water vole survey involved identification of evidence of water vole activity up to 5m from the channel of any waterbody or watercourse surveyed. Surveys applied the standard methodologies of Strachan et al. (2011) and Dean et al. (2016). Field signs searched for were:

- latrine sites – distinct piles of water vole droppings found near burrows, at the ranges of territorial boundaries and where the animals enter and leave the water;
- feeding stations – areas with distinct neat piles of chewed lengths of vegetation along pathways or haul out platforms along the water's edge;
- burrows – burrow entrances are typically wider than high with a diameter between 4-8 cm. Burrow entrances are generally located at the water's edge;
- lawns – short grazed areas at the entrances to burrows;
- prints – identifiable prints in soft margins of the watercourse; and
- runways – low tunnels that are pushed through the vegetation and often leading to burrows or feeding stations.

3.2.3 Any information gathered on water vole signs were used to calculate and estimate water vole population / activity within those specific waterbodies / ditches. The presence / absence of American mink (Mustela vison) and brown rat (Rattus norvegicus) was also recorded if the species or signs of their presence were noted.

Population Size Class Assessment

3.2.4 The number of water vole latrines recorded by the survey can provide an indication of the relative population of water vole present (Dean *et al.,* 2016) and the survey areas can be subdivided by density which can be interpreted as follows:

Table 1: Estimating Populations of Water Vole (Dean et al., 2016)

Relative Population Density	Approximate number of latrines per 100 m of bankside habitat	
	Survey in first half of the season (mid-April to end of June)	Survey in second half of the season (July to September)
High	10 or more	20 or more
Medium	3 – 9	6 – 19
Low	< 2 (or none, but with other field signs)	< 5 (or none, but with other field signs)

3.2.5 It is not considered possible to make robust estimates of the number of water voles from latrine counts, but latrines do provide an indication of activity suitable for assessment of impacts and designing mitigation (Dean et al., 2016).

3.3 Otter Survey Method

3.3.1 The survey method aimed to determine the presence or likely absence of otter on those waterbodies and watercourses surveyed. The methodology used was based on the guidance in the *New Rivers and Wildlife Handbook* (RSPB, NRA & RSNC, 1994); the *Environment Agency's Fifth Otter Survey of England 2009-2010* (Environment Agency, 2010) *and Monitoring the Otter* (Chanin, 2003).

3.3.2 Due to the low likelihood of making an actual observation of otter, the survey concentrated on locating field signs indicating otter presence or use within the survey area. Such field signs include:

- spraints – characteristic sweet-smelling, black tar-like (where fresh/relatively recent i.e. within a few weeks) or grey crumbly (when old) faecal deposits usually containing fish scales, bones and occasionally invertebrate exoskeleton and bird feathers;
- footprints – in good substrate typically asymmetrical and showing five toes arched around a large pad and, depending on substrate, webbing and claw marks. Poorer, generally coarser substrates do not often enable the identification of otter footprints. Additional signs of otter presence may occur, although without additional evidence is not usually conclusive proof of current otter presence;
- feeding remains – feeding remains may include partially eaten fish, frogs, piles of mussel shells or crayfish remains;
- slides/ haul-outs – routes into and out of the water, which are usually associated with terrestrial routes such as short cuts around meanders or along traditionally used otter paths/routes;
- couches/ hovers – above ground resting places. Usually associated with cover such as dense scrub, rushes or reed, flood debris or fallen trees. Many couches are rarely used whilst others more so. Difficult to prove use without radio tracking; and

- holts – below ground resting site usually associated with sprainting. Sometimes used with greater frequency than couches and can be important for breeding (natal holts) where other signs are usually absent. Notoriously difficult to find or prove without radio tracking.

3.4 Limitations

3.4.1 A number of factors meant that there were limitations to the survey for water vole and otter:

- Dense vegetation (including reed growth and brambles) made surveying for field signs of water vole and otter difficult, and small (<20 m) sections of Smite Brook and the field drain east of the rugby fields were not surveyed in July. However, the rest of each of these watercourses were surveyed and therefore the lack of survey of a small section is not considered a limitation on the efficacy of the survey.
- There was no access to the Oak Farm Nurseries drain or the field drain to the south of Binley Wood in July or September. However, an assessment of the likelihood of water vole and otter presence in these ditches was made based on professional judgement, in consideration of the results of previous surveys (in 2017), habitat changes (since 2017) and in review of connectivity of these watercourses to off-site watercourses and waterbodies. Therefore, this limitation did not impact significantly on the efficacy of the survey.
- Due to health and safety concerns, with the presence of a member of the public acting in an undesirable manner within Claybrookes Marsh Nature reserve, the drainage ditch to the south of Claybrookes Marsh was not surveyed in July. However, a survey of this ditch was undertaken in September and therefore, a lack of access in July is not a limitation on the efficacy of the survey.
- There were difficulties encountered with safely accessing small (<20 m) sections of Smite Brook in July due to steep sided banks and deep water and this was not fully accessed during the survey due to health and safety concerns. However, the rest of this watercourse was surveyed and there were no such limitations to the September survey; therefore, the lack of survey of a small section in July is not considered a limitation on the efficacy of the survey.

4. RESULTS AND EVALUATION

4.1 Water Vole and Otter

4.1.1 The watercourse and waterbody characteristics are detailed in Appendix A.

4.1.2 No evidence of water vole was found within any of the surveyed waterbodies or watercourses in July or September 2019.

4.1.3 Otter footprints were recorded in the shallow watercourse that feeds Smite Brook, to the west of Combe Pool SSSI (see section 4.1.2) in July and September 2019.

4.1.4 Evidence of American mink was found in the Smite Brook in July and in the shallow watercourse that feeds Smite Brook, to the west of Combe Pool SSSI in September.

Smite Brook

4.1.5 This stream is 600 m north of the Proposed Scheme and is connected to the large waterbody at Combe Pool in Coombe Country Park via a culvert (reference 1 on Figure 3.1, see photos in Appendix B). The stream is fed via a weir from Combe Pool, with other serving watercourses along the western side of Combe Pool.

4.1.6 At the culverted end (at the A46), the water is greater than 1 m deep in places, occasionally becoming shallower and faster flowing away from the A46. There is significant growth of bankside vegetation over the Smite Brook. Small sections of this watercourse are considered suitable for water vole and otter, owing to the profile of the stream and its banks, the abundance of bankside vegetation and regularity of marginal aquatic habitat.

4.1.7 Evidence of brown rat (droppings) were recorded at the eastern end of Smite Brook. A single American mink scat and footprints were found at approximately SP381792. American mink is a predatory species which preys on water vole, which reduces the likelihood of water voles being present in this watercourse.

4.1.8 No signs of water vole or otter were recorded in Smite Brook.

Combe Pool SSSI / Coombe Country Park drains

4.1.9 Coombe Pool Fishery (waterbody reference 2 on Figure 3.1, see photos in Appendix B) is a mature estate lake covering 32 ha (80 acres) set in a Country Park landscape. The lake is part of Combe Pool SSSI which also includes a heronry and woodland that lines one side of the lake. This large waterbody is located to the immediate north of the Proposed Scheme, to the west of Coombe Country Park and north of Brinklow Road. It is predominantly reedbed in the south-eastern corner, opening up to a large reed fringed area of open water. In the north-western corner, a weir feeds into a wide channel, acting as a serving watercourse for Smite Brook under the A46 (see Figure 3.1). The citation for Combe Pool SSSI does not include any mention of water vole or otter.
(https://designatedsites.naturalengland.org.uk/PDFsForWeb/Citation/1001242.pdf).

4.1.10 A shallow watercourse, running from Brinklow Road along the western side of Combe Pool feeds into the deeper channel at the weir, feeding Smite Brook.

4.1.11 The western surrounding habitat of the weir, feeding into Smite Brook, is considered suitable habitat for water vole and otter as it contains a mixture of slow-moving water, emergent vegetation, pockets of deep water and exposed banking.

4.1.12 No signs of water vole were recorded in any of the surveyed areas.

4.1.13 Otter footprints were recorded in the shallow watercourse west of Coombe Country Park at SP384791 and SP384792 (see Appendix B). No other evidence of otter (holts, spraints or feeding remains) were found in this watercourse.

Oak Farm Nurseries Drain

4.1.14 This drain is to the immediate north-east of the Proposed Scheme and runs north-east to south-west from the A46 to Brinklow Road (waterbody reference 3 on Figure 3.1).

4.1.15 Due to access restrictions, this drain was not surveyed for water vole and otter presence. However, this watercourse is connected to watercourse 4 (see Appendix C, Figure 3.1) and based on the lack of suitable habitat and no evidence of water vole or otter in the joining field drain (see section 4.1.4), it is unlikely that the Oak Farm Nurseries Drain supports a population of water vole or otter.

Field drain to east of rugby fields

4.1.16 This field drain runs approximately north to south along the eastern edge of arable farmland and the playing fields associated with Broadstreet Rugby Club, commencing to the immediate east of a block of woodland known as Little Rough and ending near to Oak Farm nurseries (waterbody reference 4 on Figure 3.1, see photos in Appendix B).

4.1.17 Drainage ditches feed into this ditch from the rugby club playing fields around the perimeter of Little Rough. In July 2019, this ditch was heavily overgrown with bramble and other scrub and is, in part, dry. However, the majority of bankside vegetation on the rugby club side had been cut back in September 2019. At the time of the surveys the water within the ditch was orange, had a 'film' on the surface and appeared heavily polluted, presumably from run-off from the industrial estate on the western side of the A46.

4.1.18 Therefore, this field drain is not considered suitable for water vole or otter and no evidence of either species was found during the survey.

Field drain south of Binley wood

4.1.19 This field drain, to the immediate east of the A46 runs east to west along the south side of Binley Wood, to the immediate north of an arable field with potential linkages, via culvert, to field drains in Binley Industrial Estate, to the west of the A46 (waterbody reference 5 on Figure 3.1).

4.1.20 In September 2017 (AECOM, 2017), some sections of this drain were recorded as containing suitable habitat for water vole, with frequent marginal aquatic habitat and herbs. However, no water vole evidence was recorded in 2017 and with its isolated location with broad-leaved woodland to the immediate north and arable farmland to the south, this ditch was considered unlikely to support water vole or otter.

4.1.21 This ditch was not surveyed for riparian mammals in July 2019, due to access restrictions. However, an appraisal of the habitat conditions within this watercourse was made in July and September. In consideration of the results of the 2017 survey (AECOM, 2017), that the habitat in this area has not changed in 2019 and that there is no connectivity between this watercourse and other watercourses or waterbodies off-site, it is unlikely that this ditch is now populated by water vole or otter.

Herald Way Marsh (Claybrookes Marsh) SSSI and Local Nature Reserve (LNR) waterbodies

4.1.22 The waterbodies within Claybrookes Marsh nature reserve lie to the south-west of the Proposed Scheme (waterbody reference 6 on Figure 3.1, see photos in Appendix B). These waterbodies are shown as open water on aerial photography; however, no areas of open water were found during the survey and these waterbodies are now substantially overgrown with common reed (*Phragmites australis*). The waterbodies were also found to be mostly dry or containing little water, with only small amounts of standing water present.

4.1.23 A drainage ditch runs to the east of the Claybrookes Marsh waterbodies, culverted under the A46 and running into woodland to the south-east of the A46 (waterbody reference 6 on Figure 3.1, see photos in Appendix B). In September 2017 (AECOM, 2017), this ditch was fast flowing under the culvert, with little to no bankside or emergent vegetation and heavily shaded under the woodland canopy and was not considered suitable for water vole or otter. In July 2019, the flow of the ditch was slow, but heavily shaded under the woodland canopy and with little to no bankside vegetation.

4.1.24 No evidence of water vole or otter was found during the survey.

Drain to south of Claybrookes Marsh

4.1.25 The drainage ditch running from Claybrookes Marsh under the A46 via culvert, despite being fast-flowing on the northern side of the A46, was identified as sluggish on the southern side of the A46 where it emerges. The ditch feeds into smaller streams running through the broad-leaved woodland (waterbody reference 7 on Figure 3.1). In September 2017, this ditch was considered as unsuitable for water vole owing to the lack of emergent or bankside vegetation and over-shading from the broad-leaved woodland canopy and had low potential to support otter.

4.1.26 This drainage ditch was not surveyed in July 2019 due to health and safety concerns. However, in consideration of the unsuitability of the ditch for water vole and otter, the lack of evidence of either species in the wider area and the likelihood that the habitat within this area is unlikely to have changed, it is considered that this ditch does not support water vole or otter.

5. CONCLUSIONS AND RECOMMENDATIONS

5.1 Water Vole

5.1.1 The ditch to the south of Binley Wood and the drain to the south of Claybrookes Marsh were not surveyed in July 2019. However, these ditches are not considered likely to support water vole, based on the lack of evidence of water vole in the surrounding watercourses and the likelihood that, since previous surveys in September 2017 that did not record any water vole in these ditches, the habitat has not changed and therefore water vole is unlikely to have colonised from outside the survey area. No evidence of water vole was found during the survey of watercourses surrounding the proposed A46 junction improvement at Binley. However, it is recommended that if no works on the Proposed Scheme commence within two years from the date of this report, that a pre-commencement survey to check for water vole colonisation is undertaken during the appropriate time (May-October).

5.1.2 In those waterbodies and ditches that were not surveyed, an appraisal was made of their likelihood to support water vole through consideration of the context of the surrounding habitat and informed by the results of surveying nearby waterbodies / ditches. The drainage ditch within Oak Farm nurseries was not surveyed, but is considered unlikely to support water vole, owing to the lack of evidence of this species in the surrounding watercourses. This ditch is potentially connected to the drains feeding Smite Brook and to the field drains along the eastern edge of the rugby club fields, but no evidence of water vole was found within these ditches. Furthermore the presence of American mink, an invasive species that predates water vole, in the Smite Brook means it is unlikely that a population of water vole would persist in this area.

5.1.3 Although water vole was not recorded within the surveyed watercourses and waterbodies in July or September 2019 and no water vole is considered to be present in the watercourses and waterbodies that could not be surveyed, appropriate working practices should be implemented as part of the Proposed Scheme, as detailed in a Construction Environmental Management Plan (CEMP) to avoid polluting watercourses.

5.2 Otter

5.2.1 Otter footprints were recorded in the shallow watercourse to the west of Combe Pool SSSI in July and September 2019. However, no otter holts or other signs of otter presence (fish scales, spraints etc) were recorded.

5.2.2 The Proposed Scheme will not result in the direct or indirect loss of any watercourses or waterbodies potentially used by otter. Therefore, the functionality of the Smite Brook as a dispersal corridor for otters should be maintained.

5.2.3 A pre-construction survey should be undertaken immediately prior to construction to determine any change in distribution and identify any otter holts or resting places and an appropriate mitigation strategy or Natural England Licence should be put in place (if and where applicable).

5.2.4 During construction, best practice methods to avoid disturbance to dispersing otter will be detailed in a CEMP or EcoCEMP and this will include implementation of measures to minimise noise, lighting and vibration disturbance.

5.2.5 Otter dispersal corridors alongside watercourses will be maintained during construction wherever possible by siting any temporary or permanent compounds as far away from the banks of watercourses as possible or avoiding structures placed in watercourses and preventing otters migrating within the watercourse. Any storage or work compounds, where these are located near watercourses, should be fenced off to prevent otters accessing these areas. Any excavations should be covered, or where this is not possible, ramps should be provided to avoid an otter falling in and becoming trapped. Night time working will also be avoided where possible and if not avoidable, the use of lighting should be minimised and any light spill onto adjacent watercourses avoided.

6. REFERENCES

AECOM (2017) A46 Coventry, Junction Improvement: Water Vole and Otter Survey Report. Unpublished. Prepared for: Highways England.

Chanin, P. (2003). Ecology of European Otter, Conserving Natura 2000 Rivers Ecology Series No.10 English Nature.

Dean, M., Strachan, R., Gow, D. and Andrews, R. (2016) The Water Vole Mitigation Handbook (The Mammal Society Mitigation Guidance Series). Eds Fiona Mathews and Paul Chanin. The Mammal Society, London.

Highways Agency (1999) Design Manual for Roads and bridges – Volume 10, Section 4, Part 4. Nature Conservation Advice in relation to Otters. Highways Agency, London.

RSPB, NRA and RSNC (1994) The New Rivers & Wildlife Handbook. RSPB.

Strachan, R, Moorhouse, Y and Gelling, M. (2011) The Water Vole Conservation Handbook (Third Edition).

Warwickshire Wildlife Trust. Warwickshire, Coventry and Solihull Local Biodiversity Action Plan: https://www.warwickshirewildlifetrust.org.uk/LBAP, accessed July 2019.

Appendix A Watercourse and waterbody characteristics

Watercourse / waterbody name	Habitat type	Width (top of bank to top of bank)	Bank height and angle	Flow and depth of water	Description of bankside vegetation	Dominant emergent / marginal species and % of channel occupied
1. Smite Brook SP 3812 7921 – SP 3833 7921	Meandering stream	2.0 -5.0 m	0.5 – 1.0 m <45°	Slow, occasionally fast in places 1.0 – 2.0m	Permanent grazed grassland to the north and parkland / urban areas to the south	Occasional reeds / sedge along bankside
2. Combe Pool SSSI and drainage ditches SP 3848 7922 – SP 3905 7886	Large waterbody and connecting drainage ditches	>100m	0.5 – 1.0 m <45°	Static 1.0 – 2.0m on the extreme edge	Open water with scrub, occasional trees and *Phragmites* along edge	*Phragmites* along edge and in south-eastern corner
4. Field drains to east of rugby club SP 3885 7858 - SP 3892 7799	Meandering drainage ditch	1.0 m	0.5 – 1.0 m <45°, occasionally >45°	Slow / minimal 0.5 – 1.0 m	Heavily overgrown with bramble and scrub, occasional trees	Occasional *Phragmites,* <10%
5. Field Drain south of Binley Wood SP 3876 7743 - SP 3899 7738	Linear drainage ditch	1.0 – 2.0 m	1.0 – 2.0 m >45°	Sluggish 0.5 – 1.0 m	Woodland on northern side, short-cropped grass and occasional tussocky grass with scrub on southern side	Occasional *Phragmites* Approx. 20-30% coverage
6. Claybrookes Marsh waterbodies approximately SP 3807 7687	Small connected waterbodies	5.0 – 10.0 m, occasionally 10.0 – 20.0 m	<0.5m <10°	Static <0.5m	*Phragmites* overgrowth, with surrounding broad-leaved woodland	Dominated by *Phragmites*. 98% coverage

Appendix B Photographs

Representative photos of habitat surveyed



Smite Brook (Waterbody 1)



Smite Brook



Coombe Country Park Drains (Waterbody 2)



Coombe Country Park drains – showing bank profile



Coombe Country Park Drains – showing gravely stream bed



Coombe Country Park Drains – Otter footprints



Drain east of rugby fields (Watercourse 4)



Drain east of rugby fields -showing polluted water



Claybrookes Marsh waterbody (Watercourse 6)



Claybrookes Marsh waterbody (Watercourse 6)



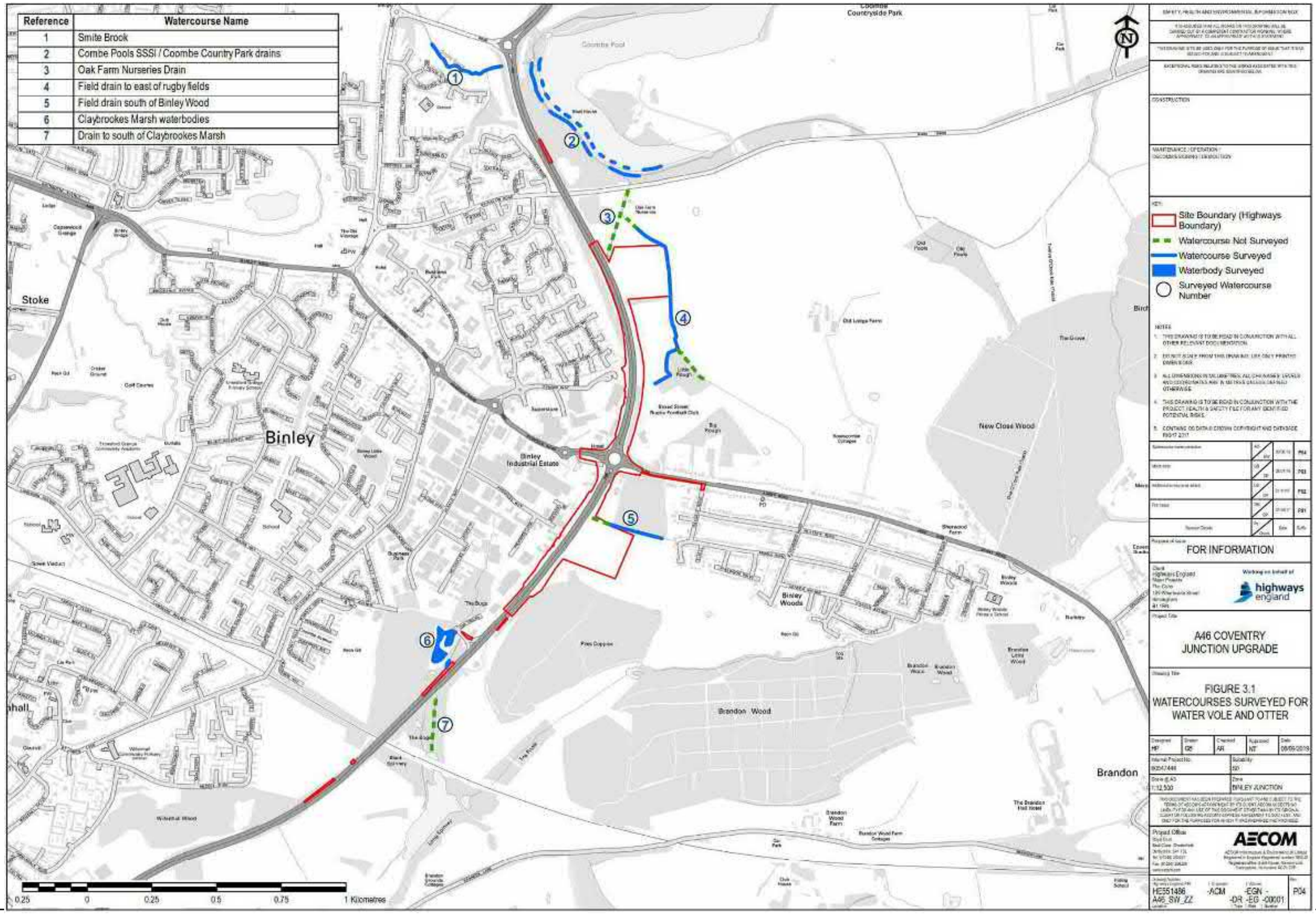
Claybrookes Marsh waterbody (Watercourse 6)



Drain running east of Claybrookes Marsh, under A46 (feeds Watercourse 7)

Appendix C Surveyed watercourses for Water Vole and Otter

Reference	Watercourse Name
1	Smite Brook
2	Combe Pools SSSI / Coombe Country Park drains
3	Oak Farm Nurseries Drain
4	Field drain to east of rugby fields
5	Field drain south of Binley Wood
6	Claybrookes Marsh waterbodies
7	Drain to south of Claybrookes Marsh



Appendix 8.2 m

Aquatic Ecology Walkover and Macroinvertebrate Survey 2017

1 Introduction

1.1 Background

1.1.1 An aquatic walkover and macroinvertebrate survey was carried out in June 2017 of the A46 Coventry Junction Upgrade (hereafter referred to as the *proposed scheme*) plus a 200m buffer zone from the proposed scheme site boundary (the *survey area*).

1.1.2 The purpose of the survey was to assess the habitats present and biological quality of the waterbodies in the survey area. This was to determine whether the proposed scheme has the potential to have adverse impacts on the aquatic ecology. Additionally, it was necessary to identify a need for further aquatic surveys to determine baseline conditions and to inform the impact assessment process.

1.2 Survey Area Description

1.2.1 The landscape within and surrounding the proposed scheme comprises various semi-natural and man-made habitats. It is predominantly urban to the west of the proposed scheme, with a mixture of arable, woodland, and recreational land to the east. To the north-east of the proposed scheme is Coombe Country Park and Coombe Pool SSSI, designated for its ornithological interest, and to the south-west is Herald Way Marsh (Claybrookes Marsh) SSSI and Local Nature Reserve (LNR), designated for its range of wetland habitats and assemblage of invertebrates.

1.2.2 For the purpose of the aquatic walk over and macroinvertebrate survey the area was defined to include the proposed scheme site and a *zone of potential impact*, which included all areas within 200m of the proposed scheme site boundary. For the purposes of identifying aquatic receptors potentially at risk, 200m was considered appropriate, when taking into account the following:

- The proposed scheme will involve the upgrading of an existing junction. This means that any waterbodies already present in the vicinity of the proposed scheme are currently subjected to existing traffic movements and associated disturbances
- The footprint of the proposed scheme is likely to result in only minimal direct loss of aquatic habitats of potential suitability to fish, macrophytes, and macroinvertebrates
- Beyond 200m it is considered that any construction related impacts and increases in operational disturbance will be minimal. However, the Smite Brook and River Sowe were considered to be within the survey area due to their hydrological connection to Coombe Pool SSSI

1.2.3 A small section of Coombe Pool SSSI is within the survey area (area of woodland including a drainage ditch, see map in Figure 1), but the majority of the main waterbody is outside of the 200m buffer. Similarly this is the case for Herald Way Marsh (Claybrook Marsh) SSSI and LNR where the majority lies outside of the 200m buffer with a ditch that lies within the 200m buffer.

1.3 Objectives

1.3.1 The objectives of the aquatic walkover survey and macroinvertebrate survey were to:

- Provide an assessment of the suitability, quality and importance of habitats within the survey area for notable fish, macrophyte, and macroinvertebrate communities
- Evaluate the necessity for further aquatic ecology surveys to inform the impact assessment process

2 Legislation and Policy

2.1.1 The legislative provisions for the protection of aquatic ecology in the UK are contained primarily under the Water Environment (Water Framework Directive) (England and Wales) Regulations 2003. The Water Framework Directive applies to all ground and surface waters (rivers, lakes, transitional waters and coastal waters).

2.1.2 The Water Framework Directive aims to achieve *good ecological status* to all waterbodies. Status is assessed by evaluating biological quality which reflects the condition of fish, macroinvertebrates, macrophyte, and phytobenthos communities, and is to be reviewed in 2021 and thereafter every six years. The status of *good* means the boundary between the conditions consistent with the description of good ecological status and moderate status in accordance with section 1.2 of Annex V of the Water Framework Directive.

2.1.3 Additionally, the Water Framework Directive aims to achieve *good ecological potential* for waterbodies that are artificial or heavily modified. To achieve this status, biological quality indicators which are not sensitive to the artificial or modified characteristics of the waterbody are assessed. The ecological potential of the waterbody is classified as *good* if all the mentioned indicators to do not fall to less than good.

3 Methodology

3.1 Aquatic Walkover Survey

3.1.1 The aquatic walkover survey was undertaken by two experienced aquatic ecologists on 27 and 28 November 2017. The survey involved a walkover of all the waterbodies (ditches, linear watercourses and lakes) (where access was granted) within a 200m buffer of the proposed scheme, or where a waterbody was deemed to be hydrologically connected to waterbodies within the 200m buffer. The survey was conducted when the waterbodies were not in spate (meaning it was normal and not usually deep) and the weather was dry and overcast.

3.1.2 This survey gave the opportunity to identify any need for further, more in-depth surveys (fish survey, macrophyte survey, macroinvertebrate survey and habitat survey). The walkover survey assessed the following features over where possible, a 200m reach of the waterbody:

- Macrophyte presence, cover and species
- Channel bed substrate
- Depth and width of channel
- Habitat type
- Fish presence and spawning features
- Modifications and pressures to the waterbody
- The surrounding land use

3.2 Macroinvertebrates

3.2.1 At each site surveyed (where access was granted) a macroinvertebrate sample was taken by two experienced aquatic ecologists using a standard Freshwater Biological Association (FBA) pattern pond net (mesh size: 1mm) applying the *kick sampling* method. This methodology is the standard procedure used by the Environment Agency, the Scottish Environment Protection Agency and the Northern Ireland Environment Agency and so is considered best practice. Samples should be taken in spring and autumn to provide the most comprehensive representation of macroinvertebrate diversity (Hill et al, 2016).

3.2.2 The sample was collected in a single area that covered the whole width of the stream with the length dependent on the width (usually between 5m and 30m). The major habitat types within the sampled area were proportionally covered within 3 minutes whilst working upstream. The substrate and marginal vegetation was agitated by *kicking* the substrate upstream of a pond net to catch any macroinvertebrates dislodged.

3.2.3 Samples were then preserved in isopropyl alcohol 70% v/v (volume of solute per volume of solute) for laboratory processing with identification to 'mixed taxon level', which is to species level (where practicable) for the majority of groups.

3.2.4 Samples taken were analysed using the indexes set out below (further details of theses indexes can be found in Appendix B);:

- Biological Monitoring Working Party (BMWP) scores and Average Score Per Taxon (ASPT) values - scores are derived based on the sensitivity of particular taxa (families) of invertebrates to organic pollution
- Community Conservation Index (CCI) method – to assess the conversation value of the macroinvertebrate populations present and identify any unusual or rare species
- Lotic-Invertebrate Index for Flow Evaluation (LIFE) method – to assess the sensitivity of benthic macroinvertebrate communities to variable flows. Higher flows should result in higher LIFE scores
- Proportion of Sediment-sensitive Invertebrates (PSI) index – to assess the sensitivity of benthic macroinvertebrate communities to fine sediments

3.3 Limitations

3.3.1 The aquatic walkover survey provided a snapshot recording of the species and habitat type. Although it gives an indication as to what fish species and population maybe supported by the waterbody, it cannot be relied upon to accurately state fish presence. Additionally, due to the survey being conducted in November 2017, macrophyte identification to species level is limited due to plant degradation and the absence of key vegetative features essential to identification. While this survey does give baseline conditions for macroinvertebrates around the proposed scheme, further surveys may be required to confirm the findings of these surveys.

4 Results and Evaluation

4.1 Introduction

4.1.1 The results of the aquatic walkover survey considered the waterbodies present within the survey area in the context of their suitability to support notable aquatic ecology that, if considered present, may require further surveying to determine whether they pose a constraint on the proposed scheme.

4.1.2 The potential for waterbodies to support notable aquatic ecology in the survey area is considered in the context of the potential for direct and indirect impacts of the proposed scheme during both construction and operation. Such impacts include those associated with noise disturbance, visual disturbance, any additional lighting and habitat degradation through surface runoff, dust deposition, and exhaust pollutants.

4.2 Aquatic Walkover Survey and macroinvertebrate survey

4.2.1 The waterbodies surveyed are summarised in Table 8-2(g)-A and there locations can be seen in Figure 1.

Table 8-2(g)-A: Waterbodies where an aquatic walkover survey was conducted and where macroinvertebrate samples were taken

Waterbody name	Site name	Date surveyed	National Grid Reference	Number of macroinvertebrate samples taken
Field drain east of the rugby pitches in Broadstreet Rugby Club	WB 04	27 November 2017	SP 39065 78071	1 (sample in analysis)
Coombe Pool SSSI drain	WB 02	27 November 2017	SP 38463 79164	1 (sample in analysis)
River Sowe	WB 08	27 November 2017	SP 38302 79633	2 (samples in analysis)
Smite Brook	WB 01	28 November 2017	SP 38123 79221	0
Herald Way Marsh (Claybrook Marsh) SSSI	WB 06	28 November 2017	SP 38187 77065	0

The macroinvertebrate data for WB 02, WB 04 and WB 08 can be found in Table 8-2(g)-B.

Table 8-2(g)-B: macroinvertebrate species list and calculated indexes (CCI, PSI, LIFE, BMWP, ASPT) for Sites WB 02, WB 04 and WB 08 (U/S and D/S samples)

BMWP group	Species	BMWP score	Conservation Score	Flow group	FSSR Score	WB02	WB04	WB 08 U/S Smite confluence	WB 08 D/S Smite confluence
Flatworms									
Planariidae	*Polycelis felina*	**5**	**3**	**II**	**C**		2		
Snails									
Lymnaeidae	*Radix balthica*	**3**	**1**	**IV**	**D**			1	
Valvatidae	*Valvata piscinalis*	**3**	**1**	**IV**	**C**	1			
Hydrobiidae	*Potamopyrgus antipodarum*	**3**	**1**	**III**	**C**	20		1725	315
Physidae	*Physa fontinalis*	**3**	**1**	**III**	**D**				8
	Physella sp.	**3**			**D**			1	
Planorbidae	*Anisus vortex*	**3**	**1**	**IV**	**D**			2	1
	Gyraulus albus	**3**	**1**	**IV**	**C**				1
	Armiger crista	**3**	**2**	**IV**	**C**				10
	Bathyomphalus contortus	**3**	**2**	**IV**	**D**	3			
	Hippeutis complanatus	**3**	**3**	**V**	**D**	1			
Limpets and bivalves									
Anyclidae	*Ancylus fluviatilis*	**6**	**1**	**II**				12	66
Acroloxidae	*Acroloxus lacustris*	**6**	**2**	**IV**		1		1	1
Sphaeriidae	*Sphaerium sp.*	**3**			**D**			250	132
	Sphaerium corneum	**3**	**1**	**IV**	**D**			50	
	Pisidium sp.	**3**			**D**	76		100	268
Worms									
Oligochaeta		**1**			**D**	36	28	200	145

BMWP group	Species	BMWP score	Conservation Score	Flow group	FSSR Score	WB02	WB04	WB 08 U/S Smite confluence	WB 08 D/S Smite confluence
Leeches									
Glossiphoniidae	*Glossiphonia complanata*	**3**	**1**	**IV**	**C**	8		1	1
	Helobdella stagnalis	**3**	**1**	**IV**	**C**	4			
Erpobdellidae	Erpobdellidae (juvenile / damaged)	**3**		**IV**	**C**	1			
	Erpobdella octoculata	**3**	**1**	**IV**	**C**	1			
Mites									
Hydracarina		**-**				8	1	1	
Crustaceans									
Ostracoda		**-**				1			
Cladocera		**-**							1
Gammaridae	Gammaridae	**6**		**II**	**B**	87	220		
	Gammarus sp.	**6**			**B**				2
	Dikerogammarus haemobaphes	**6**						110	134
	Gammarus pulex	**6**	**1**	**II**	**B**	72	84		
Asellidae	*Asellus aquaticus*	**3**	**1**	**IV**	**D**	72			1
	Asellus meridianus	**3**	**3**	**IV**	**D**	32	4		
Mayflies									
Baetidae	*Baetis rhodani*	**4**	**1**	**II**	**A**	56			
Ephemeridae	*Ephemera danica*	**10**	**1**	**II**	**C**			1	1

BMWP group	Species	BMWP score	Conservation Score	Flow group	FSSR Score	WB02	WB04	WB 08 U/S Smite confluence	WB 08 D/S Smite confluence
Caenidae	*Caenis luctuosa*	**7**	**1**	**IV**	**D**			6	173
Stoneflies									
Nemouridae	*Nemoura sp.*	**7**			**C**		1		
Beetles									
Dytiscidae	*Agabus sp.*	**5**			**D**		1		
Scirtidae	Scirtidae (larvae / damaged)	**5**		**IV**	**B**		114		
Elmidae	*Elmis aena*	**5**	**1**	**II**	**B**			5	10
	Oulimnius sp.	**5**		**IV**	**C**	20		6	32
	Oulimnius tuberculatus	**5**	**2**	**IV**	**C**	1			3
Caddisflies									
Glossosomatidae	*Agapetus sp.*	**7**		**II**	**A**				4
	Agapetus fuscipes	**7**	**1**	**II**	**A**	11		500	81
Polycentropodidae	Polycentropodidae (juvenile / damaged)	**7**		**IV**	**B**		2		
	Plectrocnemia conspersa	**7**	**2**	**II**	**B**		4		
	Polycentropus flavomaculatus	**7**	**2**	**II**	**B**				1
Psychomyiidae	Psychomyiidae (juvenile / damaged)	**8**		**II**	**B**	1			
	Tinodes waeneri	**8**	**1**	**III**	**B**	5			
	Lype reducta	**8**	**3**	**II**			1		1
Hydropsychidae	*Hydropsyche sp.*	**5**			**A**				4
	Hydropsyche	**5**	**2**	**II**				25	13

BMWP group	Species	BMWP score	Conservation Score	Flow group	FSSR Score	WB02	WB04	WB 08 U/S Smite confluence	WB 08 D/S Smite confluence
	pellucidula								
	Hydropsyche angustipennis	**5**	**1**	**II**	**B**				5
	Hydropsyche siltatai	**5**	**1**	**II**	**A**			35	10
Hydroptilidae	*Hydroptila sp.*	**6**							20
Limnephilidae	Limnephilidae (juvenile / damaged)	**7**		**IV**	**B**	7	8		8
	Glyphotaelius pellucidus	**7**	**3**	**IV**	**D**	4	1		2
	Micropterna lateralis	**7**	**2**	**II**	**B**		2		
	Micropterna sequax	**7**	**1**	**II**	**B**		2		
Leptoceridae	*Athripsodes sp.*	**10**				5			
	Athripsodes cinereus	**10**	**1**	**II**	**B**	4		75	21
	Athripsodes bilineatus	**10**	**5**	**II**	**A**	1			
	Mystacides sp.	**10**		**IV**	**D**				2
Goeridae	*Goera pilosa*	**10**	**3**	**I**	**B**			6	3
Lepidostomatidae	*Lepidostoma hirtum*	**10**	**2**	**II**	**B**			6	8
Trueflies									
Chironomidae	Tanypodinae	**2**					43	9	35
	Orthocladiinae	**2**				4	87		279
	Chironomini	**2**						20	
	Tanytarsini	**2**				10	13 23	50	

BMWP group	Species	BMWP score	Conservation Score	Flow group	FSSR Score	WB02	WB04	WB 08 U/S Smite confluence	WB 08 D/S Smite confluence
	Prodiamesinae	**2**					87		
Tipulidae	*Tipula sp.*	**5**		**IV**	**B**	1		6	4
Pediciidae	*Dicranota* sp.	**5**		**II**	**B**	8	8	1	
Limoniidae	*Pilaria sp.*	**5**			**B**	2			
Simuliidae	Simuliidae (damaged / juvenile)	**5**		**II**	**A**			20	
	Simulium sp.	**5**			**B**				48
Dixidae	*Dixa nubilipennis*	**-**	**5**		**B**		1		
Psychodidae		**-**			**D**	9	8		10
Empididae		**-**					1		3
Ceratopogonidae		**-**				3	2	4	14
Ptychopteridae	*Ptychoptera sp.*	**-**		**II**	**D**		1		
Other Taxa									
Microturbellaria		**-**							1
Collembola		**-**					28		
Number of scoring families (BMWP)						**18**	**12**	**20**	**24**
BMWP score						**79**	**61**	**107**	**135**
ASPT (BMWP)						**4.4**	**5.1**	**5.4**	**5.6**
PSI Score (species)						**38.46**	**41.2**	**35.0**	**40.0**
LIFE Score (species)						**6.62**	**7.7**	**7.4**	**7.1**
CCI Score						**8.61**	**12.8**	**6.6**	**7.6**
Total Number of species						**18**	**9**	**17**	**24**

4.3 Field Drain East of Rugby Pitches at Broadstreet Rugby Club

4.3.1 This waterbody lies approximately 200m east of the proposed scheme site boundary. It is an agricultural drainage ditch and likely to be ephemeral. It has an average width 0.5m and an average depth of 8cm, both of which did not vary throughout the waterbody. The surrounding land use was primarily characterised by tilled land/arable and broadleaf wood. There was heavy shading along the ditch which was concentrated on the left bank. Both banks were steep and trapezoidal with the left bank having simple (2-3 dominant) vegetation types and the right bank having uniform (1 dominant) vegetation type.

4.3.2 The substrate was dominated by leaf matter and silt (80% coverage) with areas of sand sparsely distributed throughout (20% coverage). The bed stability was soft and the turbidity clear. The flow was normal at less than 10cm per second. As such the habitat type was 100% ponded reach.

4.3.3 The ditch was heavily shaded with minimal flow and appeared ephemeral. No macrophytes were recorded, possibly due to the level of shading. No suitable salmonid spawning habitat was present. It is unlikely that the ditch would support any notable fish populations due to the depth of water, low flow, and apparent ephemeral nature. The lack of connectivity between the feature and any main watercourse means fish would be unable to migrate to it.

4.3.4 A macroinvertebrate sample was taken from an area that was most representative of the waterbody. The macroinvertebrate species diversity at this waterbody was relatively low (nine species identified in the sample). The majority of species were identified as having conservation values of Frequent or below (see Table A2, Appendix B) with the exception of the truefly Dixa nubilipennis which is of Local value. This is reflected in the CCI score of 12.8 which gives this waterbody a Fairly high conservation value (see Table A3, Appendix B).

4.3.5 This waterbody had a PSI (species) score of 41.2, which suggests it is moderately sedimented (see Table A7, Appendix B). A LIFE (species) score of 7.7 was calculated with all species falling into the Moderate/fast and Flowing/standing categories (see Table A6, Appendix B), appropriate values for a waterbody of this type.

4.3.6 The biological quality of this waterbody was Moderate (BMWP score 61, ASPT score 5.1), suggesting that it is currently receiving a degree of organic pollution.

4.4 Coombe Pool SSSI Drain

4.4.1 The Coombe Pool SSSI is situated approximately 90m to the east of the proposed scheme site boundary. It is dominated by a large expanse of water (Coombe Pool itself) that is fringed by a mixture of branched bur-reed (*Sparganium erectum)* and common reed (*Phragmites australis)*. The lake is popular with anglers and contains mixed course fish including common carp (*Cyprinus carpio)*, pike (*Esox luscious)*, common bream (*Abramis brama), tench (Tinca tinca)* and the non-native zander (*Sander lucioperca*) (Coventry City Council. 2017).

4.4.2 A drain runs along the western flank of Coombe Pool and is of more interest due to its direct connectivity to Smite Brook and close proximity to the proposed scheme boundary (about 50m). The drain had an average width of approximately 2m and average depth of about 10cm. There was variation in the width and depth throughout the survey reach, with a maximum width of approximately 2.5m and a maximum depth of 20cm. The surrounding land use was primarily characterised by broadleaf wood which gave moderate shading along the ditch. Both banks had simple vegetation types.

4.4.3 The substrate was characterised by mixed sediment types (30% pebbles; 30% gravel; 20% sand; 20% silt). The bed stability was stable and the turbidity was clear. The flow was normal and was on average less than 10cm per second. The flow varied throughout the ditch giving a variety of habitat types (20% riffle; 20% pool: 20% glide; 20% ponded reach; 20% marginal dead water).

4.4.4 In total three different species of macrophyte were recorded giving a coverage of 30%. These included pendulous sedge (*Carex pendulus)* and water forget-me-not (*Myosotis scorpioides)*. No in-stream submerged macrophytes were recorded.

4.4.5 Extensive spawning habitat was recorded for salmonid species. Although the Smite Brook in which the drain is connected to has no reports of salmonid in it (Environment Agency, 2016), there is still the potential for the drain to support them. Additionally, there is potential habitat for other notable fish species such as bullhead (*Cottus gobio*) and stone loach (*Barbatula barbatula)*, both of which have been recorded in the Smite Brook (Environment Agency, 2016a).

4.4.6 A macroinvertebrate sample was taken from an area that was most representative of the waterbody. Macroinvertebrate species diversity was relatively high with 18 species identified in the sample, the majority of which had conservation scores of Frequent or below. One exception was the caddisfly Tinodes waeneri which was of Local value. The CCI score was 8.61 which is of Moderate conservation value.

4.4.7 The PSI (species) score was calculated as 38.46 which suggest that this waterbody is Sedimented. The LIFE (species) score of 6.62 was calculated with the majority of the species being categorised as Moderate/fast and Flowing/standing flow groups.

4.4.8 The BMWP (79) and ASPT (4.4) scores suggest that the waterbody has good biological quality with slight organic inputs.

4.5 River Sowe

4.5.1 The River Sowe has a Water Framework Directive ecological status of *moderate* (Environment Agency 2016, b). The reach of the River Sowe surveyed is situated to the north-west of the proposed scheme site boundary and is outside of the 200m buffer. It was surveyed due to its hydrological connection to the Smite Brook and Coombe Pool SSSI.

4.5.2 This watercourse had an average width of approximately 3m and an average depth of 30cm. The width and depth varied throughout the watercourse, with a maximum width of about 5m and maximum depth of approximately 50cm. The surrounding land use was characterised by broadleaf wood and improved grassland. Secondary land use was scrub, suburban and road. Both banks had simple vegetation types and there was moderate shading throughout the surveyed reach.

4.5.3 The substrate was made up of mixed sediment types that were dominated by pebbles (40% coverage) and gravel (40% coverage). There were also areas of cobbles (10% coverage) and silt (10% coverage). The bed stability was stable and the levels of turbidity were moderate. The flow was normal and on average was 10 to 25 cm per second. The flow varied throughout the survey reach giving a variety of habitat types (40% riffle; 40% glide; 10% pool; 10% marginal dead water).

4.5.4 Throughout the survey reach three different macrophyte species were identified (pendulous sedge, branched bur-reed and in stream water crowfoot Ranunculus spp.) having a coverage of 20%.

4.5.5 There were extensive areas of potential salmon and brown trout spawning habitat throughout the survey reach. There are records of brown trout in the River Sowe

(Environment Agency, 2016). Environment Agency records also indicate the presence of notable fish species including European eel *(Anguilla Anguilla),* bleak (*Alburnus alburnus)*, bullhead, minnow (*Phoxinus phoxinus)*, stone loach and 3-spined stickleback (*Gasterosteus aculeatus)* (Environment Agency, 2016). During the macroinvertebrate survey at two sites along the survey reach, a total of 13 bullheads were caught and returned.

4.5.6 In areas of marginal dead water there were signs of a hydrocarbon based slick, which would suggest surface water runoff from the nearby road and sub/urban areas. There were also a number of other modifications and pressures to the survey reach. The channel had been straightened in sections and there was a large drainage outfall at the upstream end. Additionally, the watercourse was crossed by a main road, with concrete reinforcements on both banks under the bridge. In stream litter was observed throughout the majority of the survey reach.

4.5.7 A macroinvertebrate sample was taken upstream and downstream of the Smite Brook Confluence. They were both taken on areas which were most representative of the features of the waterbody.

4.5.8 The macroinvertebrate sample taken upstream of the Smite Brook confluence had moderate species diversity, with 17 species identified all of which had conservation scores of Frequent or lower. This was reflected in the CCI score of 6.6 which is of Moderate conservation value.

4.5.9 The PSI (species) score was calculated as 35, suggesting a Sedimented waterbody. The LIFE (species) score was calculated as 7.4 with the majority of species falling in to the Moderate/fast and Flowing/standing flow groups.

4.5.10 The biological quality at this site was very good (BMWP score 107, ASPT score 5.4). This suggests an unpolluted and unimpacted waterbody.

4.5.11 The macroinvertebrate sample that was taken downstream of the Smite Brook confluence had relatively high species diversity (the highest of all sites). All of the species had conservation scores of Frequent or lower which was reflected in the CCI score of 7.6. This gave the waterbody at this site a Moderate conservation value.

1.1.1 The PSI (species) score of 40 suggests that this waterbody is Sedimented. The LIFE (species) score was calculated as 7.1 with majority of species falling into the Moderate/fast and Flowing/standing flow groups.

4.5.12 The BMWP (135) and ASPT (5.6) scores give this waterbody a very good biological quality which is unpolluted and unimpacted.

4.5.13 It should be noted that in both the upstream and downstream samples, the invasive non-native killer shrimp *Dikerogammarus haemobaphes* was identified.

4.6 Smite Brook

4.6.1 No macroinvertebrate sample was collected at this site. The Smite Brook has a Water Framework Directive status of *moderate* due to phosphate and macrophytes and phytobenthos combined (Environment Agency, 2016c). This waterbody is situated immediately to the west and flows from under the A46 and is outside of the 200m buffer of the proposed scheme site boundary. It was surveyed due to its hydrological connection with the Coombe Pool SSSI. This watercourse had an average width of approximately 2.5m and an average depth of about 40cm. Both the width and depth varied throughout the surveyed reach with a maximum width of about 5m and a maximum depth of approximately 50cm.

4.6.2 The surrounding land use was primarily semi-improved grassland and scrub, with occasional areas of sub/urban and parkland. Both banks had simple vegetation types and there was heavy shading throughout the surveyed reach.

4.6.3 The substrate was made up of mixed sediment types, dominated by silt (60% coverage), with areas of gravel (20% coverage) and sand (20% coverage). The stability of the bed was loose with low levels of turbidity. The flow was normal and on average was 10 to 25cm per second. Flow varied throughout the survey reach giving a variety of habitat types, which were riffle (30% coverage), pool (20% coverage), glide (20% coverage), ponded reach (20% coverage) and marginal dead water (10% coverage).

4.6.4 Woody debris was consistent throughout the survey reach with 60% coverage. There were also additional areas of tree roots (20% coverage) and filamentous and non-filamentous algae. Five macrophyte species were identified throughout the survey reach, covering 25% (branched bur-reed, unbranched bur-reed (*Sparganium emersum),* duckweed (*Lemna spp*.), reed manna grass (*Glyceria maxima)* and reed canary grass (*Phalaris arundinacea)*). It is likely that areas of macrophyte would support a notable macroinvertebrate populations and fish population.

4.6.5 There were pockets of isolated potential brown trout spawning habitat. The Environment Agency has not recorded brown trout in the Smite Brook but they have been recorded in the River Sowe (Environment Agency, 2016). The survey reach was about 280m upstream of the confluence of the River Sowe (SP 37994 79478), and so it is likely that brown trout use the Smite Brook. Other notable fish species have been recorded in the Smite Brook by the Environment Agency including bullhead, stoneloach and 3-spined stickleback.

4.6.6 This waterbody had additional modifications and pressures, which included channel realignment, culverting of the A46, concrete reinforcement and cattle poaching. There were also signs of litter throughout.

4.7 Herald Way Marsh (Claybrook Marsh) SSSI

4.7.1 No macroinvertebrate sample was collected at this site. This SSSI is situated adjacent to the west of the southern extent of the proposed scheme boundary. The majority of the SSSI is made up of wetlands and common reed beds. The majority of the ditches and drains were dry, with the exception of one (SP 38187 77065) where the walkover survey was conducted.

4.7.2 This drainage ditch had an average width of approximately 0.5m and an average depth of about 2cm, which were both consistent throughout. The surrounding land use was primarily broadleaf wood, industrial buildings and road. Both banks were trapezoidal with simple vegetation, and there was heavy shading throughout the ditch.

4.7.3 The substrate was dominated by silt (95% cover) overlaying gravel; 5% of gravel was exposed. The bed stability was soft. The flow was normal and was <10cm per second, giving a 100% ponded reach waterbody. It is likely to be dry in the summer with water during periods of high rainfall.

4.7.4 This waterbody had no suitable salmonid spawning habitat and is unlikely to support fish due to its ephemeral nature, shallow depth and lack of connectivity to any main watercourses. No macrophytes were recorded. Similarly for macroinvertebrates, the waterbody seems sub-optimal due to the adjacent industrial buildings and road which is likely to negatively impact the water quality from surface runoff.

5 Discussion

5.1 Field drain East of Rugby Fields

5.1.1 This waterbody is at the margin of the 200m survey buffer. It is potentially chronically degraded by surface runoff from the adjacent heavily managed arable land. This is corroborated by the PSI (species) score which identified it as moderately sedimented. The habitat assessment suggests this waterbody supports limited aquatic communities and so any potential impacts would be minimal. However, the results of the macroinvertebrate analysis show that the water body is of Fairly high conservation value due to the presence of the truefly (*Dixa nubilipennis*).

5.2 Coombe Pool SSSI Drain

5.2.1 There is a potential for the proposed scheme to influence water quality of the waterbody through surface runoff. The waterbody supports suitable fish spawning habitat, which may deteriorate due to sedimentation. An increase in fine sediment loading on a waterbody may reduce the interstitial spaces between coarser sediment. These areas are important for salmonid eggs due to ensuring sufficient oxygenated water transfer. Additionally, the waterbody runs into the Smite Brook which has records of a notable fish population.

5.2.2 The habitat present at this waterbody may support notable macroinvertebrate communities. The macroinvertebrate assemblage may change with water quality and sedimentation, impacting the ecological integrity of the waterbody. From fine sediment loading, individuals may experience gill clogging, burial and loss of habitat (Jones et al. 2011).

5.2.3 The macroinvertebrate community is less diverse than would be expected and only of Moderate conservation value. The caddisfly Tinodes waeneri is of Local value. This is surprising but is likely to be due to impacts of sedimentation as the PSI (species) score suggests.

5.2.4 Macrophytes are currently absent suggesting that conditions do not favour their establishment. It is unlikely that this will be exacerbated by the proposed scheme.

5.3 River Sowe

5.3.1 Although this watercourse falls outside of the *zone of potential impact* it may still be at risk from the proposed works. It is downstream of are the Coombe Pool SSSI drain and thus impacts on this waterbody may influence the River Sowe.

5.3.2 There is suitable habitat and records of a notable fish population which are already impacted by a number of modifications and pressures. Its "*Reason for not achieving good status"* is phosphate loading from sewage treatment works and agricultural runoff (Environment Agency, 2017). Additional pressures from the proposed scheme may have a further negative impact on fish ecology. This is also similar for the macroinvertebrate assemblages and macrophyte presence which may deteriorate with additional pressures from the proposed scheme. Increased fine sediment loading and deterioration of water quality on macroinvertebrates and macrophytes are likely reasons for a waterbody not achieving the Water Framework Directive status of *good* (Jones et al, 2011*)*.

5.3.3 However, both macroinvertebrate samples show very good biological quality suggesting that pollution is not having detrimental effects sufficient to influence fish populations. A conservation value higher than Moderate would therefore have been expected. However, the PSI (species) score suggests that sedimentation may be contributing to the lower-than-expected value.

5.4 Smite Brook

5.4.1 Due to its connection to the Coombe Pool SSSI drain, precaution should be taken to protect this watercourse. Historical records of notable fish populations should be investigated further to inform this baseline study.

5.4.2 As previously discussed for the Rive Sowe, changes in water quality and any increases in fine sediment loading may influence macrophytes and macroinvertebrate assemblages. The walkover survey provided evidence of suitable sediment types and habitat types that would support a notable macroinvertebrate community.

5.4.3 The waterbody is currently impacted by the A46, suburban and agricultural surrounding land. It's *"Reason for not achieving good ecological status"* is phosphate loading from water treatment works and agricultural runoff (Environment Agency, 2017). Additional impacts from the proposed scheme (such as fine sediment loading and surface water runoff) may deteriorate the fish, macrophyte and macroinvertebrate ecology to a *poor* status.

5.5 Herald Way Marsh (Claybrook Marsh) SSSI

5.5.1 Due to the lack of any notable aquatic ecology, the proposed scheme is not likely to have any additional negative impacts to the aquatic ecology in Herald Way Marsh. The majority of the ditches were dry with the exception of one surveyed, which is already heavily influenced by the surrounding land use. Any impacts from the temporary works would not significantly degrade the already poor aquatic ecology in this drainage ditch.

6 Further Study

6.1 Introduction

6.1.1 Based on the findings of the surveys and points discussed, the following surveys will be undertaken to support this baseline study.

6.2 Field drain east of rugby fields

6.2.1 Due to the Fairly high conservation value identified at this waterbody, a spring macroinvertebrate sample is recommended so as to give the full seasonal diversity of the waterbody.

6.3 Coombe Pool SSSI Drain

6.3.1 A follow up macroinvertebrate survey in the spring will be conducted. There was sufficient habitat in place that would support a notable macroinvertebrate community. A spring sample to compliment the sample taken during this survey would give the full seasonal diversity of the waterbody. Macroinvertebrates respond to similar physico-chemical and habitat variables as fish. Macroinvertebrate samples will therefore act as a surrogate for a larger scaled fish survey.

6.4 River Sowe

6.4.1 A macroinvertebrate survey will be carried out in the spring. A spring sample to compliment the sample taken during this survey would give the full seasonal diversity of the waterbody. Macroinvertebrates respond to similar physico-chemical and habitat variables as fish. Macroinvertebrate samples will therefore act as a surrogate for a larger scaled fish survey.

6.4.2 A macrophyte survey will be carried out in the late spring or summer months. Due to the seasonal constraint of this survey, most aquatic plants had undergone plant senescence making species level identification of the water crowfoot difficult.

6.5 Smite Brook

6.5.1 A macroinvertebrate survey will be carried out in spring. Due to land access constraints this survey was not possible for this report. The waterbody has habitat that would suggest a notable macroinvertebrate survey. Macroinvertebrates respond to similar physico-chemical and habitat variables as fish. Macroinvertebrate samples will therefore act as a surrogate for a larger scaled fish survey.

Appendix 8.2n

Appendix B: A46 Coventry Junction Improvements - Aquatic Ecology Spring Macroinvertebrate Surveys 2018

1 Introduction

1.1 Background

1.1.1 In November 2017 aquatic habitat assessment and macroinvertebrate surveys were conducted on waterbodies within 200m (the *survey area*) of the A46 Coventry Junction Upgrade footprint (hereafter referred to as the *proposed scheme*). The objective of these surveys was to assess the aquatic habitat and biological quality of waterbodies within the survey area. The findings and recommendations are reported in Environmental Assessment Report (HE551486-ACM-EGN-A46_SW_000_Z-RP-LE-0002-C02).

1.1.2 The macroinvertebrate surveys identified four waterbodies with notable aquatic habitat and biological quality. Spring macroinvertebrate surveys have been undertaken for these waterbodies to ensure that macroinvertebrate diversity[1] was comprehensively evaluated.

1.1.3 The results of the Spring 2018 surveys are presented in this report and have been used to determine baseline conditions and to inform the impact assessment process. Details on proposed mitigation measures are presented in the Environmental Assessment Report (where applicable).

1.2 Survey Area Description

1.2.1 The landscape within and surrounding the proposed scheme comprises various semi-natural and man-made habitats. It is predominantly urban to the west of the proposed scheme, with a mixture of arable, woodland and recreational land to the east. To the north-east of the proposed scheme is Coombe Country Park and Coombe Pool SSSI, designated for its ornithological interest; and to the south-west is Herald Way Marsh (Claybrookes Marsh) SSSI / Local Nature Reserve (LNR), designated for its range of wetland habitats and assemblage of invertebrates.

1.2.2 For the purpose of the aquatic macroinvertebrate survey, areas within the proposed scheme site boundary were included as well as those within a *zone of potential impact*, 200m around the proposed scheme site boundary. For the purposes of identifying aquatic receptors potentially at risk, 200m was considered appropriate, when taking into account the following:

- The proposed scheme will involve the upgrading of existing junctions. This means that any waterbodies already present in the vicinity of the proposed scheme are currently subjected to existing traffic movements and associated disturbances.
- The footprint of the proposed scheme is likely to result in only minimal direct loss of aquatic habitats of potential suitability to fish, macrophytes and macroinvertebrates.
- Beyond 200m it is considered that any construction-related impacts and increases in operational disturbance will be minimal. However, the Smite Brook and River

[1] Hill, M.J., Sayer, C.D. and Wood, P.J. (2016) 'When is the best time to sample aquatic macroinvertebrates in ponds for biodiversity assessment?' Environmental Monitoring Assessment, 188, 194

Sowe were considered to be within the survey area due to their hydrological connection to Coombe Pool SSSI.

1.2.3 A small section of Coombe Pool SSSI is within the survey area (area of woodland), but the main waterbody is outside the 200m buffer (see Annex A-Figure 1).

2 LEGISLATION AND POLICY

2.1.1 The legislative provisions for the protection of aquatic ecology in the UK are contained primarily under the Water Environment (Water Framework Directive) (England and Wales) Regulations 2003 (WFD hereafter). The WFD applies to all ground and surface waters (rivers, lakes, transitional waters and coastal waters).

2.1.2 The WFD aims to achieve *good ecological status* to all waterbodies. Status is assessed by evaluating biological quality which reflects the condition of fish, macroinvertebrates, macrophyte and phytobenthos communities, and is to be reviewed in 2021 and thereafter every six years. The status of *good* means the boundary between the conditions consistent with the description of good ecological status and moderate status in accordance with section 1.2 of Annex V of the WFD.

2.1.3 Additionally, the WFD aims to achieve *good ecological potential* for waterbodies that are artificial or heavily modified. To achieve this status, biological quality indicators which are not sensitive to the artificial or modified characteristics of the waterbody have been assessed. The ecological potential of the waterbody is classified as *good* if all the mentioned indicators to do not fall to less than good.

3 Methodology

3.1 Macroinvertebrates

3.1.1 At each site surveyed a macroinvertebrate sample was taken by two experienced aquatic ecologists using a standard Freshwater Biological Association (FBA) pattern pond net (mesh size: 1mm) applying the *kick sampling* method. This methodology is the standard procedure used by the Environment Agency, the Scottish Environment Protection Agency, and the Northern Ireland Environment Agency and so is considered good practice. Samples should be taken in spring and autumn to provide the most comprehensive representation of macroinvertebrate diversity[2].

3.1.2 The sample was collected in a defined area that covered the whole width of the stream with the length dependent on the width (usually between 5m and 30m). The major habitat types within the sampled area were proportionally covered within three minutes whilst working upstream. The substrate and marginal vegetation were agitated by *kicking* the substrate upstream of a pond net causing macroinvertebrates to be dislodged and carried into the net by the current.

3.1.3 Samples were then preserved in isopropyl alcohol 70% v/v for laboratory processing with identification to *mixed taxon level*, which is to species level (where practicable) for the majority of groups.

3.1.4 Samples taken were analysed using the indexes set out below (further details of theses indexes can be found in Annex B);

- Biological Monitoring Working Party (BMWP) scores and Average Score Per Taxon (ASPT) values - scores are derived based on the sensitivity of particular taxa (families) of invertebrates to organic pollution;

[2] Hill, M.J., Sayer, C.D. and Wood, P.J. (2016) 'When is the best time to sample aquatic macroinvertebrates in ponds for biodiversity assessment?' Environmental Monitoring Assessment, 188, 194

- Community Conservation Index (CCI) method – to assess the conversation value of the macroinvertebrate populations present and identify any unusual or rare species;
- Lotic-Invertebrate Index for Flow Evaluation (LIFE) method – to assess the sensitivity of benthic macroinvertebrate communities to variable flows. Higher flows should result in higher LIFE scores; and
- Proportion of Sediment-sensitive Invertebrates (PSI) index – to assess the sensitivity of benthic macroinvertebrate communities to fine sediments.

3.2 Limitations

3.2.1 Due to land access restrictions, Smite Brook (WB 01) was not surveyed for macroinvertebrates in November 2017, and so the spring sample only is presented in this report. The Smite Brook data may therefore not be the most comprehensive representation of macroinvertebrate species diversity.

3.2.2 The surveys recorded species and conditions that could be identified at the specific time of the survey. Species that may be present at other times of year, sporadically and/or in low numbers may not have been recorded. Although the sampling methods adopted allow characterisation of the macroinvertebrate communities and establish the biological quality of freshwater habitats surveyed, they do not generate an exhaustive list of taxa present. To attempt to detect all species, including those at low abundance, or occurring sporadically, would be impractical and would not necessarily improve the quality of the assessment. This is in accordance with recommended practice.

3.2.3 It was not always possible to identify juvenile, damaged, or female specimens to species level (for some groups of invertebrates, identification to species relies on diagnostic male features). This was in accordance with recommended practice and therefore not considered a significant limitation.

4 Results and Evaluation

4.1.1 The spring macroinvertebrate survey considered waterbodies in Table B-1. With the exception of Smite Brook (WB 01), these had also been surveyed in autumn (November) 2017. The spring macroinvertebrate assemblages have been assessed in terms of their biological quality and conservational value and potential direct and indirect impacts of the proposed scheme during both construction and operation. Such impacts include those associated with noise disturbance, visual disturbance, any additional lighting and habitat degradation through surface runoff, dust deposition and exhaust pollutants.

Table B-1: Waterbodies that were surveyed during the aquatic walkover and where macroinvertebrate samples were taken

Waterbody	Site	Date surveyed	NGR	Macroinvertebrate samples taken
Smite Brook	WB 01	19/04/2018	SP 38131 79202	1
Coombe Pool SSSI drain	WB 02	19/04/2018	SP 38458 79164	1
Field drain east of rugby fields	WB 04	19/04/2018	SP 39124 78021	1
River Sowe U/S of Smite Brook confluence	WB 08 U/S	19/04/2018	SP 38309 79629	1
River Sowe D/S of Smite Brook confluence	WB 08 D/S	19/04/2018	SP 37898 79487	1

4.2 Aquatic Macroinvertebrate Survey

4.2.1 Macroinvertebrates occurring at WB 01 WB 02, WB 04 and WB 08 (U/S, D/S) are shown in Table B-2.

Table B-2: Macroinvertebrate species list and calculated indexes (CCI, PSI, LIFE, BMWP, ASPT) for Sites WB 01, WB 02, WB 04 and WB 08 (U/S and D/S samples)

BMWP group	Species	BMWP score	Conservation	Flow group	FSSR Score	WB01	WB02	WB04	WB08 U/S	WB08 D/S
Snails										
Lymnaeidae	*Stagnicola palustris*	**3**	**2**	**VI**	**D**	1			1	
Lymnaeidae	*Lymnaea stagnalis*	**3**	**1**	**IV**	**D**	1				
Lymnaeidae	*Radix balthica*	**3**	**1**	**IV**	**D**	1				
Valvatidae	*Valvata piscinalis*	**3**	**1**	**IV**	**C**		15			
Hydrobiidae	*Potamopyrgus antipodarum*	**3**	**1**	**III**	**C**		130		25	85
Bithyniidae	*Bithynia tentaculata*	**3**	**1**	**IV**	**D**	1	2			
Physidae	*Physidae* (juvenile / damaged)	**3**		**IV**	**D**				1	
Planorbidae	*Armiger crista*	**3**	**2**	**IV**	**C**		2			
Planorbidae	*Bathyomphalus contortus*	**3**	**2**	**IV**	**D**		2			
Planorbidae	*Hippeutis complanatus*	**3**	**3**	**V**	**D**		3			
Limpets and mussels										
Anyclidae	*Ancylius fluviatilis*	**6**	**1**	**II**			2		15	5
Sphaeriidae	*Sphaerium corneum*	**3**	**1**	**IV**	**D**					5

BMWP group	Species	BMWP score	Conservation	Flow group	FSSR Score	WB01	WB02	WB04	WB08 U/S	WB08 D/S
Sphaeriidae	*Pisidium sp.*	**3**			**D**	12	200		140	120
Worms										
Oligochaeta		**1**			**D**	19	110	15	66	35
Leeches										
Glossiphoniidae	*Glossiphonia complanata*	**3**	**1**	**IV**	**C**		15			
Glossiphoniidae	*Helobdella stagnalis*	**3**	**1**	**IV**	**C**		3			
Erpobdellidae	*Erpobdellidae* (juvenile / damaged)	**3**		**IV**	**C**		2			
Erpobdellidae	*Erpobdella sp.*	**3**		**IV**	**C**					1
Mites										
Hydracarina		**-**				1	5			
Crustaceans										
Ostracoda		**-**					1			
Gammaridae	*Gammaridae*	**6**		**II**	**B**	1	60			
Gammaridae	*Dikerogammarus haemobaphes*								9	6
Gammaridae	*Gammarus pulex*	**6**	**1**	**II**	**B**		160	18		
Crangonyctidae	*Crangonyx pseudogracilis*	**6**	**1**	**III**	**D**	16	1			
Asellidae	*Asellus aquaticus*	**3**	**1**	**IV**	**D**	10	70			
Asellidae	*Asellus meridianus*	**3**	**3**	**IV**	**D**			1		
Mayflies										
Baetidae	*Baetidae* (juvenile / damaged)	**4**		**II**	**A**	10			1	
Baetidae	*Baetis rhodani*	**4**	**1**	**II**	**A**				10	1
Ephemeridae	*Ephemera sp.*	**10**			**C**					1
Caenidae	*Caenidae* (juvenile / damaged)	**7**		**IV**	**D**					3
Caenidae	*Caenis luctuosa*	**7**	**1**	**IV**	**D**	1			9	1
True bugs										
Gerridae	*Gerris lacustris*	**5**	**1**	**IV**			1			
Beetles										
Dytiscidae	*Dytiscidae* (larvae / damaged)	**5**		**IV**	**D**			1		
Dytiscidae	*Agabus guttatus*	**5**	**5**	**II**	**B**			1		
Hydrophilidae	*Helophorus sp.*	**5**			**D**				1	

BMWP group	Species	BMWP score	Conservation	Flow group	FSSR Score	WB01	WB02	WB04	WB08 U/S	WB08 D/S
Hydrophilidae	*Anacaena limbata*	**5**	**1**	**IV**	**D**			1		
Scirtidae	*Scirtidae* (larvae / damaged)	**5**		**IV**	**B**			6		
Elmidae	*Elmis aena*	**5**	**1**	**II**	**B**		2		3	2
Elmidae	*Oulimnius sp.*	**5**		**IV**	**C**		3			1
Alderflies										
Sialidae	*Sialis lutaria*	**4**	**1**	**IV**	**D**		1			
Caddisflies										
Glossosomatidae	*Agapetus sp.*	**7**		**II**	**A**				60	
Glossosomatidae	*Agapetus fuscipes*	**7**	**1**	**II**	**A**				140	
Psychomyiidae	*Tinodes waeneri*	**8**	**1**	**III**	**B**		1			
Psychomyiidae	*Lype reducta*	**8**	**3**	**II**			1			
Hydropsychidae	*Hydropsyche sp.*	**5**			**A**				2	
Hydropsychidae	*Hydropsyche pellucidula*	**5**	**2**	**II**					1	
Hydropsychidae	*Hydropsyche siltatai*	**5**	**1**	**II**	**A**	3			9	20
Hydropsychidae	*Hydropsyche instabilis*	**5**	**4**	**II**	**A**					15
Limnephilidae	*Limnephilidae* (juvenile / damaged)	**7**		**IV**	**B**	4		2		
Limnephilidae	*Limnephilus marmoratus*	**7**	**3**	**V**	**C**	1				
Limnephilidae	*Limnephilus lunatus*	**7**	**1**	**IV**	**C**	3	2			
Limnephilidae	*Halesus radiatus*	**7**	**2**	**II**	**C**	1				
Limnephilidae	*Micropterna lateralis*	**7**	**2**	**II**	**B**			1		
Limnephilidae	*Micropterna sequax*	**7**	**1**	**II**	**B**				1	
Molannidae	*Molanna angustata*	**10**	**2**	**IV**	**C**	1				
Leptoceridae	*Leptoceridae* (juvenile / damaged)	**10**		**IV**		5				
Leptoceridae	*Athripsodes sp.*	**10**					11		10	23
Leptoceridae	*Athripsodes cinereus*	**10**	**1**	**II**	**B**				15	
Leptoceridae	*Mystacides azurea*	**10**	**2**	**IV**	**D**	20				
Goeridae	*Goeridae* (juvenile / damaged)	**10**		**I**	**A**				4	
Goeridae	*Goera pilosa*	**10**	**3**	**I**	**B**		6		19	30
Lepidostomatidae	*Lepidostoma hirtum*	**10**	**2**	**II**	**B**				1	
Trueflies										
Chironomidae	*Chironomidae* (damaged / pupea)	**2**				5			16	

BMWP group	Species	BMWP score	Conservation	Flow group	FSSR Score	WB01	WB02	WB04	WB08 U/S	WB08 D/S
Chironomidae	*Tanypodinae*	**2**				60	40	15		9
Chironomidae	*Orthocladiinae*	**2**				30	10	5	5	24
Chironomidae	*Chironomini*	**2**				30				
Chironomidae	*Tanytarsini*	**2**				30	5			
Chironomidae	*Prodiamesinae*	**2**					15			6
Tipulidae	*Tipula sp.*	**5**		**IV**	**B**				3	1
Pediciidae	*Dicranota sp.*	**5**		**II**	**B**		1			
Limoniidae	*Limoniidae*	**5**			**B**		15			
Simuliidae	*Simuliidae* (damaged / juvenile)	**5**		**II**	**A**	3	2	6	3	3
Psychodidae		**-**			**D**		17	2		
Ceratopogonidae		**-**				2	35		3	20
Rhagionidae		**-**			**D**		1			
Other Taxa										
Lepidoptera		**-**					2			
Number of scoring families (BMWP)						**20**	**21**	**9**	**20**	**17**
BMWP score						**105**	**99**	**39**	**107**	**92**
ASPT (BMWP)						**5.3**	**4.7**	**4.4**	**5.4**	**5.4**
PSI Score (species)						**10.2**	**30**	**50**	**64.7**	**53.6**
LIFE Score (species)						**6.1**	**6.8**	**7.4**	**7.9**	**7.5**
CCI Score						**7.6**	**4.2**	**12**	**6.9**	**4.5**
Total Number of species						**19**	**20**	**5**	**13**	**10**

4.3 Smite Brook (WB 01)

4.3.1 The Smite Brook has a WFD status of *moderate*[3] due to phosphate and macrophytes / phytobenthos combined. It is situated immediately to the west of the A46 and flows underneath the highway. It lies outside the 200m buffer boundary of the proposed scheme but was surveyed due to its hydrological connection with the Coombe Pool SSSI. This watercourse had an average width of ~2.5m and an average depth of ~40cm. Both width and depth varied throughout the surveyed reach with a maximum width of ~5m and a maximum depth of ~50cm.

[3] Environment Agency (2007) Catchment Data Explorer. Online, available at: http://environment.data.gov.uk/catchment-planning/ReasonsForNotAchievingGood/491077 (accessed 30/11/17)

4.3.2 The surrounding land use was primarily semi-improved grassland and scrub, with occasional areas of sub/urban and parkland. Both banks had simple vegetation types and there was heavy shading throughout the surveyed reach.

4.3.3 The substrate was made up of mixed sediment types, dominated by clay (60% cover), with areas of sand (10% cover) and silt (30% cover). The stability of the bed was unstable with low levels of turbidity. The flow was normal and on average was 10 centimetres per second (cm/s) to 25cm/sec.

4.3.4 Woody debris occurred consistently (60% coverage) throughout the survey reach with. There were also areas of tree roots (20% coverage).

4.3.5 A macroinvertebrate sample was taken in an area with features that most represented the waterbody.

4.3.6 Macroinvertebrate diversity was relatively high, with 19 species recorded in the sample. All scoring species had conservation scores of Occasional or below (see Annex B, Table B-2). This gave a CCI score of Moderate conservation value (see Annex B, Table B-3).

4.3.7 PSI (species) score of 10.2 suggests a Heavily sedimented waterbody (see Annex B Table B-7). LIFE (species) score of 6.1 was calculated with the majority of species falling in to the Flowing/standing and Slow/sluggish flow groups (see Annex B, Table B-4

4.3.8 The BMWP score of 105 (APST score 5.3) suggests the waterbody was Very good biological quality (see Annex B, Table B-1) and did not receive substantial organic pollution.

4.4 Coombe Pool SSSI Drain (WB 02)

4.4.1 The Coombe Pool SSSI is situated ~90m to the east of the proposed scheme boundary. It is dominated by a large expanse of water (Coombe Pool itself) that is fringed by a mixture of branched bur-reed *Sparganium erectum* and common reed *Phragmites australis.* The lake is popular with anglers and contains mixed coarse fish (including common carp *Cyprinus carpio,* pike *Esox luscius,* common bream *Abramis brama,* tench *Tinca tinca* and the non-native zander *Sander lucioperca)*[4].

4.4.2 A drain runs along the western flank of Coombe Pool and is of interest due to its direct connectivity to Smite Brook and close proximity to the proposed scheme boundary (~50m). The drain had an average width of ~2m and average depth of 10cm. There was variation in the width and depth throughout the survey reach, with a maximum width of ~2.5m and a maximum depth of 20cm. The surrounding land use was primarily characterised by broadleaf wood which gave moderate shading along the ditch. Both banks were vegetated.

4.4.3 A macroinvertebrate sample was taken from an area that was representative of the waterbody. Substrate was characterised by pebbles (30% cover), gravel (30% cover), sand (30% cover) and clay (10% cover). Bed stability was stable and turbidity clear. The flow was normal and on average was 10 to 25 cm/sec.

[4] Coventry City Council (2017) Coombe Country Park Fishery. Online, available at: http://www.coventry.gov.uk/info/136/coombe_country_park/503/coombe_country_park_fishery (accessed 29/11/17)

4.4.4 Species diversity was relatively high with 20 species recorded in the sample. All scoring species had conservation scores of Frequent or below. This gave CCI score of Low conservation value.

4.4.5 PSI (species) score of 30 suggests a Sedimented waterbody. The majority of species fell in to Flowing/standing and Moderate/fast flow groups, giving a LIFE (species) score of 6.8.

4.4.6 Biological quality was Good (BMWP: 99; ASPT: 4.7).

4.5 Field Drain East of Rugby Fields (WB 04)

4.5.1 This waterbody lies ~200m east of the proposed scheme site boundary. It is an agricultural drainage ditch and likely to be ephemeral. It had an average width 0.5m and an average depth of 8cm, both of which did not vary throughout. The surrounding land use was primarily characterised by tilled land/arable and broadleaf wood. There was heavy shading along the ditch especially on the left bank. Both banks were steep and trapezoidal with the left bank having simple (2-3 dominant) vegetation types and the right bank having uniform (1 dominant) vegetation type.

4.5.2 A macroinvertebrate sample was taken from an area that was most representative of the waterbody. The substrate consisted of gravel (40% cover), sand (50% cover) , and silt (10% cover). The bed stability was soft and turbidity clear. The flow was normal at <10cm/sec.

4.5.3 Macroinvertebrate species diversity was relatively low with five species identified in the sample. The majority of scoring species had conservation score of Frequent or below, with the exception of the beetle, *Agabus guttatus* which had conservation value of Local. As such the CCI is of Fairly High conservation value.

4.5.4 PSI (species) score of 50 suggests the waterbody was Moderately sedimented. All species fell in the Moderate/fast and Flowing/standing flow groups giving a LIFE (species) score of 7.4.

4.5.5 Biological quality was Poor (BMWP: 39; ASPT: 4.4)

4.6 River Sowe (WB 08)

4.6.1 The River Sowe has a WFD ecological status of *moderate*[5]. The reach surveyed is situated to the north-west of the proposed scheme boundary and is outside the 200m buffer. It was surveyed due to its hydrological connection to the Smite Brook and Coombe Pool SSSI.

4.6.2 This watercourse had an average width ~3m and an average depth of 30cm. The width and depth varied throughout the watercourse, with a maximum width of ~5m and maximum depth of ~50cm. The surrounding land use was characterised by broadleaf wood and improved grassland. Secondary land use was scrub, sub/urban and road. Both banks had simple vegetation types and there was moderate shading throughout the surveyed reach.

[5] Environment Agency (2017) Catchment Data Explorer. Online, available at: http://environment.data.gov.uk/catchment-planning/WaterBody/GB109054044540 (accessed 30/11/17)

4.6.3 The substrate was made up of mixed sediment types but predominantly pebbles (60% cover) and gravel (20% cover). There were also areas of cobbles (5% cover), sand (10% cover), and silt (5% cover). The bed was stable and the levels of turbidity clear. The flow was normal and on average was 25 to 50cm/sec but varied throughout the survey reach giving a variety of habitat types (40% riffle; 40% glide; 10% pool; 10% marginal dead water).

4.6.4 A macroinvertebrate sample was taken upstream and downstream of the Smite Brook confluence. They were both taken in areas which were most representative of the features of the waterbody.

4.6.5 The upstream sample had relatively moderate species diversity, with 13 species identified. All species had conservation scores of Frequent of below, giving a CCI score of Moderate conservation value.

4.6.6 PSI (species) score suggests the waterbody was Slightly sedimented. LIFE (species) score was calculated from the majority of species falling in to the Moderate/fast and Flowing/standing flow groups. Two species fell in to the Rapid flow group; these were the caddisfly, *Goera pilosa* and damaged *Goeridae* species.

4.6.7 Biological quality was Very Good (BMWP: 107; ASPT: 5.4).

4.6.8 The downstream sample also had relatively moderate species diversity, with 10 species identified in the sample. The majority of species had conservation score of Frequent or below, with the exception of the caddisfly, *Hydropsyche instabilis* which had conservation value of Occasional. Overall, the CCI score was of Low conservation value.

4.6.9 PSI (species) score suggests the waterbody was Moderately sedimented. LIFE (species) score was calculated from the majority of species falling in to the Moderate/fast and Flowing/standing flow groups.

4.6.10 Biological quality was Good (BMWP: 92; ASPT: 5.4).

5 Discussion

5.1 Smite Brook (WB 01)

5.1.1 This channel is of interest due to its connection to the Coombe Pool SSSI drain. An autumn macroinvertebrate sample could not be taken in the November 2017 surveys.

5.1.2 The waterbody is currently impacted by the A46, suburban and agricultural surrounding land. This is reflected in the PSI score of Heavily sedimented and the LIFE score showing a watercourse that is suffering from reduced flows.

5.1.3 The biological quality would suggest that there is little evidence of impacts from organic pollution. Although suffering only minimal organic loading, the stream probably receives plant nutrients (N and P) from well treated effluent and land drainage. These nutrients are not removed by standard sewage treatment processes and the *Reason for it not achieving good ecological status* is phosphate loading from sewage treatment works and agricultural runoff[6].

[6] Environment Agency (2017) Catchment Data Explorer. Online, available at: http://environment.data.gov.uk/catchment-planning/OperationalCatchment/3021/ReasonsForNotAchievingGood?item=all&pressure=all&swmi=all&activity=all&category=all (accessed 30/11/17)

5.1.4 Given that the conservation value is Moderate and the watercourse is currently being impacted by reduced flow and sedimentation from the surrounding land use, it is unlikely that the proposed works will have an adverse effect on the macroinvertebrate ecology. Nevertheless, mitigation measures to reduce fine sediment run-off are proposed to hinder deterioration to macroinvertebrate habitat. Refer to Environmental Assessment Report for further details.

5.2 Coombe Pool SSSI Drain (WB 02)

5.2.1 There is potential for the proposed scheme to influence water quality through surface runoff. An increase in fine sediment loading may reduce the interstitial spaces between coarser sediment particles and can be detrimental to fish as it can cause gill clogging, burial, and loss of habitat[7].

5.2.2 Macroinvertebrate species diversity was similar to that recorded in the autumn survey but conservation value was reduced (from Moderate to Low) as no notable species were recorded. The reduced conservation value is likely due to impacts of sedimentation, as suggested by the PSI score.

5.2.3 Although no notable species were recorded in the spring sample, a Local value species was found in the autumn survey. The proposed scheme however avoids habitat loss of Coombe Pool SSSI Drain. Refer to Environmental Assessment Report for further details.

5.3 Field Drain East of Rugby Fields (WB 04)

5.3.1 This waterbody is at the edge of the 200m survey buffer. It is potentially chronically degraded by surface runoff from the adjacent heavily-managed arable land which is apparent in the BMWP score and PSI (species) score. Biological quality appears to have fallen since the autumn survey (November 2017) which may be due to increased organic run-off from the surrounding agricultural land. The results of the macroinvertebrate analysis for the spring samples show that the water body is of Fairly high conservation value due to the presence of the beetle, *Agabus guttatus.* This conservation value is consistent for the waterbody in the autumn survey.

5.3.2 The current impacts to this waterbody would suggest that effects from the proposed works will have minimal impact on this waterbody. The proposed scheme avoids habitat loss of this field drain, ensuring that the conservation value of this waterbody does not degrade. Refer to Environmental Assessment Report for further details.

5.4 River Sowe (WB 08)

5.4.1 Although this watercourse falls outside of the *zone of potential impact* it may still be influenced by effects from the proposed works. It is downstream of the Coombe Pool SSSI drain and thus impacts on this waterbody may influence the River Sowe.

[7] Jones, I.J., Murphy, J.F., Collins, A.L., Sear, D.A., Naden, P.S. and Armitage P.D. (2011) 'The impact of fine sediment on macro-invertebrates', *River Research and Applications,* 28, 8, 1055-1071

5.4.2 The *Reason for it not achieving good status* is phosphate loading from sewage input and agricultural runoff[8]. The biological quality of both the upstream and downstream samples suggests Very Good and Good quality respectively. Results from autumn surveys also showed Very Good biological quality which suggests that sewage entering the channel is well treated and the organic load low enough to have little detrimental effect on macroinvertebrates. However, nutrients (N and P) from this source may be having a fertilising effect.

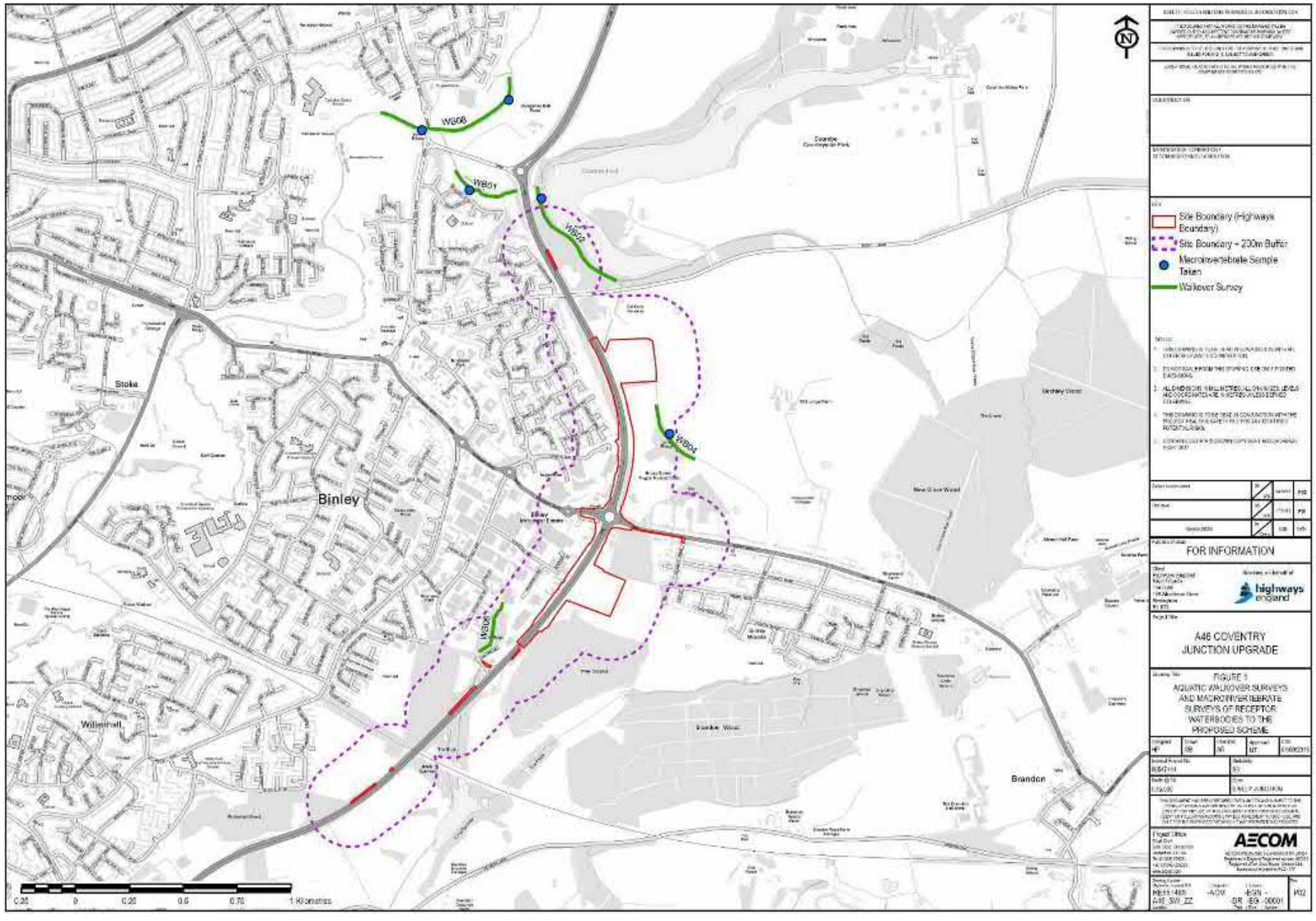
5.4.3 Increased fine sediment loading and deterioration of water quality can cause a waterbody not to achieve the WFD status of *good*[9]. The PSI score from both the upstream and downstream samples would suggest the watercourse is moderately impacted from sedimentation. Mitigation measures are proposed to avoid increased run-off and fine sedimentation from the proposed works. Refer to Environmental Assessment Report for further details.

5.4.4 The conservation value of this waterbody was at best moderate value. Species values were all below Local, and so it is unlikely that the proposed works will have detrimental impacts to the conservation value of this waterbody.

[8] Environment Agency (2017) Catchment Data Explorer. Online, available at: http://environment.data.gov.uk/catchment-planning/OperationalCatchment/3021/ReasonsForNotAchievingGood?item=all&pressure=all&swmi=all&activity=all&category=all (accessed 30/11/17)

[9] Jones, I.J., Murphy, J.F., Collins, A.L., Sear, D.A., Naden, P.S. and Armitage P.D. (2011) 'The impact of fine sediment on macro-invertebrates', *River Research and Applications,* 28, 8, 1055-1071

Annex A Survey Map



Annex B Biological Monitoring Working Party Score (BMWP Score), Average Score Per Taxon (ASPT)

Based on each family's sensitivity to organic pollution, aquatic ecologists have allocated scores between 1 and 10 to about 80 taxa (known as the BMWP-scoring families) of benthic macroinvertebrates colonising flowing freshwater habitats. The BMWP Score for a site comprises the sum of the scores for individual taxa occurring at the site. The average of the values for each taxon in a sample, known as ASPT (average score per taxon), is a stable and reliable index of organic pollution and indicates the average sensitivity of the animals in a sample. Values lower than expected suggest environmental stress deriving from organic pollution.

The most useful way of summarising the biological data was found to be one that combined the number of taxa and the ASPT. Good quality is indicated by a diverse range of taxa, including those that are sensitive to pollution. Poorer quality is indicated by lower diversity and the absence of taxa that are sensitive to pollution. Organic pollution often results in an increased abundance of taxa adapted to tolerate it.

The biotic scores can be interpreted by following the guidelines in the table (Table A1) below (taken from Armitage *et al*., 1983; Chapman, 1996; Mason, 2002). However, these categories are for guidance only and it should be remembered that maximum achievable values will vary between geological regions. For example, pristine lowland streams in East Anglia will always score lower than pristine Welsh mountain streams as they are unable to support many of the high-scoring taxa associated with fast flowing habitat. BMWP scores and ASPT for different types watercourse are dependent on the quality and diversity of habitat, natural water chemistry (associated with geology, distance from source etc.), altitude, gradient, time of year the sample was taken and other factors.

Table B-1: A guide to interpreting BMWP Score and ASPT

BMWP score	ASPT	Interpretation
0-10	<3.0	Very poor, heavily polluted
11-40	3.0-4.3	Poor, polluted or impacted
41-70	4.3-4.8	Moderate, moderately impacted
71-100	4.8-5.4	Good, clean but slightly impacted
>100	>5.4	Very good, unpolluted, unimpacted

Predictive Methods - Changes in biotic scores reflect the response of biological communities to environmental changes caused primarily by organic pollution. However, temporal and spatial factors can influence aquatic communities by way of variables such as location, discharge, current velocity, sediment deposition, temperature and water chemistry. It is therefore important to distinguish these effects from pollution.

To achieve this for flowing waters, the Institute of Freshwater Ecology collated macroinvertebrate community data from a range of unpolluted streams throughout the UK from which they developed the River Invertebrate Prediction and Classification System (RIVPACS).

The River Invertebrate Classification Tool (a software-driven update of RIVPACS) enables assemblages likely to occur at unpolluted sites to be predicted on the basis of spatial parameters such as altitude, latitude, distance from source, slope, stream order, mean depth, mean width (supplemented where appropriate by physico-chemical variables). The package takes this physical and geographical information and predicts the invertebrate assemblage 'expected' in a river of that type in that geographic location. This predicted score is then compared with the score that was actually recorded for the river to calculate the Ecological Quality Ratio (EQR) for the site. The EQR score is then used as an indicator of the ecological health of the river for its WFD invertebrate classification. The current biotic index used for the WFD Invertebrate Classification is the ASPT index.

Community Conservation Index (CCI)

Predictive methodologies are able to suggest suites of species suited to a site, based on location and key physico-chemical features as many organisms require not only good quality water, but also appropriate habitat. The evaluation of conservation value or potential should therefore incorporate habitat assessment. It should also be remembered that although family-level identification may be adequate for water quality assessment, it is not sufficient for conservation evaluations, for which, individual components must be identified to species level.

Analysis of species-level data to estimate conservation value can be achieved by way of the Community Conservation Index (CCI) (Chadd & Extence, 2004) which allocates a score of 1–10 (common species score 1; Endangered (RDB1) species score 10) to aquatic macroinvertebrates colonising British freshwater and brackish ecosystems (Table A2). The scores are summed, and then divided by the number of scoring species to derive an average. This is then enhanced using a multiplier (Community Score or CoS) based on BMWP score, which is strongly influenced by habitat as well as water quality, and acts as a surrogate for measures of species richness or community diversity. The CoS may also be based on the rarest taxon in the dataset. Whichever CoS is the higher is the one which is used in multiplication. Thus, samples supporting a large number of common species or a sample supporting a limited fauna, but including rare species, are accentuated.

Table B-2: Conservation Scores from the Community Conservation Index

Conservation Score	Conservation value/Equivalent RDB status
10	RDB1 (Endangered)
9	RDB2 (Vulnerable)
8	RDB3 (Rare)
7	Notable (but not RDB status)
6	Regionally notable
5	Local
4	Occasional (species not in categories 10-5, which occur in up to 10% of all samples from similar habitats)
3	Frequent (species not in categories 10-5, which occur in up to >10-25% of all samples from similar habitats)
2	Common (species not in categories 10-5, which occur in up to >25-50% of all samples from similar habitats)

Conservation Score	Conservation value/Equivalent RDB status
1	Very common (species not in categories 10-5, which occur in up to >50-100 % of all samples from similar habitats)

The overall index provides an indication of the conservation value of the community sampled based on a combination of the rarity of the different species present and overall community richness, as shown on Table A3. In some cases, expert judgment may be needed to moderate these assessments with reference to current information on status and distribution.

Table B-3: Guidance on interpretation of CCI scores (from Chadd & Extence, 2006)

CCI Score	Description	Interpretation
0.0 – 5.0	Sites supporting only common species and/or a community of low taxon richness	Low conservation value
5.0 – 10.0	Sites supporting at least one species of restricted distribution and/or a community of moderate taxon richness	Moderate conservation value
10.0 – 15.0	Sites supporting at least one uncommon species, or several species of restricted distribution and/or a community of high taxon richness	Fairly high conservation value
15.0 – 20.0	Sites supporting several uncommon species, at least one of which may be nationally rare and/or a community of high taxon richness	High conservation value
>20.0	Sites supporting several rarities, including species of national importance, or at least one extreme rarity and/or a community of high taxon richness	Very high conservation value

Lotic-invertebrate Index for Flow Evaluation (LIFE)

The Lotic-invertebrate Index for Flow Evaluation (Extence et al, 1999) is based on the recognised flow associations of different macroinvertebrate species and families. Taxa are assigned flow scores (fs) which are calculated from a matrix (Table A4) based on the affiliation of the species/family for a certain flow regime and the estimated abundance of that species in a sample.

Table B-4: Scores (fs) for different abundance categoris of taxa associated with flow groups I-VI (Extence *et al*, 1999).

Flow Groups	Abundance Categories			
	A	B	C	D/E
I: Rapid	9	10	11	12
II: Moderate/Fast	8	9	10	11
III: Slow/Sluggish	7	7	7	7
IV: Flowing/Standing	6	5	4	3
V: Standing	5	4	3	2
VI: Drought Resistant	4	3	2	1

Standard Environment Agency macroinvertebrate abundance categories are shown in the table below (Table A5).

Table B-5: Standard Environment Agency macroinvertebrate abundance categories for LIFE

Category	Estimated Abundance
A	1-9
B	10-99
C	100-999
D	1000-9999
E	10000+

The greater the association a species has for a faster flow, the higher the flow score for that species. The LIFE score is calculated by totalling the flow scores for all taxa in a sample and dividing the result by the number of taxa used to calculate it. The greater the number of species associated with fast flows in a sample, the greater will be the LIFE score for that sample.

LIFE scores can be used to indicate possible impacts from low flows on macroinvertebrate communities in a watercourse. Abnormally low scores for sites expected to have an assemblage associated with fast flows would indicate an impact from over-abstraction of water or from impoundments. Changes in scores over time at a reference site can provide an indication of a changing flow regime within a watercourse. It must be noted that sites on sluggish, lowland rivers will naturally have low LIFE scores and this should not be interpreted as being any sign of an impact.

Proportion of Sediment Sensitive Invertebrates (PSI)

Impacts of fine sediment deposition on benthic macroinvertebrate communities have long been recognised. Alterations in benthic community structure are an inevitable consequence of fine sediment deposition. Such alterations are a direct result of smothering of substratum and clogging of interstices and indirectly through changes in macrophyte and algal communities.

Sources of fine sediment inputs to watercourses included agricultural land, urban environments, deforestation, road construction activities and mineral extraction. Other sources are from bank erosion, habitat modification or from low flows.

The PSI index has been used to assess the impacts of fine sediment loading on the aquatic macroinvertebrate communities on rivers and streams (Extence et al, 2013). The index can be calculated for both family and species level data.

Taxa are individually assigned one four Sediment Sensitivity Ratings (SSR) defined in Table A6. This was achieved through an extensive literature review and an assessment of anatomical, physiological and behavioural traits exhibited by individual taxa.

Table B-6: Fine Sediment Sensitive Ratings (FSSR) for groups of taxa.

Group	Fine Sediment Sensitivity Ratings (FSSR)	Log Abundance			
		1-9	10-99	100-999	1000+
A	Highly Sensitive	2	3	4	5
B	Moderately Sensitive	1	2	3	4
C	Moderately Insensitive	1	2	3	4
D	Highly Insensitive	2	3	4	5

The PSI score describes the percentage of sediment sensitive taxa present in a sample and the scores can be interpreted as shown in Table A7.

Table B-7: River bed conditions for Proportion of Sediment Sensitive Invertebrates (PSI) scores.

PSI	River Bed Condition
81-100	Minimally sedimented/Unsedimented
61-80	Slightly sedimented
41-60	Moderately sedimented
21-40	Sedimented

PSI	River Bed Condition
0-20	Heavily sedimented

The PSI score will show natural variation according to the nature of the watercourse being assessed. Additionally, unusually low PSI scores on a fast-flowing stony river would indicate excessive siltation. The PSI index is most valuable when used as a monitoring tool for tracking changes over time or for comparing baseline data with that collected post construction works.

Appendix 8.3

Appendix 8-3 Habitat Descriptions and Target Notes 2019

The following habitats occur onsite or in the immediate surrounds up to 0.03 miles (0.05km).

Cultivated or disturbed land – arable

This is the dominant habitat in the landscape, to the west of the A46 (TN27, TN28). The land is intensively managed with little grassy field margin.

Cultivated or disturbed land- amenity grasslan

Amenity grassland was present along parts of the A46 roadside verge close to the junction and a short sward due to regular mowing (TN19). There were no tall or semi-improved grassland areas to the verges at the time of the survey. Species present included perennial rye grass (*Lolium perenne*), common daisy (*Bellis perennis*), dandelion (*Taraxacum officinale* agg.) and white clover (*Trifolium repens*).

Broadleaved woodland – semi-natural (incl. ancient woodland)

Broadleaved semi-natural woodland was present within the boundary of Herald Way Marsh SSSI (TN2), and composed of young to mature standing trees, mostly ash (*Fraxinus excelsior*), sycamore (*Acer pseudoplatanus*), alder (*Alnus glutinosa*) and oak (*Quercus sp.*).

Some veteran trees were present in the ancient woodland noted at Binley Common Farm Wood (TN3) and Piles Coppice (TN1).

There were three areas of woodland surrounding the rugby club; these were dominated by ash with an understorey of occasional hawthorn (TN4).

There was broadleaved semi-natural woodland in Coombe Pool SSSI and Country Park made up of abundant ash, peduculate oak (*Quercus robur*) and sycamore, frequent alder (*Alnus glutinosa*) and occasional common lime (*Tilia x europaea*) (TN5). The understorey was made up of abundant ivy (*Hedera helix*) cover and occasional bramble (*Rubus fruitcosus*), nettle (*Urtica dioica*) and holly (*Ilex aquifolium*). Nearer the road this woodland contained more ornamental species and was characterised by younger trees and shrubs, including hazel (*Corylus avellana*) and hawthorn (*Crataegus monogyna*).

There was broadleaved woodland dominated by sycamore, with abundant silver birch (*Betula pendula*), frequent pedunculated oak, ash and willow (*Salix* sp.), occasional Norway maple (*Acer platanoides*), hawthorn and alder towards the railway line south of the Proposed Scheme (TN7).

A pocket of broadleaved semi natural woodland was present adjacent to the A46 south west of the Proposed Scheme (TN22), separated from Piles Coppice (TN1) by an area of tall ruderal habitat. It was made up of pedunculate oak and ash. It had an understorey of scrub including hazel, holly and bramble.

Broadleaved woodland – plantation

Broadleaved plantation woodland was present along the embankment of the A46 (TN6, TN8 and TN32) and by Coombe Poole SSS1 (TN5) and some planted trees on the Binley Roundabout (TN26).

Scrub – dense or continuous

Scrub bordered the verges adjacent to the eastern side of the A46, in association with arable fields.

Species-poor hedgerow

Species-poor hedgerows were present adjacent to the A46 and bordering the arable fields (TN11 and TN12).

Buildings and hardstanding

Buildings and hardstanding present included the existing A46, plus residential and industrial development to the west of the A46.

Other habitat – private gardens

Residential buildings and gardens were located to the west of the A46 and along the A428 Rugby Road (TN23).

Swamp

Two areas of swamp located in the Herald Way Marsh SSSI and LNR (TN9) were recorded. These were dominated by common reed (*Phragmites australis*). Refer to Great Crested Newt 2018 Survey Report (Appendix8-2(d)) for further details.

Tall ruderal

A strip of tall ruderal separated the rugby club from the arable land this was dominated by common nettle and spear thistle (*Cirsium vulgare*) (TN10). Also present to the west of Piles Coppice (TN21, TN22).

Open water

One pond was recorded within Binley Common Farm Wood pLWS. A pond was also recorded to the west of the Binley roundabout (TN33). Refer to Great Crested Newt 2018 Survey Report (Appendix 8-2(d)) for further details.

Running Water

Six watercourses and field drains fell within 50m of the Proposed Scheme boundary (TN13, TN14, TN15, TN16, TN17 and TN18). Refer to Aquatic Invertebrate 2017 and 2018 Report (Appendix 8-2(m) and (n)) and Otter and Water Vole Report 2019 (Appendix 8-2(l)) for further details.

Target Note (TN) – Refer to Figure 8-5A and B	Description	Bat Roost Suitability Assessment
TN1	The woodland of Piles Coppice. The canopy of this wood is dominated by common lime (*Tilia x europaea*) with abundant pedunculate oak (*Quercus robur*) and ash (*Fraxinus excelsior*). It had a sparse understorey of hazel (*Corylus avellana*), holly (*Ilex aquifolium*), elm (*Ulmus minor*) and bracken (*Pteridium aquilinum*). This is an area of designated ancient woodland.	**Moderate**
TN2	A large area of broadleaved woodland. This is made up of two distinct areas of woodland; the area near the railway is dominated by sycamore (*Acer pseudoplatanus*) with frequent pedunculate oak, willow (*Salix sp.*), ash and occasional Norway maple (*Acer platanoides*), hawthorn (*Crataegus monogyna*), alder (*Alnus glutinosa*) and abundant silver birch (*Betula pendula*). It has an understorey made up of bramble (*Rubus fruticosus* agg.). The other, nearer the area of swamp, is more indicative of wet woodland with alder and willow becoming abundant with frequent sycamore and occasional silver birch and hawthorn. This area has an understorey made up of frequent bramble and barren brome (*Bromus sterilis*) and occasional common bent (*Agrostis capillaris*).	Not assessed (not considered to be directly impacted by the proposed scheme)
TN3	The ancient woodland of Binley Common Farm Wood. This patch of woodland, which is located adjacent to the proposed scheme boundary, was not accessible at the time of the survey and so was assessed from its edges. It was dominated by sycamore with abundant pedunculated oak and ash, occasional hazel, holly, elm. Its understorey was fairly sparse and choked by ivy with frequent bramble and occasional common nettle (*Urtica dioica*) and herb Robert (*Geranium robertianum*). There are footpaths through the wood used by the public.	**Moderate**
TN4	There were three areas of woodland surrounding the rugby club; these were dominated by ash with an understorey of occasional hawthorn.	Negligible
TN5	Broadleaved semi-natural woodland in Coombe Pool SSSI and Country Park made up of abundant ash, peduculate oak and sycamore, frequent alder and occasional common lime. The understorey was made up of abundant ivy (*Hedera helix*) cover and occasional bramble, nettle and holly. Nearer the road this woodland contained more ornamental species and was characterised by younger trees and shrubs, including hazel and hawthorn (see below).	**Moderate**
	Adjacent to the road this becomes a strip of broadleaved plantation woodland.	Negligible

Target Note (TN) – Refer to Figure 8-5A and B	Description	Bat Roost Suitability Assessment
TN6	Plantation woodland made up of a mix of species including ash, hawthorn, and willow with an understorey of bramble.	Not assessed (not considered to be directly impacted by the proposed scheme)
TN7	Woodland dominated by sycamore, with abundant silver birch, frequent pedunculated oak, ash and willow, occasional Norway maple, hawthorn and alder.	Not assessed (not considered to be directly impacted by the proposed scheme)
TN8	Plantation woodland made up of frequent whitebeam (*Sorbus aria*), hazel, dogwood (*Cornus sanguinea*) and cherry (*Prunus sp.*), occasional dog rose (*Rosa canina* agg.), blackthorn (*Prunus spinosa*) and hawthorn, with a bramble understorey.	Negligible
TN9	Areas of swamp containing ponds within the boundary of Herald Way Marsh SSSI and dominated by common reed (*Phragmites australis*). Surveyed for great crested newts in 2018.	Not applicable (N/A) - No suitable bat roost features to assess.
TN10	Tall ruderal dominated by common nettle and spear thistle (*Cirsium vulgare*).	N/A
TN11	Hedge made up of hawthorn and blackthorn.	N/A
TN12	Plantation woodland containing ash, silver birch, Norway maple, European larch (*Larix decidua*), Pedunculate oak, alder and red oak (*Quercus rubra*) with an understorey of bramble. Species-poor hedgerow adjoining the Premier Inn and other commercial buildings.	Negligible
TN13-18	Waterbodies and courses with potential to support riparian mammals and aquatic invertebrates.	N/A
	TN14-The drain that runs adjacent to the rugby ground and through site compound 1 had a species-poor hedge associated with it made up of hawthorn and blackthorn.	Not assessed (no access available at time of survey)
TN19	Two areas of amenity grassland either side of the A46 dominated by perennial ryegrass (*Lolium perenne*) with occasional ribwort plantain (*Plantago lanceolata*) and dandelion (*Taraxacum officinale* sp.)	N/A
TN20	Railway Line. No access	N/A
TN21	An area of tall ruderal where the woodland has been cleared for the pylons. This area is dominated by bramble, stinging	N/A

Target Note (TN) – Refer to Figure 8-5A and B	Description	Bat Roost Suitability Assessment
	nettle and bracken (*Pteridium aquilinum*). This separates the area of ancient woodland (TN1) from the woodland that borders the A46 (TN22).	
TN22	Broadleaved semi natural woodland made up of pedunculate oak and ash. It had an understorey of scrub including hazel, holly and bramble.	Negligible
TN23	Proposed footpath widening location surrounded by houses and gardens. No access to houses and gardens.	Buildings not assessed (not considered to be directly impacted by the proposed scheme)
TN24	Refer to updated Target Note TN34.	
TN25	Trees 2,3 and 4: Tree 2: Peduculate oak, 0.2m DBH, no suitable bat roost features. Grid ref: SP 38955 77628. Tree 3: Peduculate oak, 0.2m DBH, no suitable bat roost features. Grid ref: SP 38955 77628. Tree 4: Peduculate oak, 0.2m DBH, no suitable bat roost features. Grid ref: SP 38955 77628.	Negligible
TN26	A46 roundabout - This is dominated by a small area of plantation woodland surrounded by amenity grassland verges. Species unknown but no trees of sufficient age for bat potential. No access, surveyed from roadside.	Negligible
TN27	Arable field – candidate site for construction compound 1. Access was restricted to this area during the Phase 1 surveys and was surveyed from neighbouring land parcels.	N/A
TN28	Arable field – candidate site for construction compound 2. Scrub borders the western extent, adjacent to the A46.	N/A
TN29	Proposed road signage location. Mostly hard standing adjacent to woodland at Coombe Country Park (TN5). No access.	N/A
TN30	Proposed road signage location. Mostly hard standing adjacent to woodland at Herald Way Marsh.	N/A
TN31	Proposed road signage location. Mostly hard standing outside initial site boundary so not assessed. No access.	N/A
TN32	An area of Broadleaved plantation woodland containing pedunculate oak, hazel, European larch (*Larix decidua*) and cherry (*Prunus* sp.) It had and understorey made up of dog rose and bramble. Coniferous species made up less than 10% of the trees.	Negligible

Target Note (TN) – Refer to Figure 8-5A and B	Description	Bat Roost Suitability Assessment
TN33	Pond. Refer to Great Crested Newt 2018 Report (Appendix 8-2(d).	N/A
TN34	Updated assessment of TN24. Tree 4: Pedunculate oak, 12m height, 0.8m DBH. Peeling bark on multiple faces, well separated in places but some areas appear to offer suitable shelter for bats. Split on limb 6m/SW unable to see extent from ground but may lead to larger cavity. Knot hole 5m/NE doesn't appear to go anywhere but flagged as precaution.	**Moderate**
TN35	Tree 5: Common ash, 15m height, 0.8m DBH. Tear out 3-4M/E unable to see if callusing is tight to heartwood thus requires further investigation. Broken limb 4m/E unable to fully assess but may have splits which would provide suitable shelter for a bat. Ivy covering is superficial and not arboreal but may be covering other potential PRFs.	**Moderate**
TN36	Tree 6: Japanese cherry, 5m height, 0.45m DBH. Tree is standing deadwood with multiple splits/holes which appear to provide suitable shelter for bats. Unsafe to climb but could be assessed with an endoscope from the ground.	**Low/Moderate**
TN37	Garden centre. No access to conduct detailed external survey so building was assessed from Public Rights of Way with binoculars. Externally the building (e.g. mortar) appears to be in a good state of repair however several missing tiles were recorded. The building is currently well lit (at night time) from the existing road network and subject to high levels of disturbance due to current use as a garden centre. West of the building backs onto an area of broad-leaved woodland. No access to conduct internal inspection.	Low

Appendix 8.4

Appendix 8-4: Ecological Impact Assessment Methodology

1. Characterisation of Ecological Impacts

1.1. Based upon Interim Advice Note (IAN) 130/10, and the CIEEM guidelines (2019), when describing potential impacts, reference is made to the following, where applicable:

Sign (SI):

- Positive (beneficial; +ve) or Negative (adverse; -ve) impact;
- Probability of Occurring (PO); and,
- Confidence in predictions (levels of certainty that an impact would occur as predicted), based on the following four point scale:
    - Certain/ Near Certain (≥ 95% probability);
    - Probable (50 - 95% probability);
    - Unlikely (5 - 49% probability); or,
    - Extremely Unlikely (≤ 5% probability).

Complexity (CO):

- Direct or Indirect Impacts:
    - Both direct and indirect impacts are considered within the assessment. A direct impact is directly attributable to a defined action such as the physical loss of a habitat or the immediate mortality of an individual of a particular species. Indirect impacts are attributable to an action, but which affect ecological resources through effects on an intermediary ecosystem, process or receptor i.e. feature. An example of an indirect effect would be the loss of an important prey species for a predator.
- Cumulative Impacts:
    - Effects on the environment caused by the combined results of past, current and future activities.

Extent (EC):

- Spatial/ geographical area over which the impact or effect may occur.

Size (SZ):

- Description of level of severity of influence (e.g. amount, intensity, percentage, complete loss, number of animals affected). Also, referred to as magnitude, determined on a quantitative basis if possible; and,
- When the receptor / feature being considered is a habitat itself, size (magnitude) and extent may be synonymous.

Reversibility (RE):

- Reversible (temporary) or Not Reversible (permanent) impact (can the impact/ effect be reversed, whether this is planned or not).

Duration (DU):

- The time for which an impact is expected to last prior to recovery or replacement of the resource or feature. This is in ecological terms (e.g. in relation to the life-cycle of the receptor/feature) not human timeframes.

Timing and Frequency (TF):

- Important seasonal and/ or life-cycle constraints and any relationship with frequency considered e.g. bird nesting season.

2. Significance of Effects

2.1. The significance of an effect is largely a product of the value/importance of the ecological receptor/feature and the characterisation of the ecological impact, supplemented by professional judgement.

2.2. Based upon CIEEM guidelines (2019), a significant effect, in ecological terms, is defined as an effect (either positive or negative) that either supports or undermines biodiversity conservation objectives for important (i.e. valuable) ecological features. Effects can be considered significant at a wide range of scales from international/ European to local.

2.3. Table 1, adopted from DMRB IAN 130/10 (Highways Agency, 2010), illustrates the approach to relating significant effects on features at different levels of value/importance. The significance of effects are categorised as very large, large, moderate, slight, or neutral. IAN 130/10 uses a slightly different terminology to the CIEEM guidelines to grade the significance of effects. However, the IAN 130/10 approach is fully compatible with the CIEEM guidelines approach and does not alter the conclusions which have been reached in this assessment.

2.4. The approach adopted herein aims to determine whether an effect is either significant or not significant on the basis of an assessment of the factors which characterise it i.e. the ecological significance of an effect is not dependent on the importance of the feature in question. The importance of any feature that would be significantly affected is used to assist in determining the geographical scale at which the effect is significant, for example an ecologically significant effect on a feature of county level importance (in CIEEM guidance terms) is generally regarded as a moderate significant effect (in DMRB terms) as per Table 8.4. This in turn is used to determine the implications in terms of legislation, policy and/or development control.

2.5. Note that Table 8-4A is used as a guide and professional judgement has also been used to determine the significance of ecological effects. Table 8-4A illustrates an approach and comparison to the overall 'significance categories' used by other topic areas. In relation to these categories, a significant effect in relation to the EIA Regulations (refer to Section 1.3) is one which is identified as being of moderate or greater significance (these being considerations that are either important, material or key factors in the decision-making process). Refer to Chapter 4 Environmental Impact Assessment Methodology, paragraph 4.5.11 for details.

Table 8-4A: Significance of Ecological Effects

Biodiversity significance category CIEEM (2018)	Biodiversity Significance Category DMRB	Typical Descriptors of Effect (Biodiversity)[1]	Effect significance in relation to EIA Regulations and in comparison with other topics
Regional	**Very Large**	Generally, an impact on one or more features of International, European or National or UK Value/Importance. NOTE: only adverse (negative)	Significant

[1] It is important to note that the level of significance of effect may be less that the value/importance of the ecological feature; and a justification is given accordingly

Biodiversity significance category CIEEM (2018)	Biodiversity Significance Category DMRB	Typical Descriptors of Effect (Biodiversity)[1]	Effect significance in relation to EIA Regulations and in comparison with other topics
		effects are normally assigned this level of significance. They should be considered to represent key factors in the decision-making process.	
	Large	Generally, an impact on one or more features of Regional Value/Importance. NOTE: these beneficial or adverse effects are considered to be very important considerations and are likely to be material in the decision-making process.	
County OR Unitary Authority	**Moderate**	Generally, an impact on one or more features of County or Unitary Authority Area Value/Importance NOTE: these beneficial or adverse effects are unlikely to be critical in the decision-making process, but are important in enhancing the subsequent design of the project.	
Local	**Slight**	Generally, an impact on one or more features of Local Value/Importance NOTE: these beneficial or adverse effects are unlikely to be critical in the decision making process, but are important in enhancing the subsequent design of the project.	Not significant
Site	**Neutral**	No significant impacts on key biodiversity features. NOTE: absence of effects, or those that are beneath levels of perception.	

2.6. For the purposes of this assessment, effects are assessed in detail only for those features that are of at least local importance, or are subject to some form of legal protection. In terms of protected species, it should be noted that irrespective of the significance of the ecological effect, mitigation would be required to ensure the law is not contravened.

2.7. This assessment takes into account impact avoidance measures (i.e. design measures that have been incorporated into the Proposed Scheme to avoid/ reduce (or 'design-out') impacts) and mitigation and management activities. Enhancement measures are also considered. The characterisation of impacts and significance of effects are then assessed. Any significant effects, together with an assessment of the likelihood of

success of the proposed mitigation approach, are the factors to be considered against legislation, policy and development control in determining the application.

Appendix 9.1 Enviro and Geo Insight report

Aecom Infrastructure and Environment UK Ltd

Scott House, Alencon Link,
Basingstoke, RG21 7PP

Groundsure Reference:	GS-4527237
Your Reference:	A46_Coventry_Junction
Report Date	29 Nov 2017
Report Delivery Method:	Email - pdf

Enviro Insight

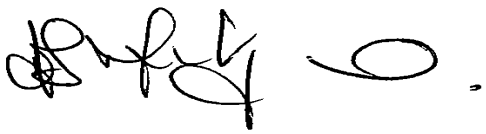
Address: 438602, 277664,

Dear Sir/ Madam,

Thank you for placing your order with Groundsure. Please find enclosed the **Groundsure Enviro Insight** as requested.

If you need any further assistance, please do not hesitate to contact our helpline on 08444 159000 quoting the above Groundsure reference number.

Yours faithfully,



Managing Director
Groundsure Limited

Enc.
Groundsure Enviroinsight

Enviro Insight

Address:	**438602, 277664,**
Date:	**29 Nov 2017**
Reference:	**GS-4527237**
Client:	**Aecom Infrastructure and Environment UK Ltd**

NW N NE



W E

SW S SE

Aerial Photograph Capture date:	09-Jul-2013
Grid Reference:	438774,277696
Site Size:	10.04ha

Report Reference: GS-4527237
Client Reference: A46_Coventry_Junction

Contents Page

Contents Page 3
Overview of Findings 6
Using this report 10
1. Historical Land Use 11
1. Historical Industrial Sites 12
1.1 Potentially Contaminative Uses identified from 1:10,000 scale Mapping....12
1.2 Additional Information – Historical Tank Database....14
1.3 Additional Information – Historical Energy Features Database....16
1.4 Additional Information – Historical Petrol and Fuel Site Database....16
1.5 Additional Information – Historical Garage and Motor Vehicle Repair Database....17
1.6 Potentially Infilled Land....17
2. Environmental Permits, Incidents and Registers Map 22
2. Environmental Permits, Incidents and Registers 23
2.1 Industrial Sites Holding Licences and/or Authorisations....23
2.1.1 Records of historic IPC Authorisations within 500m of the study site:....23
2.1.2 Records of Part A(1) and IPPC Authorised Activities within 500m of the study site:....24
2.1.3 Records of Red List Discharge Consents (potentially harmful discharges to controlled waters) within 500m of the study site:....26
2.1.4 Records of List 1 Dangerous Substances Inventory Sites within 500m of the study site:....26
2.1.5 Records of List 2 Dangerous Substance Inventory Sites within 500m of the study site:....26
2.1.6 Records of Part A(2) and Part B Activities and Enforcements within 500m of the study site: 26
2.1.7 Records of Category 3 or 4 Radioactive Substances Authorisations:....28
2.1.8 Records of Licensed Discharge Consents within 500m of the study site:....28
2.1.9 Records of Water Industry Referrals (potentially harmful discharges to the public sewer) within 500m of the study site: 29
2.1.10 Records of Planning Hazardous Substance Consents and Enforcements within 500m of the study site:....29
2.2 Dangerous or Hazardous Sites....30
2.3 Environment Agency/Natural Resources Wales Recorded Pollution Incidents....30
2.3.1 Records of National Incidents Recording System, List 2 within 500m of the study site:....30
2.3.2 Records of National Incidents Recording System, List 1 within 500m of the study site:....32
2.4 Sites Determined as Contaminated Land under Part 2A EPA 1990....32
3. Landfill and Other Waste Sites Map 33
3. Landfill and Other Waste Sites 34
3.1 Landfill Sites....34
3.1.1 Records from Environment Agency/Natural Resources Wales landfill data within 1000m of the study site: 34
3.1.2 Records of Environment Agency/Natural Resources Wales historic landfill sites within 1500m of the study site: 34
3.1.3 Records of BGS/DoE non-operational landfill sites within 1500m of the study site:....36
3.1.4 Records of Landfills from Local Authority and Historical Mapping Records within 1500m of the study site:....36
3.2 Other Waste Sites....37
3.2.1 Records of waste treatment, transfer or disposal sites within 500m of the study site: 37
3.2.2 Records of Environment Agency/Natural Resources Wales licensed waste sites within 1500m of the study site: 38
4. Current Land Use Map 39
4. Current Land Uses 40
4.1 Current Industrial Data....40
4.2 Petrol and Fuel Sites....42
4.3 National Grid High Voltage Underground Electricity Transmission Cables....43
4.4 National Grid High Pressure Gas Transmission Pipelines....43

5. Geology 44
5.1 Artificial Ground and Made Ground 44
5.2 Superficial Ground and Drift Geology 44
5.3 Bedrock and Solid Geology 44
6 Hydrogeology and Hydrology 45
6a. Aquifer Within Superficial Geology 45
6b. Aquifer Within Bedrock Geology and Abstraction Licenses 46
6c. Hydrogeology – Source Protection Zones and Potable Water Abstraction Licenses 47
6d. Hydrogeology – Source Protection Zones within confined aquifer 48
6e. Hydrology – Detailed River Network and River Quality 49
6.Hydrogeology and Hydrology 50
6.1 Aquifer within Superficial Deposits 50
6.2 Aquifer within Bedrock Deposits 50
6.3 Groundwater Abstraction Licences 51
6.4 Surface Water Abstraction Licences 52
6.5 Potable Water Abstraction Licences 52
6.6 Source Protection Zones 52
6.7 Source Protection Zones within Confined Aquifer 53
6.8 Groundwater Vulnerability and Soil Leaching Potential 53
6.9 River Quality 54
6.9.1 Biological Quality: 54
6.9.2 Chemical Quality: 54
6.10 Detailed River Network 54
6.11 Surface Water Features 56
7a. Environment Agency/Natural Resources Wales Flood Map for Planning (from rivers and the sea) 57
7b. Environment Agency/Natural Resources Wales Risk of Flooding from Rivers and the Sea (RoFRaS) Map 58
7 Flooding 59
7.1 River and Coastal Zone 2 Flooding 59
7.2 River and Coastal Zone 3 Flooding 59
7.3 Risk of Flooding from Rivers and the Sea (RoFRaS) Flood Rating 59
7.4 Flood Defences 60
7.5 Areas benefiting from Flood Defences 60
7.6 Areas benefiting from Flood Storage 60
7.7 Groundwater Flooding Susceptibility Areas 60
7.7.1 Are there any British Geological Survey groundwater flooding susceptibility areas within 50m of the boundary of the study site? Yes 60
7.7.2 What is the highest susceptibility to groundwater flooding in the search area based on the underlying geological conditions? 60
7.8 Groundwater Flooding Confidence Areas 61
8. Designated Environmentally Sensitive Sites Map 62
8. Designated Environmentally Sensitive Sites 63
8.1 Records of Sites of Special Scientific Interest (SSSI) within 2000m of the study site: 63
8.2 Records of National Nature Reserves (NNR) within 2000m of the study site: 63
8.3 Records of Special Areas of Conservation (SAC) within 2000m of the study site: 64
8.4 Records of Special Protection Areas (SPA) within 2000m of the study site: 64
8.5 Records of Ramsar sites within 2000m of the study site: 64
8.6 Records of Ancient Woodland within 2000m of the study site: 65
8.7 Records of Local Nature Reserves (LNR) within 2000m of the study site: 65
8.8 Records of World Heritage Sites within 2000m of the study site: 66
8.9 Records of Environmentally Sensitive Areas within 2000m of the study site: 66

8.10 Records of Areas of Outstanding Natural Beauty (AONB) within 2000m of the study site: 66
8.11 Records of National Parks (NP) within 2000m of the study site: 66
8.12 Records of Nitrate Sensitive Areas within 2000m of the study site: 66
8.13 Records of Nitrate Vulnerable Zones within 2000m of the study site: 66
8.14 Records of Green Belt land within 2000m of the study site: 67
9. Natural Hazards Findings 68
9.1 Detailed BGS GeoSure Data 68
9.1.1 Shrink Swell 68
9.1.2 Landslides 68
9.1.3 Soluble Rocks 68
9.1.4 Compressible Ground 69
9.1.5 Collapsible Rocks 69
9.1.6 Running Sand 69
9.2 Radon 70
9.2.1 Radon Affected Areas 70
9.2.2 Radon Protection 70
10. Mining 71
10.1 Coal Mining 71
10.2 Non-Coal Mining 71
10.3 Brine Affected Areas 71
Contact Details 72
Standard Terms and Conditions 74

Overview of Findings

For further details on each dataset, please refer to each individual section in the main report as listed. Where the database has been searched a numerical result will be recorded. Where the database has not been searched '-' will be recorded.

Section 1: Historical Industrial Sites	On-site	0-50	51-250	251-500
1.1 Potentially Contaminative Uses identified from 1:10,000 scale mapping	1	10	13	72
1.2 Additional Information – Historical Tank Database	0	0	25	38
1.3 Additional Information – Historical Energy Features Database	0	1	2	17
1.4 Additional Information – Historical Petrol and Fuel Site Database	0	0	1	0
1.5 Additional Information – Historical Garage and Motor Vehicle Repair Database	1	5	2	7
1.6 Potentially Infilled Land	8	17	27	101

Section 2: Environmental Permits, Incidents and Registers	On-site	0-50m	51-250	251-500
2.1 Industrial Sites Holding Environmental Permits and/or Authorisations				
2.1.1 Records of historic IPC Authorisations	0	0	0	7
2.1.2 Records of Part A(1) and IPPC Authorised Activities	0	0	0	10
2.1.3 Records of Red List Discharge Consents	0	0	0	0
2.1.4 Records of List 1 Dangerous Substances Inventory sites	0	0	0	0
2.1.5 Records of List 2 Dangerous Substances Inventory sites	0	0	0	0
2.1.6 Records of Part A(2) and Part B Activities and Enforcements	0	2	2	10
2.1.7 Records of Category 3 or 4 Radioactive Substances Authorisations	0	0	0	0
2.1.8 Records of Licensed Discharge Consents	0	0	2	3
2.1.9 Records of Water Industry Referrals	0	0	0	0
2.1.10 Records of Planning Hazardous Substance Consents and Enforcements within 500m of the study site	0	0	0	3
2.2 Records of COMAH and NIHHS sites	0	0	0	2
2.3 Environment Agency/Natural Resources Wales Recorded Pollution Incidents				
2.3.1 National Incidents Recording System, List 2	0	0	3	12
2.3.2 National Incidents Recording System, List 1	0	0	0	0
2.4 Sites Determined as Contaminated Land under Part 2A EPA 1990	0	0	0	0

Section 3: Landfill and Other Waste Sites	On-site	0-50m	51-250	251-500	501-1000	1000-1500
3.1 Landfill Sites						
3.1.1 Environment Agency/Natural Resources Wales Registered Landfill Sites	0	0	0	0	0	Not searched
3.1.2 Environment Agency/Natural Resources Wales Historic Landfill Sites	4	0	1	2	6	1
3.1.3 BGS/DoE Landfill Site Survey	0	0	0	0	0	0
3.1.4 Records of Landfills in Local Authority and Historical Mapping Records	1	0	1	3	2	0
3.2 Landfill and Other Waste Sites Findings						
3.2.1 Operational and Non-Operational Waste Treatment, Transfer and Disposal Sites	0	0	0	11	Not searched	Not searched
3.2.2 Environment Agency/Natural Resources Wales Licensed Waste Sites	0	0	0	1	0	0

Section 4: Current Land Use	On-site	0-50m	51-250	251-500
4.1 Current Industrial Sites Data	1	12	36	Not searched
4.2 Records of Petrol and Fuel Sites	0	2	2	1
4.3 National Grid Underground Electricity Cables	0	0	0	0
4.4 National Grid Gas Transmission Pipelines	0	0	0	0

Section 5: Geology	
5.1 Are there any records of Artificial Ground and Made Ground present beneath the study site?	Yes
5.2 Are there any records of Superficial Ground and Drift Geology present beneath the study site?	Yes
5.3 For records of Bedrock and Solid Geology beneath the study site see the detailed findings section.	

Section 6: Hydrogeology and Hydrology	0-500m
6.1 Are there any records of Strata Classification in the Superficial Geology within 500m of the study site?	Yes
6.2 Are there any records of Strata Classification in the Bedrock Geology within 500m of the study site?	Yes

	On-site	0-50m	51-250	251-500	501-1000	1000-2000
6.3 Groundwater Abstraction Licences (within 2000m of the study site)	0	0	0	0	0	5
6.4 Surface Water Abstraction Licences (within 2000m of the study site)	0	0	0	0	1	1
6.5 Potable Water Abstraction Licences (within 2000m of the study site)	0	0	0	0	0	0
6.6 Source Protection Zones (within 500m of the study site)	0	0	0	0	Not searched	Not searched
6.7 Source Protection Zones within Confined Aquifer	0	0	0	0	Not searched	Not searched
6.8 Groundwater Vulnerability and Soil Leaching Potential (within 500m of the study site)	2	0	1	3	Not searched	Not searched

Section 6: Hydrogeology and Hydrology

	0-500m					
	On-site	0-50m	51-250	251-500	501-1000	1000-1500
6.9 Is there any Environment Agency/Natural Resources Wales information on river quality within 1500m of the study site?	No	No	No	No	Yes	Yes
6.10 Detailed River Network entries within 500m of the site	0	1	7	9	Not searched	Not searched
6.11 Surface water features within 250m of the study site	No	Yes	Yes	Not searched	Not searched	Not searched

Section 7: Flooding

7.1 Are there any Enviroment Agency Zone 2 floodplains within 250m of the study site?	Yes
7.2 Are there any Environment Agency/Natural Resources Wales Zone 3 floodplains within 250m of the study site	Yes
7.3 What is the Risk of flooding from Rivers and the Sea (RoFRaS) rating for the study site?	Low
7.4 Are there any Flood Defences within 250m of the study site?	No
7.5 Are there any areas benefiting from Flood Defences within 250m of the study site?	No
7.6 Are there any areas used for Flood Storage within 250m of the study site?	No
7.7 What is the maximum BGS Groundwater Flooding susceptibility within 50m of the study site?	Potential at Surface
7.8 What is the BGS confidence rating for the Groundwater Flooding susceptibility areas?	High

Section 8: Designated Environmentally Sensitive Sites

	On-site	0-50m	51-250	251-500	501-1000	1000-2000
8.1 Records of Sites of Special Scientific Interest (SSSI)	0	0	2	0	3	6
8.2 Records of National Nature Reserves (NNR)	0	0	0	0	0	0
8.3 Records of Special Areas of Conservation (SAC)	0	0	0	0	0	0
8.4 Records of Special Protection Areas (SPA)	0	0	0	0	0	0
8.5 Records of Ramsar sites	0	0	0	0	0	0
8.6 Records of Ancient Woodlands	0	2	0	1	5	9
8.7 Records of Local Nature Reserves (LNR)	0	0	1	0	0	2
8.8 Records of World Heritage Sites	0	0	0	0	0	0
8.9 Records of Environmentally Sensitive Areas	0	0	0	0	0	0

Section 8: Designated Environmentally Sensitive Sites

	On-site	0-50m	51-250	251-500	501-1000	1000-2000
8.10 Records of Areas of Outstanding Natural Beauty (AONB)	0	0	0	0	0	0
8.11 Records of National Parks	0	0	0	0	0	0
8.12 Records of Nitrate Sensitive Areas	0	0	0	0	0	0
8.13 Records of Nitrate Vulnerable Zones	1	0	0	0	1	2
8.14 Records of Green Belt land	1	0	0	0	2	2

Section 9: Natural Hazards

9.1 What is the maximum risk of natural ground subsidence?	Moderate
9.1.1 What is the maximum Shrink-Swell hazard rating identified on the study site?	Low
9.1.2 What is the maximum Landslides hazard rating identified on the study site?	Very Low
9.1.3 What is the maximum Soluble Rocks hazard rating identified on the study site?	Negligible
9.1.4 What is the maximum Compressible Ground hazard rating identified on the study site?	Moderate
9.1.5 What is the maximum Collapsible Rocks hazard rating identified on the study site?	Very Low
9.1.6 What is the maximum Running Sand hazard rating identified on the study site?	Very Low
9.2 Radon	
9.2.1 Is the property in a Radon Affected Area as defined by the Health Protection Agency (HPA) and if so what percentage of homes are above the Action Level?	The property is not in a Radon Affected Area, as less than 1% of properties are above the Action Level.
9.2.2 Is the property in an area where Radon Protection are required for new properties or extensions to existing ones as described in publication BR211 by the Building Research Establishment?	No radon protective measures are necessary.

Section 10: Mining

10.1 Are there any coal mining areas within 75m of the study site?	Yes
10.2 Are there any Non-Coal Mining areas within 50m of the study site boundary?	No
10.3 Are there any brine affected areas within 75m of the study site?	No

Using this report

The following report is designed by Environmental Consultants for Environmental Professionals bringing together the most up-to-date market leading environmental data. This report is provided under and subject to the Terms & Conditions agreed between Groundsure and the Client. The document contains the following sections:

1. Historical Industrial Sites

Provides information on past land uses that may pose a risk to the study site in terms of potential contamination from activities or processes. Potentially Infilled Land features are also included. This search is conducted using radii of up to 500m.

2. Environmental Permits, Incidents and Registers

Provides information on Regulated Industrial Activities and Pollution Incidents as recorded by Regulatory Authorities, and sites determined as Contaminated Land. This search is conducted using radii up to 500m.

3. Landfills and Other Waste Sites

Provides information on landfills and other waste sites that may pose a risk to the study site. This search is conducted using radii up to 1500m.

4. Current Land Uses

Provides information on current land uses that may pose a risk to the study site in terms of potential contamination from activities or processes. These searches are conducted using radii of up to 500m. This includes information on potentially contaminative industrial sites, petrol stations and fuel sites as well as high pressure gas pipelines and underground electricity transmission lines.

5. Geology

Provides information on artificial and superficial deposits and bedrock beneath the study site.

6. Hydrogeology and Hydrology

Provides information on productive strata within the bedrock and superficial geological layers, abstraction licenses, Source Protection Zones (SPZs) and river quality. These searches are conducted using radii of up to 2000m.

7. Flooding

Provides information on river and coastal flooding, flood defences, flood storage areas and groundwater flood areas. This search is conducted using radii of up to 250m.

8. Designated Environmentally Sensitive Sites

Provides information on the Sites of Special Scientific Interest (SSSI), National Nature Reserves (NNR), Special Areas of Conservation (SAC), Special Protection Areas (SPA), Ramsar sites, Local Nature Reserves (LNR), Areas of Outstanding Natural Beauty (AONB), National Parks (NP), Environmentally Sensitive Areas, Nitrate Sensitive Areas, Nitrate Vulnerable Zones and World Heritage Sites and Scheduled Ancient Woodland. These searches are conducted using radii of up to 2000m.

9. Natural Hazards

Provides information on a range of natural hazards that may pose a risk to the study site. These factors include natural ground subsidence and radon..

10. Mining

Provides information on areas of coal and non-coal mining and brine affected areas.

11. Contacts

This section of the report provides contact points for statutory bodies and data providers that may be able to provide further information on issues raised within this report. Alternatively, Groundsure provide a free Technical Helpline (08444 159000) for further information and guidance.

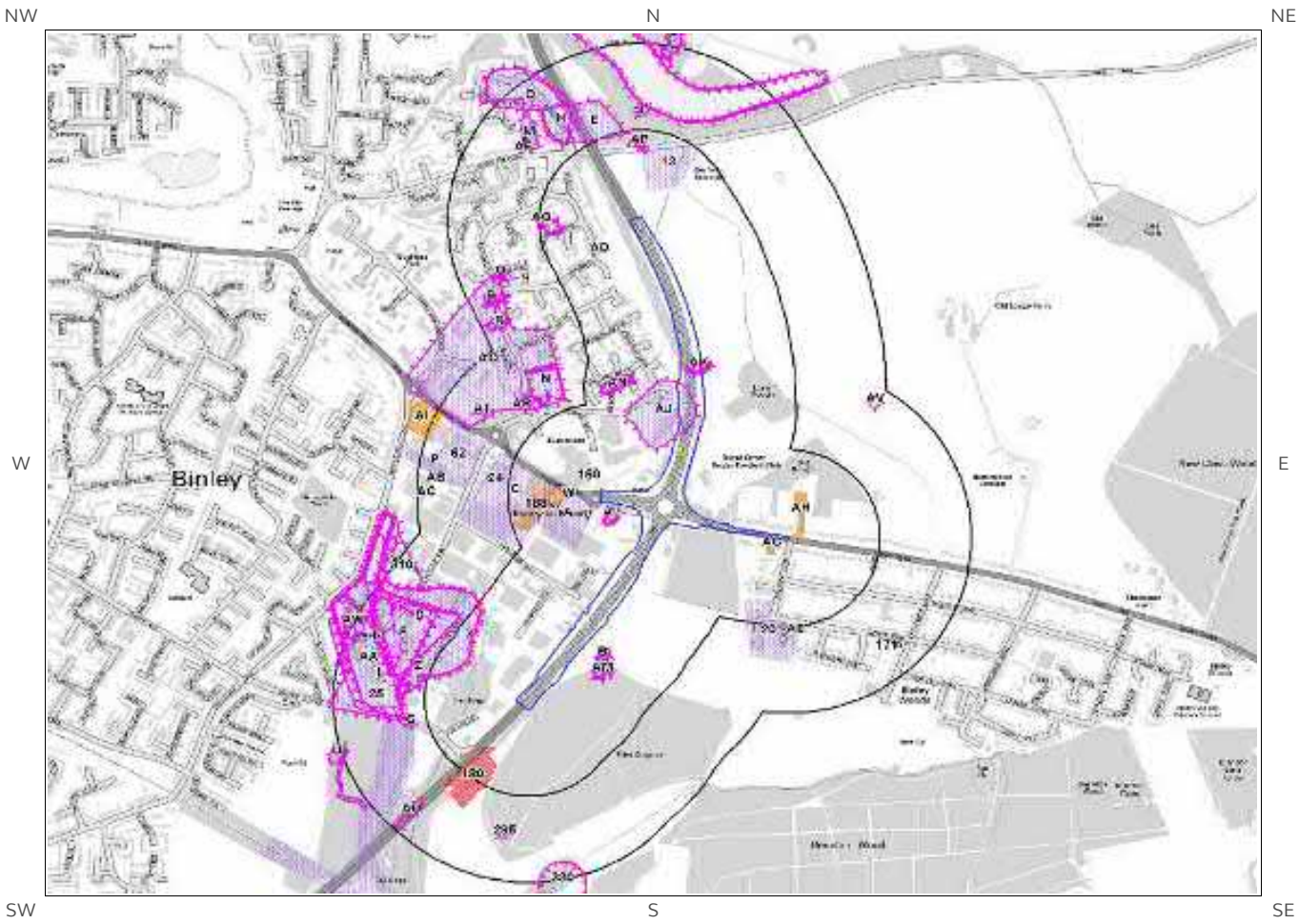
Note: Maps

Only certain features are placed on the maps within the report. All features represented on maps found within this search are given an identification number. This number identifies the feature on the mapping and correlates it to the additional information provided below. This identification number precedes all other information and takes the following format -Id: 1, Id: 2, etc. Where numerous features on the same map are in such close proximity that the numbers would obscure each other a letter identifier is used instead to represent the features. (e.g. Three features which overlap may be given the identifier “A” on the map and would be identified separately as features 1A, 3A, 10A on the data tables provided).

Where a feature is reported in the data tables to a distance greater than the map area, it is noted in the data table as “Not Shown”.

All distances given in this report are in Metres (m). Directions are given as compass headings such as N: North, E: East, NE: North East from the nearest point of the study site boundary.

1. Historical Land Use



© Crown copyright and database rights 2017.
Ordnance Survey license 100035207.

Site Outline

250
500
Search Buffers (m)

Historical 1:10,000 and 1:10,560 scale mapping

Industrial Land Use

Potentially Infilled Land

Historical 1:2,500, 1:1,250 and 1:500 scale mapping

Energy Features

Petrol Stations

Tanks

Garages

1. Historical Industrial Sites

1.1 Potentially Contaminative Uses identified from 1:10,000 scale Mapping

The systematic analysis of data extracted from standard 1:10,560 and 1:10,000 scale historical maps provides the following information:

Records of sites with a potentially contaminative past land use within 500m of the search boundary: 96

ID	Distance [m]	Direction	Use	Date
1AJ	0	On Site	Refuse Heap	1973
2A	10	W	Unspecified Works	1980
3A	10	W	Unspecified Commercial/Industrial	1991
4A	13	W	Unspecified Depot	1950
5B	39	SE	Unspecified Pit	1950
6B	42	SE	Unspecified Pits	1926
7B	42	SE	Unspecified Pits	1926
8B	42	SE	Unspecified Pits	1886
9B	42	SE	Unspecified Pits	1912
10B	42	SE	Unspecified Pits	1938
11B	42	SE	Unspecified Pits	1903
12AM	64	SE	Unspecified Pit	1950
13	79	N	Nursery	1991
14C	123	W	Unspecified Works	1973
15C	125	W	Industrial Estate	1991
16C	125	W	Unspecified Works	1980
17D	176	NW	Unspecified Disused Tip	1973
18D	177	NW	Refuse Heap	1967
19F	177	NW	Unspecified Mine	1967
20	180	S	Nursery	1967
21AO	239	W	Unspecified Heap	1886
22E	241	N	Refuse Heap	1973
23E	241	N	Refuse Heap	1967
24	241	W	Unspecified Works	1967
25	267	NW	Mineral Railway Sidings	1950
26D	267	NW	Refuse Heap	1950
27F	267	NW	Colliery	1950
28AQ	279	N	Disused Brick Works	1886
29N	280	N	Unspecified Pit	1903
30Q	283	NW	Gravel Pit	1950
31G	285	W	Refuse Heap	1926
32G	285	W	Refuse Heap	1926
33H	285	NW	Unspecified Pit	1973

34H	285	NW	Unspecified Pit	1967
35I	287	NW	Unspecified Heap	1912
36I	287	NW	Unspecified Heap	1938
37I	287	NW	Unspecified Heap	1903
38J	289	N	Unspecified Pit	1938
39J	289	N	Unspecified Pit	1912
40I	290	NW	Unspecified Pit	1926
41I	290	NW	Unspecified Pit	1926
42J	292	N	Unspecified Pit	1926
43J	292	N	Unspecified Pit	1926
44J	292	N	Unspecified Pit	1950
45	293	W	Railway Sidings	1967
46I	294	NW	Unspecified Ground Workings	1903
47I	296	NW	Unspecified Ground Workings	1950
48F	303	NW	Refuse Heap	1938
49K	303	NW	Colliery	1938
50K	303	NW	Colliery	1912
51F	304	NW	Refuse Heap	1926
52K	304	NW	Colliery	1926
53F	304	NW	Refuse Heap	1926
54K	304	NW	Colliery	1926
55L	309	W	Mineral Railway Sidings	1926
56L	310	W	Railway Sidings	1912
57L	310	W	Mineral Railway Sidings	1938
58M	331	NW	Refuse Heap	1967
59M	331	NW	Unspecified Pit	1950
60N	334	NW	Unspecified Old Kiln	1886
61K	339	NW	Unspecified Heap	1912
62	342	NW	Unspecified Works	1973
63O	373	SW	Unspecified Pit	1950
64O	374	SW	Unspecified Pit	1926
65O	374	SW	Unspecified Pit	1926
66O	376	SW	Unspecified Pit	1938
67P	380	W	Unspecified Commercial/Industrial	1991
68P	380	W	Unspecified Works	1980
69Q	384	NW	Refuse Heap	1967
70Q	384	NW	Refuse Heap	1973
71R	424	SW	Unspecified Pit	1886
72R	424	SW	Unspecified Pit	1938
73R	424	SW	Unspecified Pit	1903
74R	424	SW	Unspecified Pit	1912
75R	425	SW	Unspecified Pit	1967
76R	425	SW	Unspecified Pit	1973
77R	428	SW	Unspecified Pit	1926

78R	428	SW	Unspecified Pit	1926
79S	432	SW	Unspecified Pit	1973
80S	432	SW	Unspecified Pit	1967
81S	432	SW	Unspecified Pit	1950
82S	433	SW	Unspecified Pit	1926
83S	433	SW	Unspecified Pit	1926
84T	451	N	Unspecified Pit	1903
85T	451	N	Unspecified Pit	1886
86T	459	N	Unspecified Pit	1926
87T	459	N	Unspecified Pit	1926
88T	462	N	Unspecified Pit	1980
89T	462	N	Unspecified Pit	1973
90T	462	N	Unspecified Pit	1991
91T	462	N	Unspecified Pit	1950
92T	462	N	Unspecified Pit	1967
93AW	465	NW	Unspecified Heap	1912
94AX	483	W	Unspecified Ground Workings	1950
95U	487	W	Unspecified Pit	1967
96U	487	W	Unspecified Pit	1950

1.2 Additional Information – Historical Tank Database

The systematic analysis of data extracted from High Detailed 1:1,250 and 1:2,500 scale historical maps provides the following information.

Records of historical tanks within 500m of the search boundary: 63

ID	Distance (m)	Direction	Use	Date
97V	52	SW	Unspecified Tank	1969
98V	54	SW	Unspecified Tank	1990
99V	54	SW	Unspecified Tank	1980
100V	54	SW	Unspecified Tank	1992
101V	54	SW	Unspecified Tank	1992
102W	81	W	Unspecified Tank	1969
103W	81	W	Unspecified Tank	1992
104W	81	W	Unspecified Tank	1992
105W	83	W	Unspecified Tank	1990
106W	83	W	Unspecified Tank	1980
107A	147	SW	Unspecified Tank	1980
108Y	171	W	Unspecified Tank	1959
109X	206	NW	Tanks	1996
110X	206	NW	Tanks	1992
111X	206	NW	Tanks	1992

112X	208	NW	Tanks	1990
113Y	227	W	Tanks	1992
114Y	227	W	Tanks	1996
115Y	227	W	Tanks	1992
116Y	229	W	Tanks	1990
117Y	229	W	Tanks	1980
118X	244	NW	Tanks	1992
119X	244	NW	Tanks	1996
120X	244	NW	Tanks	1992
121X	245	NW	Tanks	1990
122AE	264	S	Tanks	1959
123Z	280	W	Unspecified Tank	1992
124Z	280	W	Unspecified Tank	1992
125Z	280	W	Unspecified Tank	1996
126Z	281	W	Unspecified Tank	1990
127AA	421	W	Unspecified Tank	1958
128L	421	W	Unspecified Tank	1947
129AA	422	W	Unspecified Tank	1938
130L	422	W	Unspecified Tank	1947
131AA	430	W	Unspecified Tank	1925
132K	434	W	Unspecified Tank	1938
133AB	449	W	Unspecified Tank	1992
134AB	449	W	Unspecified Tank	1996
135AB	449	W	Unspecified Tank	1992
136AB	450	W	Unspecified Tank	1969
137AB	451	W	Unspecified Tank	1990
138AB	451	W	Unspecified Tank	1980
139AA	458	W	Unspecified Tank	1947
140AA	459	W	Unspecified Tank	1947
141AA	459	W	Unspecified Tank	1913
142AA	471	W	Unspecified Tank	1947
143AA	472	W	Unspecified Tank	1947
144AA	472	W	Unspecified Tank	1947
145AA	473	W	Unspecified Tank	1958
146AA	473	W	Unspecified Tank	1947
147AC	474	W	Unspecified Tank	1996
148AC	474	W	Unspecified Tank	1992
149AC	474	W	Unspecified Tank	1992
150AC	475	W	Unspecified Tank	1980
151AC	475	W	Unspecified Tank	1990
152AA	478	W	Unspecified Tank	1938
153AA	484	W	Unspecified Tank	1947
154AA	484	W	Unspecified Tank	1947
155AC	487	W	Unspecified Tank	1992
156AC	487	W	Unspecified Tank	1996
157AC	487	W	Unspecified Tank	1992

158AC	488	W	Unspecified Tank	1990
159AC	488	W	Unspecified Tank	1980

1.3 Additional Information – Historical Energy Features Database

The systematic analysis of data extracted from High Detailed 1:1,250 and 1:2,500 scale historical maps provides the following information.

Records of historical energy features within 500m of the search boundary: 20

ID	Distance (m)	Direction	Use	Date
160	41	NW	Electricity Substation	1996
161AD	115	SW	Electricity Substation	1997
162AD	115	SW	Electricity Substation	1996
163AE	265	S	Electricity Substation	1969
164AR	320	NW	Gas Governor	1996
165AF	359	NW	Electricity Substation	1994
166AF	359	NW	Electricity Substation	1994
167AF	359	NW	Electricity Substation	1996
168AF	359	NW	Electricity Substation	1993
169AF	359	NW	Electricity Substation	1994
170AF	359	NW	Electricity Substation	1991
171	411	SE	Electricity Substation	1969
172L	418	W	Electricity Substation	1992
173L	418	W	Electricity Substation	1986
174S	427	SW	Electricity Substation	1998
175S	427	SW	Electricity Substation	1996
176S	427	SW	Electricity Substation	1995
177S	427	SW	Electricity Substation	1996
178AA	472	W	Electric Power Station	1925
179AA	473	W	Electricity Power Station	1947

1.4 Additional Information – Historical Petrol and Fuel Site Database

The systematic analysis of data extracted from High Detailed 1:1,250 and 1:2,500 scale historical maps provides the following information.

Records of historical petrol stations and fuel sites within 500m of the search boundary: 1

ID	Distance (m)	Direction	Use	Date
180	143	SW	Filling Station	1991

1.5 Additional Information – Historical Garage and Motor Vehicle Repair Database

The systematic analysis of data extracted from High Detailed 1:1,250 and 1:2,500 scale historical maps provides the following information.

Records of historical garage and motor vehicle repair sites within 500m of the search boundary: 15

ID	Distance (m)	Direction	Use	Date
181AG	0	On Site	Garage	1992
182AG	6	S	Garage	1969
183AG	6	S	Garage	1959
184AG	8	E	Garage	1992
185AH	16	E	Garage	1969
186AH	16	E	Garage	1959
187W	91	W	Garage	1996
188	123	W	Garage	1996
189AI	474	NW	Garage	1969
190AI	474	NW	Garage	1959
191AI	485	NW	Garage	1992
192AI	485	NW	Garage	1992
193AI	485	NW	Garage	1996
194AI	487	NW	Garage	1990
195AI	487	NW	Garage	1980

1.6 Potentially Infilled Land

Records of Potentially Infilled Features from 1:10,000 scale mapping within 500m of the study site: 153

The following Historical Potentially Infilled Features derived from the Historical Mapping information is provided by Groundsure:

ID	Distance(m)	Direction	Use	Date
196AJ	0	On Site	Refuse Heap	1973
197AK	0	On Site	Pond	1950
198AK	0	On Site	Pond	1967
199AK	0	On Site	Pond	1912
200AK	0	On Site	Pond	1938
201AK	0	On Site	Pond	1886
202AK	0	On Site	Pond	1903
203AK	0	On Site	Pond	1926
204AL	14	S	Pond	1950
205AL	14	S	Pond	1967
206AL	14	S	Pond	1973
207AL	14	S	Pond	1991
208AL	14	S	Pond	1980
209AL	20	S	Pond	1903

210AL	20	S	Pond	1912
211AL	20	S	Pond	1938
212AL	20	S	Pond	1886
213AL	20	S	Pond	1926
214B	39	SE	Unspecified Pit	1950
215B	42	SE	Unspecified Pits	1926
216B	42	SE	Unspecified Pits	1926
217B	42	SE	Unspecified Pits	1912
218B	42	SE	Unspecified Pits	1938
219B	42	SE	Unspecified Pits	1886
220B	42	SE	Unspecified Pits	1903
221AM	64	SE	Unspecified Pit	1950
222AN	112	W	Ponds	1886
223AN	112	W	Ponds	1938
224AN	112	W	Ponds	1903
225AN	112	W	Ponds	1912
226AN	118	W	Ponds	1950
227AN	120	W	Ponds	1926
228D	176	NW	Unspecified Disused Tip	1973
229F	177	NW	Unspecified Mine	1967
230D	177	NW	Refuse Heap	1967
231AO	189	W	Pond	1903
232AO	189	W	Pond	1912
233AO	189	W	Pond	1938
234AO	190	W	Pond	1926
235AO	191	W	Pond	1967
236AO	191	W	Pond	1950
237AO	191	W	Pond	1973
238AP	194	N	Ponds	1938
239AP	195	N	Ponds	1926
240AP	195	N	Ponds	1912
241AP	195	N	Ponds	1886
242AP	195	N	Ponds	1903
243AP	196	N	Ponds	1973
244AP	196	N	Ponds	1967
245AO	239	W	Unspecified Heap	1886
246E	241	N	Refuse Heap	1967
247E	241	N	Refuse Heap	1973
248K	267	NW	Colliery	1950
249D	267	NW	Refuse Heap	1950
250AQ	279	N	Disused Brick Works	1886
251N	280	N	Unspecified Pit	1903
252Q	283	NW	Gravel Pit	1950
253G	285	W	Refuse Heap	1926
254G	285	W	Refuse Heap	1926
255H	285	NW	Unspecified Pit	1973

256H	285	NW	Unspecified Pit	1967
257AR	287	NW	Unspecified Heap	1912
258AR	287	NW	Unspecified Heap	1903
259AR	287	NW	Unspecified Heap	1938
260J	289	N	Unspecified Pit	1938
261J	289	N	Unspecified Pit	1912
262AR	290	NW	Unspecified Pit	1926
263AR	290	NW	Unspecified Pit	1926
264J	292	N	Unspecified Pit	1926
265J	292	N	Unspecified Pit	1926
266J	292	N	Unspecified Pit	1950
267AR	294	NW	Unspecified Ground Workings	1903
268AS	295	N	Pool	1912
269AS	295	N	Pool	1903
270AS	295	N	Pool	1886
271AS	295	N	Fish Pond	1938
272AS	295	N	Fish Pond	1926
273AR	296	NW	Unspecified Ground Workings	1950
274AS	298	N	Fish Pond	1973
275AS	298	N	Fish Pond	1950
276AS	298	N	Fish Pond	1991
277AS	298	N	Fish Pond	1967
278AS	298	N	Fish Pond	1980
279K	303	NW	Colliery	1938
280F	303	NW	Refuse Heap	1938
281K	303	NW	Colliery	1912
282F	304	NW	Refuse Heap	1926
283K	304	NW	Colliery	1926
284F	304	NW	Refuse Heap	1926
285K	304	NW	Colliery	1926
286AR	312	NW	Pond	1903
287AR	312	NW	Pond	1938
288AR	312	NW	Pond	1912
289AR	319	NW	Pond	1950
290AR	319	NW	Pond	1967
291N	329	W	Pond	1886
292M	331	NW	Unspecified Pit	1950
293M	331	NW	Refuse Heap	1967
294K	339	NW	Unspecified Heap	1912
295	356	S	Ponds	1886
296O	373	SW	Unspecified Pit	1950
297O	374	SW	Unspecified Pit	1926
298O	374	SW	Unspecified Pit	1926
299O	376	SW	Unspecified Pit	1938

300AT	379	NW	Pond	1938
301AT	379	NW	Pond	1886
302AT	379	NW	Pond	1912
303AT	379	NW	Pond	1903
304Q	384	NW	Refuse Heap	1967
305Q	384	NW	Refuse Heap	1973
306AU	387	SW	Pond	1980
307AU	387	SW	Pond	1967
308AU	387	SW	Pond	1973
309S	389	SW	Ponds	1926
310	400	NW	Pond	1967
311S	405	SW	Pond	1903
312S	405	SW	Pond	1912
313S	405	SW	Pond	1886
314S	405	SW	Pond	1938
315R	424	SW	Unspecified Pit	1886
316R	424	SW	Unspecified Pit	1912
317R	424	SW	Unspecified Pit	1938
318R	424	SW	Unspecified Pit	1903
319R	425	SW	Unspecified Pit	1973
320R	425	SW	Unspecified Pit	1967
321R	428	SW	Unspecified Pit	1926
322R	428	SW	Unspecified Pit	1926
323S	432	SW	Unspecified Pit	1967
324S	432	SW	Unspecified Pit	1950
325S	432	SW	Unspecified Pit	1973
326S	433	SW	Unspecified Pit	1926
327S	433	SW	Unspecified Pit	1926
328AV	439	NE	Pond	1967
329AV	439	NE	Pond	1950
330	448	S	Pools	1886
331T	451	N	Pond	1912
332T	451	N	Unspecified Pit	1886
333T	451	N	Pond	1938
334T	451	N	Unspecified Pit	1903
335T	459	N	Unspecified Pit	1926
336T	459	N	Unspecified Pit	1926
337AA	461	W	Reservoir	1926
338T	462	N	Unspecified Pit	1991
339T	462	N	Unspecified Pit	1973
340T	462	N	Unspecified Pit	1950
341T	462	N	Unspecified Pit	1967
342T	462	N	Unspecified Pit	1980
343AA	463	W	Reservoir	1938
344AW	465	NW	Unspecified Heap	1912
345AW	475	NW	Reservoir	1950

346AX	483	W	Unspecified Ground Workings	1950
347U	487	W	Unspecified Pit	1967
348U	487	W	Unspecified Pit	1950

2. Environmental Permits, Incidents and Registers Map



© Crown copyright and database rights 2017.
Ordnance Survey license 100035207.

Site Outline

250
500
Search Buffers (m)

Recorded Pollution Incident

Dangerous Substances (List 1)

Dangerous Substances (List 2)

Water Industry Referrals

Licenced Discharge Consents

Red List Discharge Consents

RAS 3 & 4 Authorisations

Part A(1) Authorised Processes and Historic IPC Authorisations

Part A(2) and Part B Authorised Processes

COMAH / NIHHS Sites

Sites Determined as Contaminated Land

Hazardous Substance Consents and Enforcements

2. Environmental Permits, Incidents and Registers

2.1 Industrial Sites Holding Licences and/or Authorisations

Searches of information provided by the Environment Agency/Natural Resources Wales and Local Authorities reveal the following information:

2.1.1 Records of historic IPC Authorisations within 500m of the study site:

7

The following IPC Authorisations are represented as points on the Environmental Permits, Incidents and Registers Map:

ID	Distance (m)	Direction	NGR	Details	
67D	375	NW	438100 277400	Operator: Notedome Ltd Address: 34 Herald Way, Binley Industrial Estate, Binley, CV3 2RQ Process: Di-isocyanate Processes	Permit Number: AZ5995 Original Permit Number: IPCMINVAR Date Approved: 25-9-1997 Effective Date: 29-9-1997 Status: Superseded By Variation
68D	375	NW	438100 277400	Operator: Notedome Ltd Address: 34 Herald Way, Binley Industrial Estate, Binley, CV3 2RQ Process: Di-isocyanate Processes	Permit Number: BQ3363 Original Permit Number: IPCMAJVAR Date Approved: 22-4-2002 Effective Date: 22-4-2002 Status: Revoked - Now Ippc
69D	375	NW	438100 277400	Operator: Notedome Ltd Address: 34 Herald Way, Binley Industrial Estate, Binley, CV3 2RQ Process: Di-isocyanate Processes	Permit Number: BE4592 Original Permit Number: IPCMINVAR Date Approved: 24-11-1998 Effective Date: 30-11-1998 Status: Superseded By Variation
70D	375	NW	438100 277400	Operator: Notedome Ltd Address: 34 Herald Way, Binley Industrial Estate, Binley, CV3 2RQ Process: Di-isocyanate Processes	Permit Number: BB2356 Original Permit Number: IPCMINVAR Date Approved: 11-5-1998 Effective Date: 13-5-1998 Status: Superseded By Variation
71D	375	NW	438100 277400	Operator: Rohm and Haas Electronic Materials Europe Ltd Address: Herald Way, Binley Induistrial Estate, Coventry, West Midlands, CV3 2RQ Process: Processes Involving Halogens	Permit Number: BM2357 Original Permit Number: IPCAPP Date Approved: 5-2-2002 Effective Date: 5-2-2002 Status: Revoked - Now Ippc
72D	375	NW	438100 277400	Operator: Notedome Ltd Address: 34 Herald Way, Binley Industrial Estate, Binley, CV3 2RQ Process: Di-isocyanate Processes	Permit Number: AU7486 Original Permit Number: IPCAIRAPP Date Approved: 9-8-1996 Effective Date: 12-8-1996 Status: Superseded By Variation

ID	Distance (m)	Direction	NGR	Details	
73D	375	NW	438100 277400	Operator: Notedome Ltd Address: 34 Herald Way, Binley Industrial Estate, Binley, CV3 2RQ Process: Di-isocyanate Processes	Permit Number: BF3419 Original Permit Number: IPCMINVAR Date Approved: 3-3-1999 Effective Date: 4-3-1999 Status: Superseded By Variation

2.1.2 Records of Part A(1) and IPPC Authorised Activities within 500m of the study site:

10

The following Part A(1) and IPPC Authorised Activities are represented as points on the Environmental Permits, Incidents and Registers Map:

ID	Distance (m)	Direction	NGR	Details	
57E	387	NW	438200 277560	Operator: Rohm And Haas Electronic Materials Europe Ltd Installation Name: Rohm And Haas Electronic Materials Europe Ltd Process: INORGANIC CHEMICALS; USING ETC OF ANTIMONY ETC (UNLESS OTHERRWISE PRESCRINED) (UNLESS GLAZING ETC)	Permit Number: BP5697IL Original Permit Number: BP5697IL EPR Reference: EA/EPR/BP5697IL/S002 Issue Date: 2/9/2005 00:00:00 Effective Date: 2/9/2005 Last date noted as effective: 2017-07-15 Status: Superceded
58E	387	NW	438200 277560	Operator: Rohm And Haas Electronic Materials Europe Ltd Installation Name: Rohm And Haas Electronic Materials Europe Ltd Process: ASSOCIATED PROCESS	Permit Number: BP5697IL Original Permit Number: BP5697IL EPR Reference: EA/EPR/BP5697IL/S002 Issue Date: 2/9/2005 00:00:00 Effective Date: 2/9/2005 Last date noted as effective: 2017-07-15 Status: Superceded
59E	387	NW	438200 277560	Operator: Rohm And Haas Electronic Materials Europe Ltd Installation Name: Rohm And Haas Electronic Materials Europe Ltd Process: INORGANIC CHEMICALS; USING MERCURY/CADMIUM AND COMPOUNDS IF RELEASE INTO AIR	Permit Number: BP5697IL Original Permit Number: BP5697IL EPR Reference: EA/EPR/BP5697IL/S002 Issue Date: 2/9/2005 00:00:00 Effective Date: 2/9/2005 Last date noted as effective: 2017-07-15 Status: Superceded
60E	387	NW	438200 277560	Operator: Rohm And Haas Electronic Materials Europe Ltd Installation Name: Rohm And Haas Electronic Materials Europe Ltd Process: INORGANIC CHEMICALS; USING HYDROGEN FLUORIDE/CHLORIDE ETC IF RELEASE TO AIR (OTHER THAN CHEMICALS MANUFACTURE ETC)	Permit Number: GP3834GD Original Permit Number: BP5697IL EPR Reference: EA/EPR/BP5697IL/S002 Issue Date: - Effective Date: 16/3/2009 Last date noted as effective: 2017-07-15 Status: Surrender Effective
61E	387	NW	438200 277560	Operator: Rohm And Haas Electronic Materials Europe Ltd Installation Name: Rohm And Haas Electronic Materials Europe Ltd Process: CARBON DISULPHIDE OR AMMONIA; AMMONIA RELEASE TO AIR (ANY CHEMICAL MANUFACTURE NOT REFRIDGERANT USE)	Permit Number: BP5697IL Original Permit Number: BP5697IL EPR Reference: EA/EPR/BP5697IL/S002 Issue Date: 2/9/2005 00:00:00 Effective Date: 2/9/2005 Last date noted as effective: 2017-07-15 Status: Superceded

ID	Distance (m)	Direction	NGR	Details	
62E	387	NW	438200 277560	Operator: Rohm And Haas Electronic Materials Europe Ltd Installation Name: Rohm And Haas Electronic Materials Europe Ltd Process: ASSOCIATED PROCESS	Permit Number: GP3834GD Original Permit Number: BP5697IL EPR Reference: EA/EPR/BP5697IL/S002 Issue Date: - Effective Date: 16/3/2009 Last date noted as effective: 2017-07-15 Status: Surrender Effective
63E	387	NW	438200 277560	Operator: Rohm And Haas Electronic Materials Europe Ltd Installation Name: Rohm And Haas Electronic Materials Europe Ltd Process: CARBON DISULPHIDE OR AMMONIA; AMMONIA RELEASE TO AIR (ANY CHEMICAL MANUFACTURE NOT REFRIDGERANT USE)	Permit Number: GP3834GD Original Permit Number: BP5697IL EPR Reference: EA/EPR/BP5697IL/S002 Issue Date: - Effective Date: 16/3/2009 Last date noted as effective: 2017-07-15 Status: Surrender Effective
64E	387	NW	438200 277560	Operator: Rohm And Haas Electronic Materials Europe Ltd Installation Name: Rohm And Haas Electronic Materials Europe Ltd Process: INORGANIC CHEMICALS; USING MERCURY/CADMIUM AND COMPOUNDS IF RELEASE INTO AIR	Permit Number: GP3834GD Original Permit Number: BP5697IL EPR Reference: EA/EPR/BP5697IL/S002 Issue Date: - Effective Date: 16/3/2009 Last date noted as effective: 2017-07-15 Status: Surrender Effective
65E	387	NW	438200 277560	Operator: Rohm And Haas Electronic Materials Europe Ltd Installation Name: Rohm And Haas Electronic Materials Europe Ltd Process: INORGANIC CHEMICALS; USING HYDROGEN FLUORIDE/CHLORIDE ETC IF RELEASE TO AIR (OTHER THAN CHEMICALS MANUFACTURE ETC)	Permit Number: BP5697IL Original Permit Number: BP5697IL EPR Reference: EA/EPR/BP5697IL/S002 Issue Date: 2/9/2005 00:00:00 Effective Date: 2/9/2005 Last date noted as effective: 2017-07-15 Status: Superceded
66E	387	NW	438200 277560	Operator: Rohm And Haas Electronic Materials Europe Ltd Installation Name: Rohm And Haas Electronic Materials Europe Ltd Process: INORGANIC CHEMICALS; USING ETC OF ANTIMONY ETC (UNLESS OTHERRWISE PRESCRINED) (UNLESS GLAZING ETC)	Permit Number: GP3834GD Original Permit Number: BP5697IL EPR Reference: EA/EPR/BP5697IL/S002 Issue Date: - Effective Date: 16/3/2009 Last date noted as effective: 2017-07-15 Status: Surrender Effective

2.1.3 Records of Red List Discharge Consents (potentially harmful discharges to controlled waters) within 500m of the study site:

0

Database searched and no data found.

2.1.4 Records of List 1 Dangerous Substances Inventory Sites within 500m of the study site:

0

Database searched and no data found.

2.1.5 Records of List 2 Dangerous Substance Inventory Sites within 500m of the study site:

0

Database searched and no data found.

2.1.6 Records of Part A(2) and Part B Activities and Enforcements within 500m of the study site:

14

The following Part A(2) and Part B Activities are represented as points on the Environmental Permits, Incidents and Registers Map:

ID	Distance (m)	Direction	NGR	Details	
38F	7	S	439064 277600	Address: Binley Woods Service Station, 60-62 Rugby Road, Coventry, Warwickshire, CV3 2AX Process: Waste Oil Burner <0.4 MW Status: New Legislation Applies Permit Type: Part B	Enforcement: No Enforcements Notified Date of Enforcement: No Enforcements Notified Comment: No Enforcements Notified
39F	39	S	439070 277568	Address: Binley Wood Service, Rugby Rd, Coventry, CV3 2AX Process: waste oil burning process Status: Historical Permit Permit Type: Part B	Enforcement: No Enforcements Notified Date of Enforcement: No Enforcements Notified Comment: No Enforcements Notified
40	95	NW	438551 277826	Address: WM Morrison Supermarkets, Skipworth Road, Binley, Coventry, CV3 2XA Process: Unloading of Petrol into Storage at Service Stations Status: Current Permit Permit Type: Part B	Enforcement: No Enforcements Notified Date of Enforcement: No Enforcements Notified Comment: No Enforcements Notified
41	187	W	438414 277668	Address: Listers Of Coventry Motors Ltd, Brandon Road, Coventry Process: Coating Processes Status: Historical Permit Permit Type: Part B	Enforcement: No Enforcements Notified Date of Enforcement: No Enforcements Notified Comment: No Enforcements Notified

ID	Distance (m)	Direction	NGR	Details	
42	263	NW	438377 277889	Address: Murco Petroleum Ltd, Winston House, Dollis Park, London, N3 1HZ (Brandon Road) Process: Petrol Vapour Recovery Process Status: Revoked Permit Type: Part B	Enforcement: No Enforcements Notified Date of Enforcement: No Enforcements Notified Comment: No Enforcements Notified
43	273	SW	438235 276894	Address: Binley Woods Service Station, Coventry Eastern By-pass, Coventry, CV3 2ZZ Process: Unloading of Petrol into Storage at Service Stations Status: Current Permit Permit Type: Part B	Enforcement: No Enforcements Notified Date of Enforcement: No Enforcements Notified Comment: No Enforcements Notified
44G	276	W	438101 277200	Address: Andy's Landys, Unit 4, Hotchkiss Way, Binley Industrial Estate, Coventry, CV2 4SQ Process: Waste Oil Burner <0.4 MW Status: New Legislation Applies Permit Type: Part B	Enforcement: No Enforcements Notified Date of Enforcement: No Enforcements Notified Comment: No Enforcements Notified
45H	317	W	438282 277673	Address: Solaglass, Herald Way, Binley, Coventry, CV3 2ND Process: Coating Processes Status: Revoked Permit Type: Part B	Enforcement: No Enforcements Notified Date of Enforcement: No Enforcements Notified Comment: No Enforcements Notified
46H	317	W	438282 277673	Address: Solaglass, Herald Way, Binley, Coventry, CV3 2ND Process: Polishing or Etching Glass using Hydrofluoric Acid Status: Revoked Permit Type: Part B	Enforcement: No Enforcements Notified Date of Enforcement: No Enforcements Notified Comment: No Enforcements Notified
47	344	NW	438056 277278	Address: Siv Uk Ltd, Unit 4 Herald Way, Binley Ind, Estate Binley, Coventry, CV3 2RQ Process: Di-isocyanate Processes Status: Revoked Permit Type: Part B	Enforcement: No Enforcements Notified Date of Enforcement: No Enforcements Notified Comment: No Enforcements Notified
48	374	W	438001 277200	Address: Andys Landys, Hotchkiss Way, Binley Ind Est, CV2 4SQ Process: Waste Oil Burning Process Status: Historical Permit Permit Type: Part B	Enforcement: No Enforcements Notified Date of Enforcement: No Enforcements Notified Comment: No Enforcements Notified
49D	380	NW	438085 277389	Address: Rohm and Haas Electronic Materials Europe Ltd, Shipley House, Herald Way, Coventry, CV3 2RQ Process: Coating Processes Status: Surrendered Permit Type: Part B	Enforcement: No Enforcements Notified Date of Enforcement: No Enforcements Notified Comment: No Enforcements Notified
50	433	NW	438101 277500	Address: Shipley Europe Ltd, Herald Way, CV3 2RQ Process: Coating Processes Status: Historical Permit Permit Type: Part B	Enforcement: No Enforcements Notified Date of Enforcement: No Enforcements Notified Comment: No Enforcements Notified
51	469	W	438161 277913	Address: Tools of Coventry (TOC) Ltd, Brandon Road, Coventry, CV3 2AN Process: Coating Processes Status: Historical Permit Permit Type: Part B	Enforcement: No Enforcements Notified Date of Enforcement: No Enforcements Notified Comment: No Enforcements Notified

2.1.7 Records of Category 3 or 4 Radioactive Substances Authorisations:

0

Database searched and no data found.

2.1.8 Records of Licensed Discharge Consents within 500m of the study site:

5

The following Licensed Discharge Consents records are represented as points on the Environmental Permits, Incidents and Registers Map:

ID	Distance (m)	Direction	NGR	Details	
16B	152	NW	438300 277300	Address: LEOFRIC BUSINESS CENTRE P STN, COVENTRY Effluent Type: SEWAGE DISCHARGES - SEWER STORM OVERFLOW - WATER COMPANY Permit Number: S/10/20434/O Permit Version: 1	Receiving Water: TRIB OF RIVER AVON Status: SURRENDERED UNDER EPR 2010 Issue date: 22/06/1990 Effective Date: 22-Jun-1990 Revocation Date: 31/05/2017
17B	156	NW	438279 277270	Address: PROGRESS CL (LEOFRIC COURT) SPS, LEOFRIC COURT - PROGRESS CLOSE, BINLEY, COVENTRY, WEST MIDLANDS, CV3 2TJ Effluent Type: SEWAGE DISCHARGES - PUMPING STATION - WATER COMPANY Permit Number: TSC3785 Permit Version: 2	Receiving Water: DITCH TRIBUTARY OF RIVER AVON Status: VARIED UNDER EPR 2010 Issue date: 28/09/2016 Effective Date: 28-Sep-2016 Revocation Date: -
18	265	NW	438300 277490	Address: PROGRESS CL (LEOFRIC COURT) SPS, LEOFRIC COURT - PROGRESS CLOSE, BINLEY, COVENTRY, WEST MIDLANDS, CV3 2TJ Effluent Type: SEWAGE DISCHARGES - PUMPING STATION - WATER COMPANY Permit Number: TSC3785 Permit Version: 1	Receiving Water: LOCAL DITCH Status: VARIED UNDER EPR 2010 Issue date: 03/09/2010 Effective Date: 03-Sep-2010 Revocation Date: 27/09/2016
19C	427	SW	438130 276780	Address: MOTORWAY SERVICE AREA 1493, A46 EASTERN BYPASS, BINLEY WOODS, BINLEY, COVENTRY Effluent Type: SEWAGE DISCHARGES - FINAL/TREATED EFFLUENT - NOT WATER COMPANY Permit Number: S/10/11536/T Permit Version: 1	Receiving Water: TRIB OF RIVER AVON Status: SURRENDERED UNDER EPR 2010 Issue date: 03/05/1989 Effective Date: 03-May-1989 Revocation Date: 06/10/2015
20C	427	SW	438130 276780	Address: MOTORWAY SERVICE AREA 1493, A46 EASTERN BYPASS, BINLEY WOODS, BINLEY, COVENTRY Effluent Type: TRADE DISCHARGES - SITE DRAINAGE Permit Number: S/10/11536/T Permit Version: 1	Receiving Water: TRIB OF RIVER AVON Status: SURRENDERED UNDER EPR 2010 Issue date: 03/05/1989 Effective Date: 03-May-1989 Revocation Date: 06/10/2015

2.1.9 Records of Water Industry Referrals (potentially harmful discharges to the public sewer) within 500m of the study site:

0

Database searched and no data found.

2.1.10 Records of Planning Hazardous Substance Consents and Enforcements within 500m of the study site:

3

The following records are represented as points on the Environmental Permits, Incidents and Registers Map:

ID	Distance (m)	Direction	Application Reference Number	NGR	Application Status	Application Date	Address	Details	Details of Enforcement Action
74D	380	NW	R/2004/1116	438091 277396	Withdrawn	02/11/2006	Rohm and Haas Electronic Materials Europe Limited, Herald Way, Bindley, Coventry, CV3 2RQ	Storage and use of 3 tonnes of very toxic chemicals, 100 tonnes of toxic chemicals and 250 tonnes of substances hazardous to the environment.	Enforcement: No Enforcements Notified Date of Enforcement: No Enforcement Notified Comment: No Enforcement Notified
75D	380	NW	No Details	438091 277396	Approved	No Details	Rohm and Haas Electronic Materials Europe Limited, Herald Way, Bindley, Coventry, CV3 2RN	No Details	Enforcement: No Enforcements Notified Date of Enforcement: No Enforcement Notified Comment: No Enforcement Notified
76I	462	NW	R/2001/2633	438001 277417	Approved	24/04/2001	Notedome Ltd, 34 Herald Way, Binley Industrial Estate, Coventry, CV3 2RQ	Storage and use of 20 tonnes of toluene di-isocyanate	Enforcement: No Enforcements Notified Date of Enforcement: No Enforcement Notified Comment: No Enforcement Notified

2.2 Dangerous or Hazardous Sites

Records of COMAH & NIHHS sites within 500m of the study site: 2

The following COMAH & NIHHS Authorisation records provided by the Health and Safety Executive are represented as polygons or buffered points on the Environmental Permits, Incidents and Registers Map:

ID	Distance (m)	Direction	Company	Address	Operational Status	Tier
52I	417	NW	Notedome Ltd	Notedome Ltd, 34 Herald Way, Binley Industrial Estate, Coventry, CV3 2RQ	Historical NIHHS Site	-
53I	494	NW	Notedome Limited	Notedome Limited, Coventry, Unit 4, Binley Industrial Estate, Golden Acres Lane, Coventry, West Midlands, CV3 2RT	Current COMAH Site	COMAH Lower Tier Operator

2.3 Environment Agency/Natural Resources Wales Recorded Pollution Incidents

2.3.1 Records of National Incidents Recording System, List 2 within 500m of the study site:

15

The following NIRS List 2 records are represented as points on the Environmental Permits, Incidents and Registers Map:

ID	Distance (m)	Direction	NGR	Details	
1	176	N	438710 278710	Incident Date: 03-Nov-2003 Incident Identification: 200276 Pollutant: Inert Materials and Wastes Pollutant Description: Soils and Clay	Water Impact: Category 4 (No Impact) Land Impact: Category 3 (Minor) Air Impact: Category 4 (No Impact)
2	231	S	439004 277383	Incident Date: 24-Oct-2003 Incident Identification: 198024 Pollutant: Oils and Fuel Pollutant Description: Petrol	Water Impact: Category 3 (Minor) Land Impact: Category 4 (No Impact) Air Impact: Category 4 (No Impact)
3G	247	W	438133 277211	Incident Date: 23-Sep-2002 Incident Identification: 109744 Pollutant: Specific Waste Materials Pollutant Description: Commercial Waste	Water Impact: Category 4 (No Impact) Land Impact: Category 3 (Minor) Air Impact: Category 4 (No Impact)
4	426	W	438181 277621	Incident Date: 02-Sep-2001 Incident Identification: 28434 Pollutant: Inorganic Chemicals/Products Pollutant Description: Other Inorganic Chemical or Product	Water Impact: Category 4 (No Impact) Land Impact: Category 3 (Minor) Air Impact: Category 4 (No Impact)
5A	431	NW	438027 277399	Incident Date: 29-Aug-2001 Incident Identification: 27549 Pollutant: Atmospheric Pollutants and Effects:Contaminated Water Pollutant Description: Smoke:Firefighting Run-Off	Water Impact: Category 1 (Major) Land Impact: Category 3 (Minor) Air Impact: Category 1 (Major)
6A	431	NW	438027 277399	Incident Date: 29-Aug-2001 Incident Identification: 27549 Pollutant: Atmospheric Pollutants and Effects : Contaminated Water Pollutant Description: Smoke :Firefighting Run-Off	Water Impact: Category 1 (Major) Land Impact: Category 3 (Minor) Air Impact: Category 1 (Major)

ID	Distance (m)	Direction	NGR	Details	
7A	431	NW	438027 277399	Incident Date: 29-Aug-2001 Incident Identification: 27549 Pollutant: Contaminated Water Pollutant Description: Smoke Firefighting Run-Off	Water Impact: Category 1 (Major) Land Impact: Category 3 (Minor) Air Impact: Category 1 (Major)
8A	431	NW	438027 277399	Incident Date: 29-Aug-2001 Incident Identification: 27549 Pollutant: Atmospheric Pollutants and Effects Pollutant Description: Smoke	Water Impact: Category 1 (Major) Land Impact: Category 3 (Minor) Air Impact: Category 1 (Major)
9A	431	NW	438027 277399	Incident Date: 29-Aug-2001 Incident Identification: 27549 Pollutant: Contaminated Water Pollutant Description: Firefighting Run-Off	Water Impact: Category 1 (Major) Land Impact: Category 3 (Minor) Air Impact: Category 1 (Major)
10A	443	NW	438015 277403	Incident Date: 29-Aug-2001 Incident Identification: 27809 Pollutant: Atmospheric Pollutants and Effects:Atmospheric Pollutants and Effects:Contaminated Water Pollutant Description: Fumes:Smoke:Chemically Contaminated Run-Off	Water Impact: Category 3 (Minor) Land Impact: Category 3 (Minor) Air Impact: Category 2 (Significant)
11A	443	NW	438015 277403	Incident Date: 29-Aug-2001 Incident Identification: 27809 Pollutant: Atmospheric Pollutants and Effects Contaminated Water Pollutant Description: Fumes Smoke Chemically Contaminated Run-Off	Water Impact: Category 3 (Minor) Land Impact: Category 3 (Minor) Air Impact: Category 2 (Significant)
12A	443	NW	438015 277403	Incident Date: 29-Aug-2001 Incident Identification: 27809 Pollutant: Atmospheric Pollutants and Effects : Contaminated Water Pollutant Description: Fumes :Smoke :Chemically Contaminated Run-Off	Water Impact: Category 3 (Minor) Land Impact: Category 3 (Minor) Air Impact: Category 2 (Significant)
13A	443	NW	438015 277403	Incident Date: 29-Aug-2001 Incident Identification: 27809 Pollutant: Atmospheric Pollutants and Effects Pollutant Description: Fumes	Water Impact: Category 3 (Minor) Land Impact: Category 3 (Minor) Air Impact: Category 2 (Significant)
14A	443	NW	438015 277403	Incident Date: 29-Aug-2001 Incident Identification: 27809 Pollutant: Atmospheric Pollutants and Effects Pollutant Description: Smoke	Water Impact: Category 3 (Minor) Land Impact: Category 3 (Minor) Air Impact: Category 2 (Significant)
15A	443	NW	438015 277403	Incident Date: 29-Aug-2001 Incident Identification: 27809 Pollutant: Contaminated Water Pollutant Description: Chemically Contaminated Run-Off	Water Impact: Category 3 (Minor) Land Impact: Category 3 (Minor) Air Impact: Category 2 (Significant)

2.3.2 Records of National Incidents Recording System, List 1 within 500m of the study site:

0

Database searched and no data found.

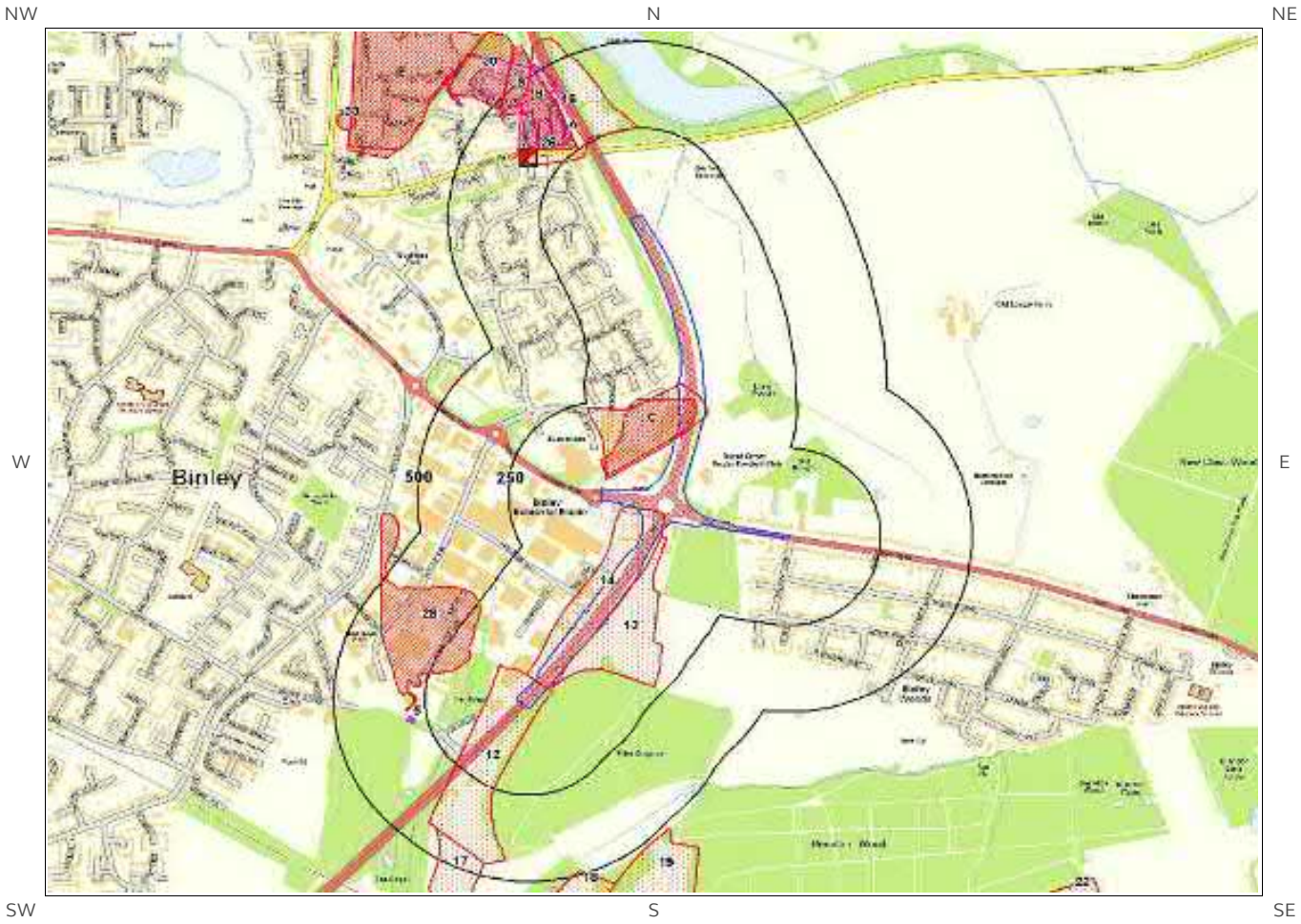
2.4 Sites Determined as Contaminated Land under Part 2A EPA 1990

How many records of sites determined as contaminated land under Section 78R of the Environmental Protection Act 1990 are there within 500m of the study site? 0

Database searched and no data found.

---

3. Landfill and Other Waste Sites Map



© Crown copyright and database rights 2017.
Ordnance Survey license 100035207.

Site Outline

250
500
Search Buffers (m)

EA/NRW Active Landfill

EA/NRW Historic Landfill

BGS / DoE Survey Landfill

Historic and Planned Waste Sites

EA/NRW Licensed Waste Site

Local Authority/Historical Mapping Landfill Records

3. Landfill and Other Waste Sites

3.1 Landfill Sites

3.1.1 Records from Environment Agency/Natural Resources Wales landfill data within 1000m of the study site:

0

Database searched and no data found.

3.1.2 Records of Environment Agency/Natural Resources Wales historic landfill sites within 1500m of the study site:

14

The following landfill records are represented as either points or polygons on the Landfill and Other Waste Sites map:

ID	Distance (m)	Direction	NGR	Details	
12	0	On Site	438200 276900	Site Address: Fosseway Sand and Gravel Company Limited, Landfill Site, Piles Coppice, Binley Woods, Near Rugby, Warwickshire Waste Licence: Yes Site Reference: R21, WDL026 Waste Type: Inert, Liquid sludge Environmental Permitting Regulations (Waste) Reference: -	Licence Issue: 14-Apr-1977 Licence Surrendered: 11-Jul-1989 Licence Holder Address: Grange Avenue, Binley, Coventry Operator: - Licence Holder: Fosseway Sand and Gravel Company Limited First Recorded: 31-Dec-1971 Last Recorded: 31-Dec-1981
13	0	On Site	438600 277300	Site Address: A428 Borrow Pit, Adjacent to Barn Antiques, Brandon Road, Coventry, Warwickshire Waste Licence: Yes Site Reference: WDL/319 Waste Type: Inert Environmental Permitting Regulations (Waste) Reference: -	Licence Issue: 15-Sep-1987 Licence Surrendered: Licence Holder Address: - Operator: - Licence Holder: A F Budge (Contractors) Limited First Recorded: 01-Aug-1987 Last Recorded: 31-Dec-1989
14	0	On Site	438600 277400	Site Address: A428 Borrow Pit, Binley, Coventry Waste Licence: - Site Reference: R20, 3700/3063 Waste Type: - Environmental Permitting Regulations (Waste) Reference: -	Licence Issue: Licence Surrendered: Licence Holder Address: - Operator: - Licence Holder: - First Recorded: - Last Recorded: -
15C	0	On Site	438700 277900	Site Address: Borrow Pit, North A428 Waste Licence: - Site Reference: R17, 3700/3060 Waste Type: Household Environmental Permitting Regulations (Waste) Reference: -	Licence Issue: Licence Surrendered: Licence Holder Address: - Operator: - Licence Holder: - First Recorded: 01-Jan-1970 Last Recorded: 31-Dec-1974

ID	Distance (m)	Direction	NGR	Details	
16	225	NW	438400 278800	Site Address: Coombe Fields, Binley, Coventry Waste Licence: - Site Reference: R05, 3700/3049 Waste Type: Industrial, Commercial Environmental Permitting Regulations (Waste) Reference: -	Licence Issue: 04-Jun-1980 Licence Surrendered: 06-Aug-1981 Licence Holder Address: - Operator: - Licence Holder: Coventry City Council First Recorded: 31-Dec-1926 Last Recorded: 05-Aug-1981
17	428	SW	438100 276600	Site Address: Harpers Lodge Landfill Site, Off Brandon Lane, Coventry, Warwickshire Waste Licence: Yes Site Reference: WDL/101 Waste Type: Inert Environmental Permitting Regulations (Waste) Reference: -	Licence Issue: 01-Sep-1977 Licence Surrendered: 01-Oct-1988 Licence Holder Address: 209 Torrington Avenue, Coventry Operator: - Licence Holder: F Clements Contractors Hire Limited First Recorded: 01-Jun-1977 Last Recorded: 31-Dec-1977
18	487	S	438500 276400	Site Address: F Clements Landfill Site, Brandon Lane, Along Railway Cutting, Coventry, Warwickshire Waste Licence: Yes Site Reference: WDL024 Waste Type: Inert Environmental Permitting Regulations (Waste) Reference: -	Licence Issue: 15-Apr-1977 Licence Surrendered: 05-Mar-1993 Licence Holder Address: 209 Torrington Avenue, Coventry Operator: - Licence Holder: F Clements Contractors Hire Limited First Recorded: 30-Jun-1976 Last Recorded: 31-Dec-1980
19	512	SE	438700 276500	Site Address: Brandon Lane, Disused Mineral Workings West of Brandon Wood, Brandon Lane, Willenhall, Coventry, Warwickshire Waste Licence: Yes Site Reference: 062, WDL/133 Waste Type: Inert, Industrial, Commercial Environmental Permitting Regulations (Waste) Reference: -	Licence Issue: 28-Sep-1979 Licence Surrendered: 18-Jul-1990 Licence Holder Address: Kiveton Lane, Kiveton Park, Kiveton, Sheffield, South Yorkshire Operator: - Licence Holder: Streetley Construction Materials Limited First Recorded: 28-Sep-1979 Last Recorded: 31-Dec-1989
20E	636	NW	438000 278900	Site Address: Coombe Estate, Binley, Coventry Waste Licence: - Site Reference: 4600.309 Waste Type: Inert Environmental Permitting Regulations (Waste) Reference: -	Licence Issue: Licence Surrendered: Licence Holder Address: - Operator: - Licence Holder: Coventry City Council First Recorded: 01-Jan-1950 Last Recorded: 31-Dec-1960
Not shown	726	S	438400 276200	Site Address: Pools Field, Brandon Quarry, Brandon Lane, Brandon, Willenhall, Coventry, Warwickshire Waste Licence: Yes Site Reference: WDL/335, 133, 062 Waste Type: Inert, Industrial, Commercial, Household Environmental Permitting Regulations (Waste) Reference: -	Licence Issue: 15-Feb-1988 Licence Surrendered: 01-Dec-1993 Licence Holder Address: Kinverton Park, Kinverton, Sheffield, South Yorkshire Operator: - Licence Holder: Streetley Quarry Products Limited First Recorded: 11-May-1988 Last Recorded: 01-Feb-1992
22	801	S	439400 276300	Site Address: Brandon Wood Farm,6635 and 7663, Brandon Lane, Brandon, Woston, Coventry Waste Licence: - Site Reference: R11, 3700/3054, 4600.304 Waste Type: Inert, Household Environmental Permitting Regulations (Waste) Reference: -	Licence Issue: Licence Surrendered: Licence Holder Address: - Operator: - Licence Holder: Mr A J Underwood First Recorded: 01-Jan-1968 Last Recorded: 31-Dec-1972

ID	Distance (m)	Direction	NGR	Details	
Not shown	961	S	438500 275800	Site Address: Streetley-Brandon Lane Concrete Works, Land at Brandon Lane Concrete Works, Brandon Lane, Willenhall, Coventry, Warwickshire Waste Licence: Yes Site Reference: WDL/414 Waste Type: Inert Environmental Permitting Regulations (Waste) Reference: -	Licence Issue: 10-Apr-1991 Licence Surrendered: 11-May-1992 Licence Holder Address: Kinverton Park, Kinverton, Sheffield, South Yorkshire Operator: - Licence Holder: Streetly Quarry Products Limited First Recorded: 12-Aug-1991 Last Recorded: 26-Mar-1992
Not shown	988	S	438200 275800	Site Address: Land South of Brandon Lane, Brandon Marsh, Brandon, Warwickshire Waste Licence: - Site Reference: 281, 3700/3025 Waste Type: - Environmental Permitting Regulations (Waste) Reference: -	Licence Issue: Licence Surrendered: Licence Holder Address: - Operator: - Licence Holder: - First Recorded: - Last Recorded: -
Not shown	1326	S	438300 275700	Site Address: Brandon Lane Tip, Brandon Lane Waste Licence: - Site Reference: 023, 3700/3007 Waste Type: - Environmental Permitting Regulations (Waste) Reference: -	Licence Issue: Licence Surrendered: Licence Holder Address: - Operator: - Licence Holder: - First Recorded: - Last Recorded: -

3.1.3 Records of BGS/DoE non-operational landfill sites within 1500m of the study site:

0

Database searched and no data found.

3.1.4 Records of Landfills from Local Authority and Historical Mapping Records within 1500m of the study site:

7

The following landfill records are represented as points or polygons on the Landfill and Other Waste Sites map:

ID	Distance (m)	Direction	NGR	Site Address	Source	Data Type
27C	0	On Site	438729 277891	Refuse Tip	1969 mapping	Polygon
28	173	NW	438134 277386	Disused Refuse Tip	1969 mapping	Polygon
29D	253	NW	438432 278871	Hawkes Tip (77 metres East of 14 Dunvegan Close, Coventry CV2 2PA)	Coventry City Council	Polygon
30	477	NW	438268 278950	Sharman's Yard (formerly) (223m East of 14 Dunvegan Close, Coventry, CV2 2PA)	Coventry City Council	Polygon
31D	484	NW	438329 278860	Hawkes Tip (77 metres East of 14 Dunvegan Close, Coventry CV2 2PA)	Coventry City Council	Polygon

ID	Distance (m)	Direction	NGR	Site Address	Source	Data Type
32E	635	NW	438093 278906	Coombe Park Estate, Coventry (Estate containing 14 Dunvegan Close, Coventry CV2 2PA)	Coventry City Council	Polygon
33	805	W	437902 278804	Coombe Park Estate	Historical Maps	Point

3.2 Other Waste Sites

3.2.1 Records of waste treatment, transfer or disposal sites within 500m of the study site:

11

The following waste treatment, transfer or disposal sites records are represented as points on the Landfill and Other Waste Sites map:

ID	Distance (m)	Direction	NGR	Details		
1A	279	NW	438511 278769	Type of Site: Scrap Yard Site Address: N/A	Planning Application Reference: N/A Date: 1993	Further Details: N/A Data Source: Historic Mapping Data Type: Polygon
2A	279	NW	438511 278769	Type of Site: Scrap Yard Site Address: N/A	Planning Application Reference: N/A Date: 1995	Further Details: N/A Data Source: Historic Mapping Data Type: Polygon
3A	280	NW	438511 278770	Type of Site: Scrap Yard Site Address: N/A	Planning Application Reference: N/A Date: 1959	Further Details: N/A Data Source: Historic Mapping Data Type: Polygon
4B	284	NW	438413 278862	Type of Site: Scrap Yard Site Address: N/A	Planning Application Reference: N/A Date: 1976	Further Details: N/A Data Source: Historic Mapping Data Type: Polygon
5	285	W	438079 277076	Type of Site: Refuse Pit Site Address: N/A	Planning Application Reference: N/A Date: 1925	Further Details: N/A Data Source: Historic Mapping Data Type: Polygon
6B	285	NW	438414 278863	Type of Site: Scrap Yard Site Address: N/A	Planning Application Reference: N/A Date: 1994	Further Details: N/A Data Source: Historic Mapping Data Type: Polygon
7B	285	NW	438414 278863	Type of Site: Scrap Yard Site Address: N/A	Planning Application Reference: N/A Date: 1994	Further Details: N/A Data Source: Historic Mapping Data Type: Polygon
8B	285	NW	438414 278863	Type of Site: Scrap Yard Site Address: N/A	Planning Application Reference: N/A Date: 1994	Further Details: N/A Data Source: Historic Mapping Data Type: Polygon
9B	285	NW	438414 278863	Type of Site: Scrap Yard Site Address: N/A	Planning Application Reference: N/A Date: 1993	Further Details: N/A Data Source: Historic Mapping Data Type: Polygon

ID	Distance (m)	Direction	NGR	Details		
10B	285	NW	438414 278863	Type of Site: Scrap Yard Site Address: N/A	Planning Application Reference: N/A Date: 1996	Further Details: N/A Data Source: Historic Mapping Data Type: Polygon
11D	328	NW	438330 278864	Type of Site: Ground Workings and Refuse Heap Site Address: N/A	Planning Application Reference: N/A Date: 1980	Further Details: N/A Data Source: Historic Mapping Data Type: Polygon

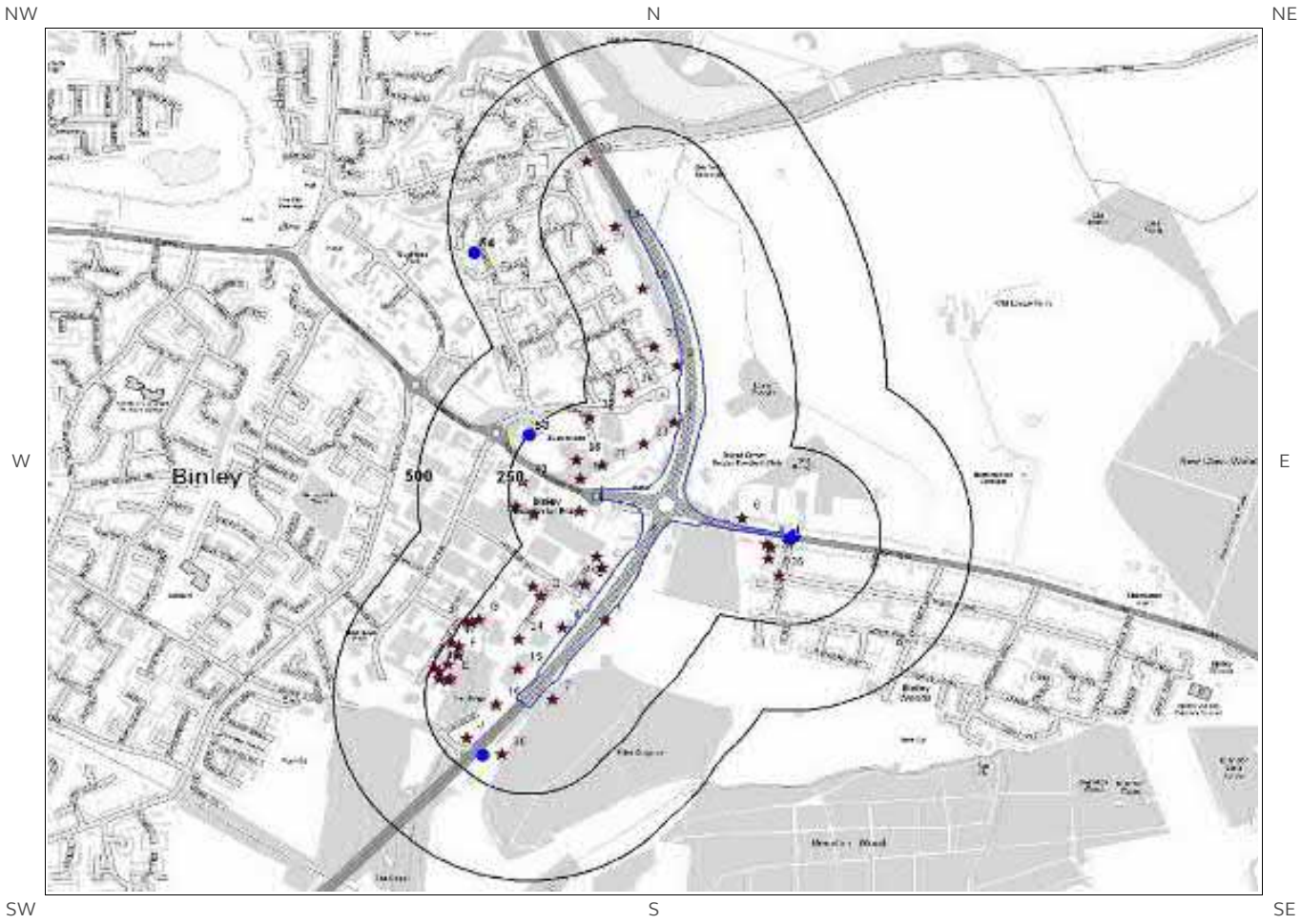
3.2.2 Records of Environment Agency/Natural Resources Wales licensed waste sites within 1500m of the study site:

1

The following waste treatment, transfer or disposal sites records are represented as points on the Landfill and Other Waste Sites map:

ID	Distance (m)	Direction	NGR	Details	
26	335	NW	438400 278700	Site Address: Coombe Fields, Coventry, West Midlands Type: Metal Recycling Site (Vehicle Dismantler) Size: < 25000 tonnes Environmental Permitting Regulations (Waste) Licence Number: SHA001 EPR reference: EA/EPR/QP3895CH/S002 Operator: Sharman J R Waste Management licence No: 48142 Annual Tonnage: 1780.0	Issue Date: 19/02/1996 Effective Date: - Modified: - Surrendered Date: 03/08/2001 Expiry Date: - Cancelled Date: - Status: Surrendered Site Name: - Correspondence Address: -

4. Current Land Use Map



© Crown copyright and database rights 2017.
Ordnance Survey license 100035207.

Site Outline

Search Buffers (m)
250
500

Current Industrial Sites

Petrol & Fuel Sites

Electricity Transmission Cables

Gas Transmission Pipelines

4. Current Land Uses

4.1 Current Industrial Data

Records of potentially contaminative industrial sites within 250m of the study site: 49

The following records are represented as points on the Current Land Uses map.

ID	Distance (m)	Direction	Company	NGR	Address	Activity	Category
1	0	On Site	Pylon	438610 277361	CV3	Electrical Features	Infrastructure and Facilities
2	11	W	Pylon	438807 278098	CV3	Electrical Features	Infrastructure and Facilities
3	15	W	Electricity Sub Station	438799 277933	CV3	Electrical Features	Infrastructure and Facilities
4	22	NW	T R I	438493 277342	Unit C2 Brandon Court, Progress Way, Binley Industrial Estate, Coventry, CV3 2TE	Clothing, Components and Accessories	Consumer Products
5A	26	S	Flash Detailing	439053 277583	60, Rugby Road, Binley Woods, Coventry, CV3 2AX	Vehicle Cleaning Services	Personal, Consumer and Other Services
6	27	N	M Chinn Wholesale	438984 277657	107, Rugby Road, Binley Woods, Coventry, CV3 2AY	Published Goods	Industrial Products
7	31	SE	Pylon	438466 277135	CV3	Electrical Features	Infrastructure and Facilities
8A	32	S	Binley Woods Service Centre	439062 277575	60, Rugby Road, Binley Woods, Coventry, CV3 2AX	Vehicle Repair, Testing and Servicing	Repair and Servicing
9A	34	S	Sandstone	439062 277573	60-62 Rugby Road, Binley Woods, Coventry, CV3 2AX	New Vehicles	Motoring
10C	34	NW	Tank	438601 277516	CV3	Tanks (Generic)	Industrial Features
11B	44	NW	Tangi-flow	438555 277464	Automatic House, Discovery Way, Leofric Business Park, Binley, Coventry, CV3 2TD	Mechanical Engineers	Engineering Services
12B	44	NW	Wickman Coventry Ltd	438555 277464	Automatic House, Discovery Way, Binley, Coventry, CV3 2TD	Tools Including Machine Shops	Industrial Products
13	47	SW	Pylon	438638 278499	CV3	Electrical Features	Infrastructure and Facilities
14	54	W	Pylon	438714 278320	CV3	Electrical Features	Infrastructure and Facilities
15	56	NW	Jabil	438370 277221	Progress Close, Binley, Coventry, CV3 2TF	Electrical Equipment Repair and Servicing	Repair and Servicing
16	58	W	Fraikin	438311 277120	Oak Tree Road, Binley, Coventry, CV3 2RR	Vehicle Hire and Rental	Hire Services

ID	Distance (m)	Direction	Company	NGR	Address	Activity	Category
17	63	NW	Electricity Sub Station	438542 277772	CV3	Electrical Features	Infrastructure and Facilities
18C	64	NW	Pylon	438585 277545	CV3	Electrical Features	Infrastructure and Facilities
19	66	SW	Electricity Sub Station	438539 277678	CV3	Electrical Features	Infrastructure and Facilities
20	66	S	Works	439057 277541	CV3	Unspecified Works Or Factories	Industrial Features
21	67	N	Electricity Sub Station	438602 277809	CV3	Electrical Features	Infrastructure and Facilities
22	71	W	R J O'Callaghan External Wall Insulation & Render Systems	438743 278152	9, Kingsholm Close, Binley, Coventry, CV3 2UQ	Construction Completion Services	Construction Services
23	80	W	Pylon	438716 277871	CV3	Electrical Features	Infrastructure and Facilities
24	99	NW	Electricity Sub Station	438373 277308	CV3	Electrical Features	Infrastructure and Facilities
25	105	NW	Morrisons Binley	438532 277824	Skipworth Road, Binley, Coventry, West Midlands, CV3 2XA	Petrol and Fuel Stations	Road and Rail
26	110	S	Electricity Sub Station	439086 277492	CV3	Electrical Features	Infrastructure and Facilities
27	114	SW	Electricity Sub Station	438598 278431	CV3	Electrical Features	Infrastructure and Facilities
28D	121	NW	Electricity Sub Station	438434 277431	CV3	Electrical Features	Infrastructure and Facilities
29	132	W	Tank	438675 278020	CV3	Tanks (Generic)	Industrial Features
30	153	SW	Mast	438326 276976	CV3	Telecommunications Features	Infrastructure and Facilities
31D	156	NW	Marposs	438412 277460	Progress Way, Binley Industrial Estate, Coventry, CV3 2TJ	Electrical and Electronic Engineers	Engineering Services
32J	176	SW	Oak Tree Garages	438232 277023	Oak Tree Road, Binley, Coventry, CV3 2RR	New Vehicles	Motoring
33H	186	W	Listers Seat Coventry	438415 277667	Brandon Road, Binley, Coventry, CV3 2AN	New Vehicles	Motoring
34E	190	W	Southstream Services Ltd	438187 277194	Unit 50 Hotchkiss Way,, Binley Industrial Estate, Coventry, CV3 2RL	Plate Makers, Print Finishers and Type Setters	IT, Advertising, Marketing and Media Services
35E	197	W	Covington Developments Ltd	438178 277188	64-68, Hotchkiss Way, Binley Industrial Estate, Coventry, CV3 2RL	Precision Engineers	Engineering Services
36F	203	NW	Chic Stone Ltd	438207 277260	Unit 20, Binley Industrial Estate, Coventry, CV3 2RL	Stone Quarrying and Preparation	Extractive Industries
37	208	N	Electricity Sub Station	438567 277948	CV3	Electrical Features	Infrastructure and Facilities
38	209	NW	Pylon	438560 278688	CV3	Electrical Features	Infrastructure and Facilities
39F	213	NW	S & H Jig Boring Specialists	438180 277235	42, Hotchkiss Way, Binley Industrial Estate, Coventry, CV3 2RL	Precision Engineers	Engineering Services

ID	Distance (m)	Direction	Company	NGR	Address	Activity	Category
40	214	W	Haddon & Abbotts	438384 277763	A S E Building, Brandon Road, Binley, Coventry, CV3 2AH	Precision Engineers	Engineering Services
41F	218	NW	Arena Auto Centre	438211 277287	Unit 10, Hotchkiss Way, Binley Industrial Estate, Coventry, CV3 2RL	Vehicle Repair, Testing and Servicing	Repair and Servicing
42G	219	NW	Holl & Holl Interiors Ltd	438266 277365	Unit 10, Lifford Way, Binley Industrial Estate, Coventry, CV3 2RN	Office and Shop Equipment	Industrial Products
43E	220	W	Hofmann Precision Balancing Ltd	438155 277193	60-62, Hotchkiss Way, Binley Industrial Estate, Coventry, CV3 2RL	Industrial Repairs and Servicing	Repair and Servicing
44E	226	W	Galaxy Seating	438156 277214	52-56, Hotchkiss Way, Binley Industrial Estate, Coventry, CV3 2RL	Office and Shop Equipment	Industrial Products
45G	231	NW	Engineering Systems Ltd	438243 277356	Unit 13, Lifford Way, Binley Industrial Estate, Coventry, CV3 2RN	Construction Completion Services	Construction Services
46H	231	W	Auto Sport Engineering	438367 277690	A S E Building, Brandon Road, Binley, Coventry, CV3 2AH	Precision Engineers	Engineering Services
47	240	NW	C A R Tooling Ltd	438191 277298	8, Hotchkiss Way, Binley Industrial Estate, Coventry, CV3 2RL	Precision Engineers	Engineering Services
48G	242	NW	Scratch & Dent Repair Centre	438231 277359	Unit 14, Lifford Way, Binley Industrial Estate, Coventry, CV3 2RN	Vehicle Repair, Testing and Servicing	Repair and Servicing
49	242	W	G T S S Engineers Supplies Ltd	438142 277224	58, Hotchkiss Way, Binley Industrial Estate, Coventry, CV3 2RL	General Construction Supplies	Industrial Products

4.2 Petrol and Fuel Sites

Records of petrol or fuel sites within 500m of the study site: 5

The following petrol or fuel site records provided by Catalist are represented as points on the Current Land Use map:

ID	Distance (m)	Direction	NGR	Company	Address	LPG	Status
50I	6	SE	439118 277596	Uk	Binley Woods Service Station, 60-62, Rugby Road, Rugby Road, Binley Woods, Coventry, Warwickshire, CV3 2AX	Not Applicable	Obsolete
51I	13	E	439128 277606	Obsolete	Popes Service Station, 135, Rugby Road, Rugby Road, Binley Woods, Coventry, Warwickshire, CV3 2AY	Not Applicable	Obsolete

ID	Distance (m)	Direction	NGR	Company	Address	LPG	Status
52J	186	SW	438277 276972	BP	Binley Woods Service Station, Coventry Eastern Bypass South, Coventry Eastern Bypass South, Binley Woods, Coventry, Warwickshire, CV3 2ZZ	Yes	Open
53	249	NW	438402 277897	Morrisons	Morrisons Binley, Skipworth Road, Skipworth Road, Binley, Coventry, West Midlands, CV3 2XA	Yes	Open
54	441	W	438250 278422	Murco	Murco Brandon Road, 3, Brandon Road, Brandon Road, Binley, Coventry, West Midlands, CV3 2JD	Not Applicable	Obsolete

4.3 National Grid High Voltage Underground Electricity Transmission Cables

This dataset identifies the high voltage electricity transmission lines running between generating power plants and electricity substations. The dataset does not include the electricity distribution network (smaller, lower voltage cables distributing power from substations to the local user network). This information has been extracted from databases held by National Grid and is provided for information only with no guarantee as to its completeness or accuracy. National Grid do not offer any warranty as to the accuracy of the available data and are excluded from any liability for any such inaccuracies or errors.

Records of National Grid high voltage underground electricity transmission cables within 500m of the study site: 0

Database searched and no data found.

4.4 National Grid High Pressure Gas Transmission Pipelines

This dataset identifies high-pressure, large diameter pipelines which carry gas between gas terminals, power stations, compressors and storage facilities. The dataset does not include the Local Transmission System (LTS) which supplies gas directly into homes and businesses. This information has been extracted from databases held by National Grid and is provided for information only with no guarantee as to its completeness or accuracy. National Grid do not offer any warranty as to the accuracy of the available data and are excluded from any liability for any such inaccuracies or errors.

Records of National Grid high pressure gas transmission pipelines within 500m of the study site: 0

Database searched and no data found.

5. Geology

5.1 Artificial Ground and Made Ground

The database has been searched on site, including a 50m buffer.

Lex Code	Description	Rock Type
WMGR-ARTDP	INFILLED GROUND	ARTIFICIAL DEPOSIT
MGR-ARTDP	MADE GROUND (UNDIVIDED)	ARTIFICIAL DEPOSIT

5.2 Superficial Ground and Drift Geology

The database has been searched on site, including a 50m buffer.

Lex Code	Description	Rock Type
BOSW-XCZ	BOSWORTH CLAY MEMBER	CLAY AND SILT
THT-DMTN	THRUSSINGTON MEMBER	DIAMICTON
BGSG-XSV	BAGINTON SAND AND GRAVEL FORMATION	SAND AND GRAVEL
RTD4-XSV	RIVER TERRACE DEPOSITS, 4	SAND AND GRAVEL
RTD4-XSV	RIVER TERRACE DEPOSITS, 4	SAND AND GRAVEL
THT-DMTN	THRUSSINGTON MEMBER	DIAMICTON
BGSG-XSV	BAGINTON SAND AND GRAVEL FORMATION	SAND AND GRAVEL
BOSW-XCZ	BOSWORTH CLAY MEMBER	CLAY AND SILT
BGSG-XSV	BAGINTON SAND AND GRAVEL FORMATION	SAND AND GRAVEL

5.3 Bedrock and Solid Geology

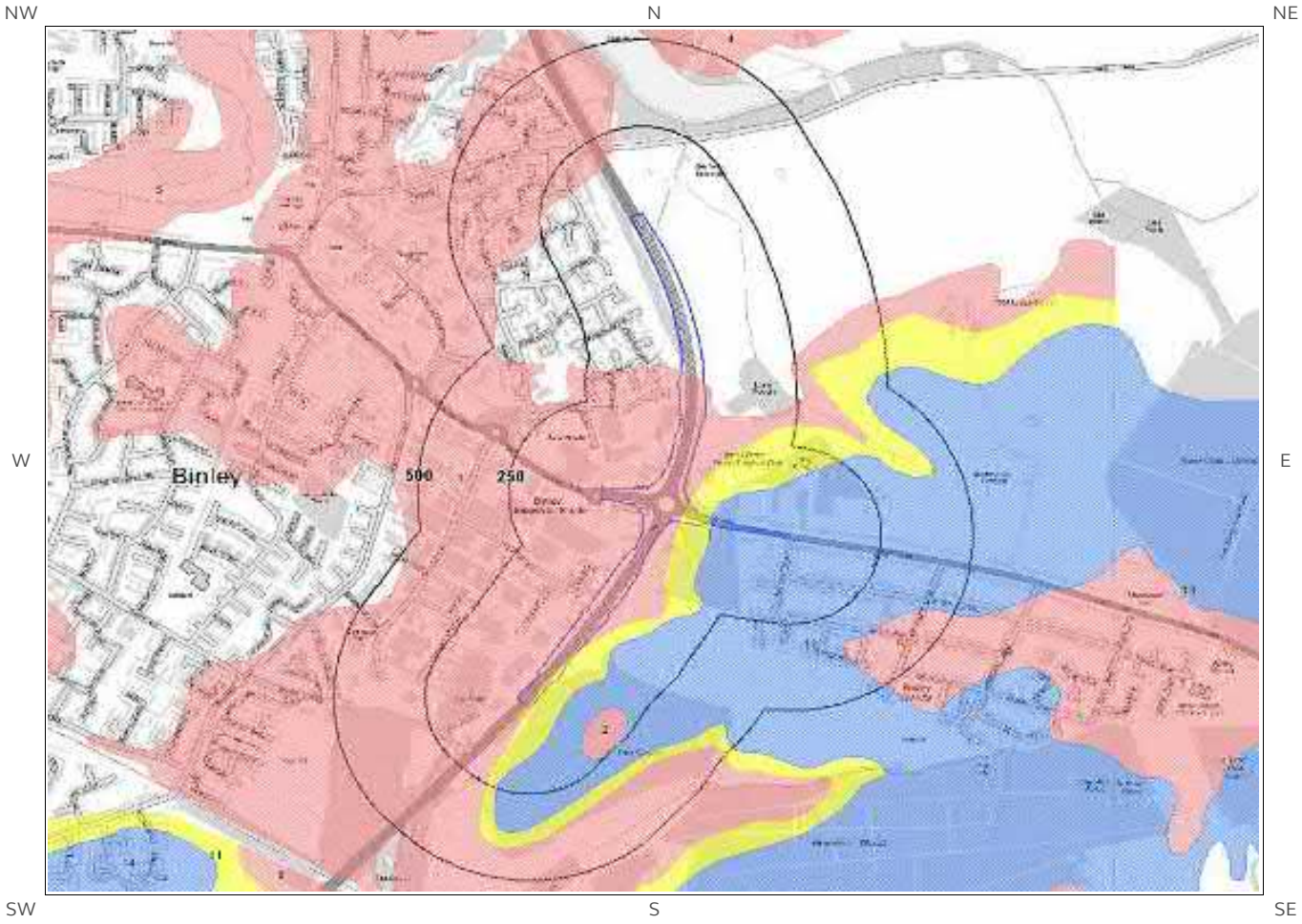
The database has been searched on site, including a 50m buffer.

Lex Code	Description	Rock Type
MMG-MDST	MERCIA MUDSTONE GROUP	MUDSTONE
MMG-MDST	MERCIA MUDSTONE GROUP	MUDSTONE

(Derived from the BGS 1:50,000 Digital Geological Map of Great Britain)

6 Hydrogeology and Hydrology

6a. Aquifer Within Superficial Geology



© Crown copyright and database rights 2017
Ordnance Survey license 100035207.

Site Outline

250
500
Search Buffers (m)

Principal Aquifer

Secondary (A) Aquifer - Permeable Layers

Secondary (B) Aquifer - Lower Permeability Layers

Secondary Aquifer - Undifferentiated Layers

Unproductive

Unknown (lakes and landslip)

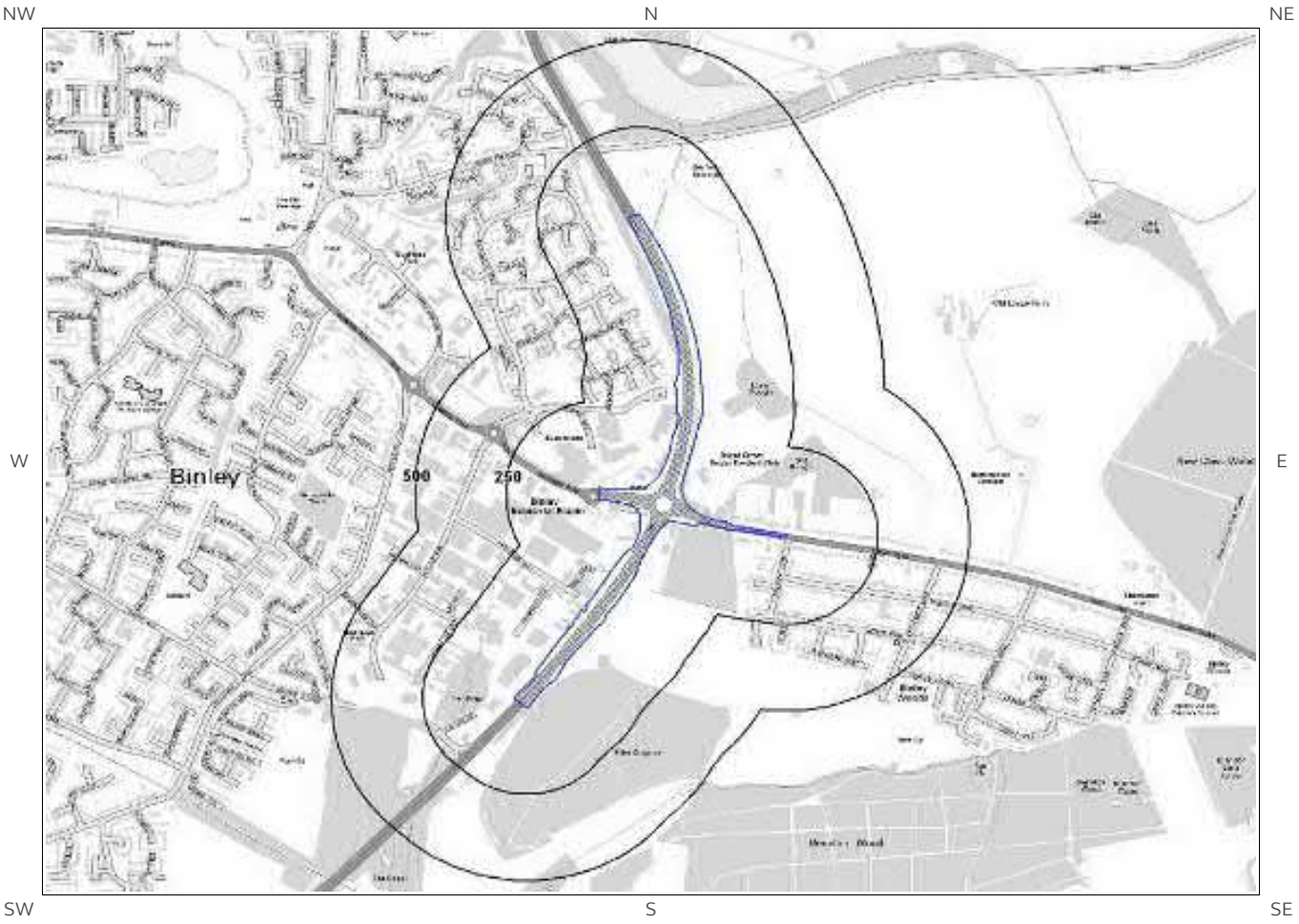
6b. Aquifer Within Bedrock Geology and Abstraction Licenses



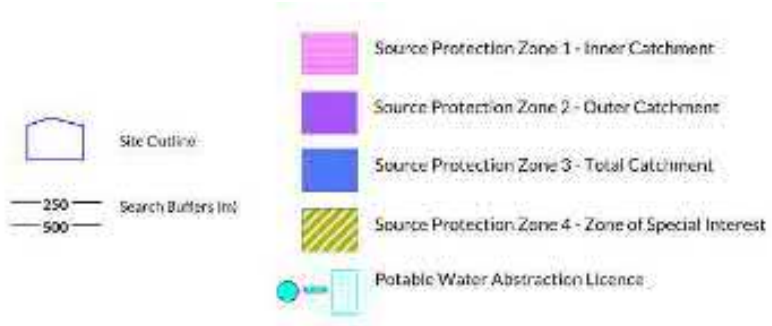
© Crown copyright and database rights 2017
Ordnance Survey license 100035207.

Site Outline
250
500
Search Buffers (m)
Principal Aquifer
Secondary (A) Aquifer - Permeable Layers
Secondary (B) Aquifer - Lower Permeability Layers
Groundwater Abstraction Licence
Secondary Aquifer - Undifferentiated Layers
Unproductive
Unknown (lakes and landslip)
Surface Water Abstraction Licence

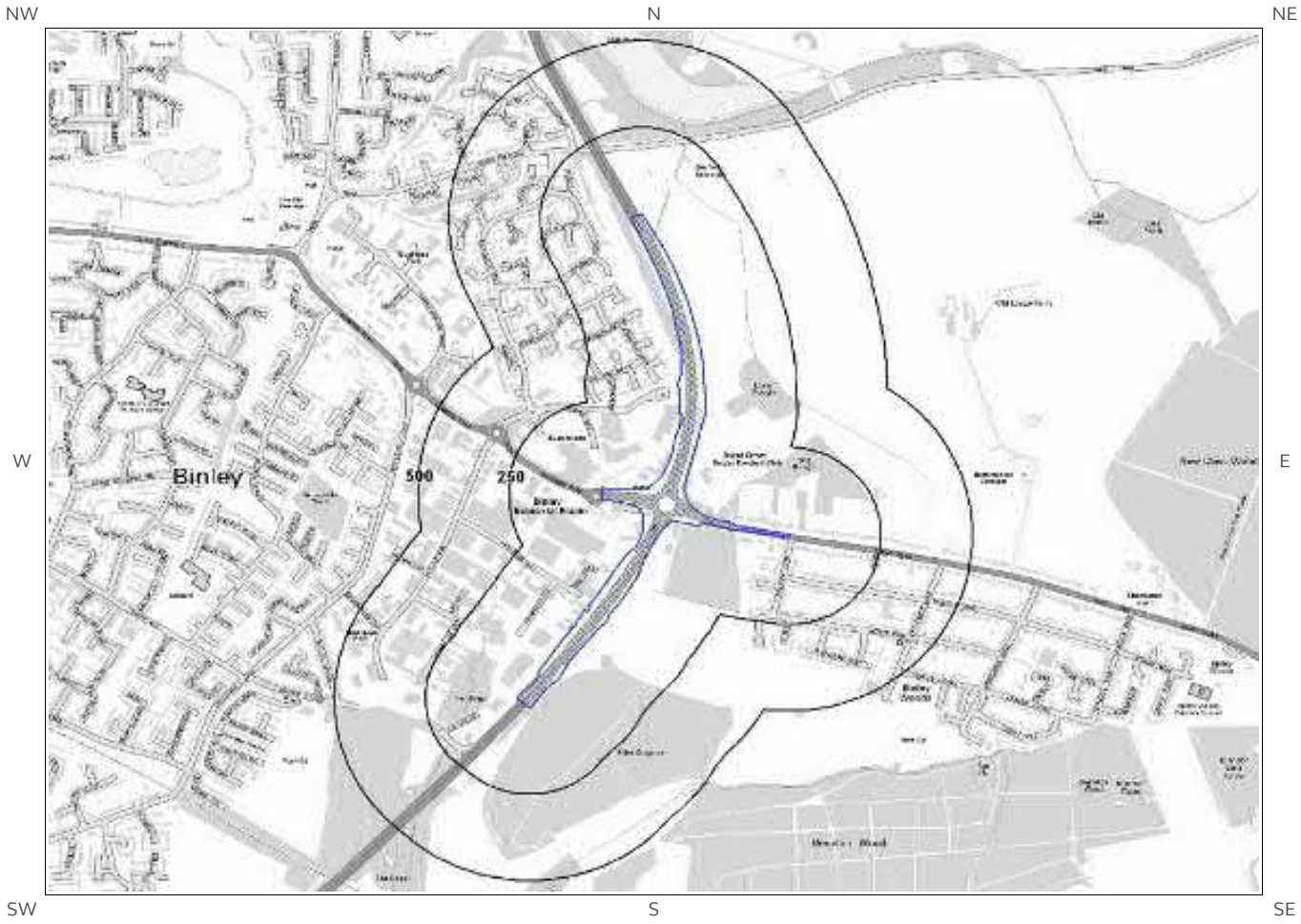
6c. Hydrogeology – Source Protection Zones and Potable Water Abstraction Licenses



© Crown copyright and database rights 2017
Ordnance Survey license 100035207.



6d. Hydrogeology – Source Protection Zones within confined aquifer



© Crown copyright and database rights 2017
Ordnance Survey license 100035207.

Site Outline

250
500
Search Buffers (m)

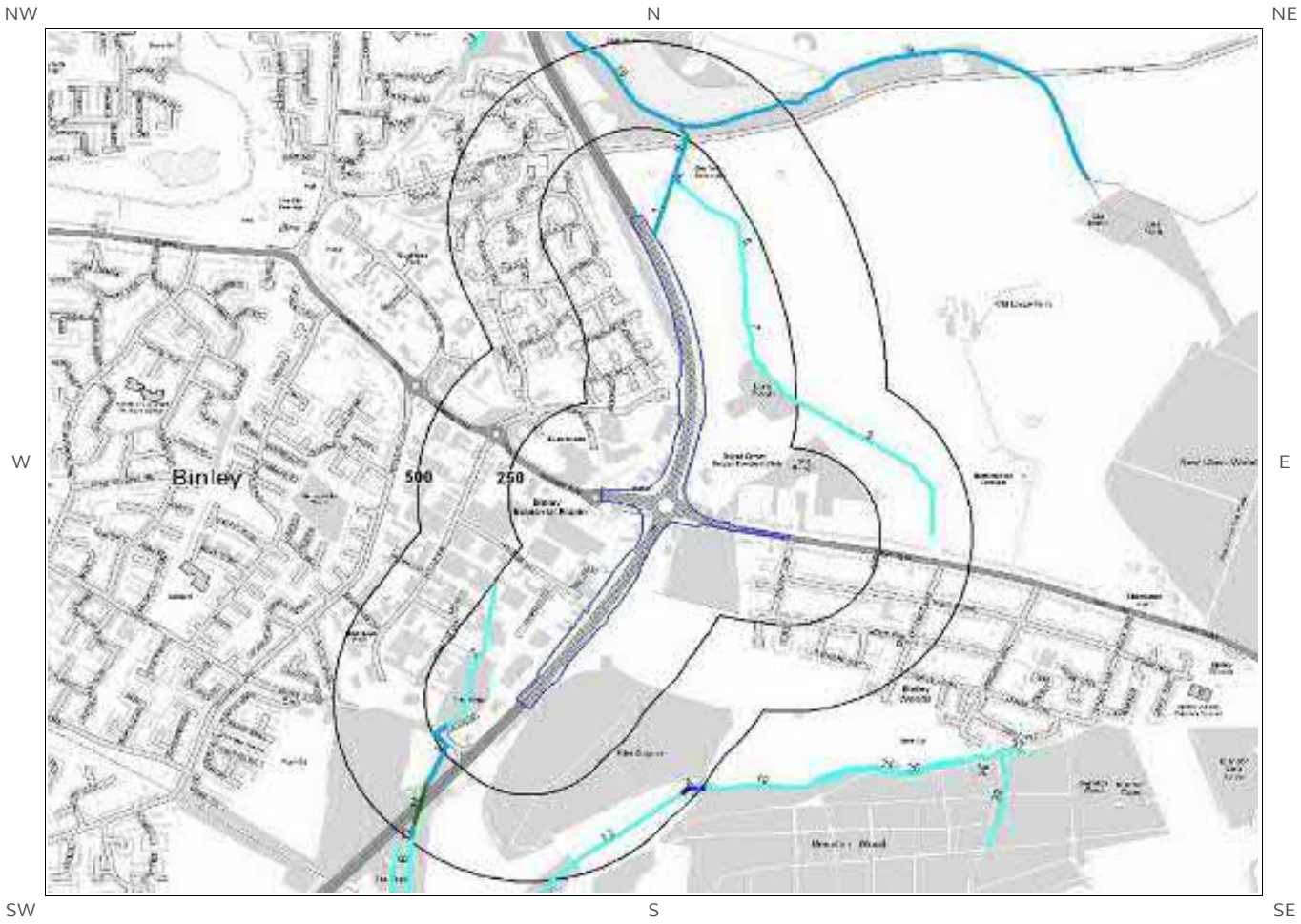
Source Protection Zone 1 - Inner Catchment

Source Protection Zone 2C - Outer Catchment within Confined Aquifer

Source Protection Zone 3C - Total Catchment within Confined Aquifer

Potable Water Abstraction Licence

6e. Hydrology – Detailed River Network and River Quality



© Crown copyright and database rights 2017.
Ordnance Survey license 100035207.

Site Outline

250
500
Search Buffers (m)

Primary River
Secondary River
Tertiary River
Lake/Reservoir
Underground River (inferred)
General Quality Assessment: Biology
General Quality Assessment: Chemistry

Canal
Canal Tunnel
Culvert
Multiple Channel Culvert
Underground River (Potential Sewer)
Underground River (local knowledge)

6.Hydrogeology and Hydrology

6.1 Aquifer within Superficial Deposits

Are there records of strata classification within the superficial geology at or in proximity to the property? Yes

From 1 April 2010, the Environment Agency/Natural Resources Wales's Groundwater Protection Policy has been using aquifer designations consistent with the Water Framework Directive. For further details on the designation and interpretation of this information, please refer to the Groundsure Enviro Insight User Guide.

The following aquifer records are shown on the Aquifer within Superficial Geology Map (6a):

ID	Distance (m)	Direction	Designation	Description
1	0	On Site	Secondary A	Permeable layers capable of supporting water supplies at a local rather than strategic scale, and in some cases forming an important source of base flow to rivers. These are generally aquifers formerly classified as minor aquifers
9	0	On Site	Secondary (undifferentiated)	Assigned where it is not possible to attribute either category A or B to a rock type. In general these layers have previously been designated as both minor and non-aquifer in different locations due to the variable characteristics of the rock type
12	0	On Site	Unproductive	These are rock layers or drift deposits with low permeability that have negligible significance for water supply or river base flow
2	144	SE	Secondary A	Permeable layers capable of supporting water supplies at a local rather than strategic scale, and in some cases forming an important source of base flow to rivers. These are generally aquifers formerly classified as minor aquifers
3	335	SE	Secondary A	Permeable layers capable of supporting water supplies at a local rather than strategic scale, and in some cases forming an important source of base flow to rivers. These are generally aquifers formerly classified as minor aquifers
4	431	N	Secondary A	Permeable layers capable of supporting water supplies at a local rather than strategic scale, and in some cases forming an important source of base flow to rivers. These are generally aquifers formerly classified as minor aquifers

6.2 Aquifer within Bedrock Deposits

Are there records of strata classification within the bedrock geology at or in proximity to the property? Yes

From 1 April 2010, the Environment Agency/Natural Resources Wales's Groundwater Protection Policy has been using aquifer designations consistent with the Water Framework Directive. For further details on the designation and interpretation of this information, please refer to the Groundsure Enviro Insight User Guide.

The following aquifer records are shown on the Aquifer within Bedrock Geology Map (6b):

ID	Distance (m)	Direction	Designation	Description
1	0	On Site	Secondary B	Predominantly lower permeability layers which may store/yield limited amounts of groundwater due to localised features such as fissures, thin permeablehorizons and weathering. These are generally the water-bearing parts of the former non-aquifers

6.3 Groundwater Abstraction Licences

Are there any Groundwater Abstraction Licences within 2000m of the study site? Yes

The following Abstraction Licences records are represented as points, lines and regions on the Aquifer within Bedrock Geology Map (6b):

ID	Distance (m)	Direction	NGR	Details	
Not shown	1180	S	438000 276000	Status: Historical Licence No: 18/54/10/0044 Details: General use relating to Secondary Category (Medium Loss) Direct Source: Groundwater Midlands Region Point: Brandon Quarry, Coventry - Borehole Data Type: Point Name: LAFARGE AGGREGATES LIMITED	Annual Volume (m^3): - Max Daily Volume (m^3): - Original Application No: - Original Start Date: 21/4/1966 Expiry Date: - Issue No: 102 Version Start Date: 11/6/2004 Version End Date:
Not shown	1440	S	438700 275700	Status: Active Licence No: 18/54/10/0026 Details: Make-Up Or Top Up Water Direct Source: Groundwater Midlands Region Point: Brandon Quarry, Coventry - Catchpits Data Type: Point Name: Breedon Southern Limited	Annual Volume (m^3): 15000 Max Daily Volume (m^3): 400 Original Application No: NPS/WR/025982 Original Start Date: 8/3/1966 Expiry Date: - Issue No: 107 Version Start Date: 15/8/2017 Version End Date:
Not shown	1440	S	438700 275700	Status: Historical Licence No: 18/54/10/0026 Details: Lake & Pond Throughflow Direct Source: Groundwater Midlands Region Point: Brandon Quarry, Coventry - Catchpits Data Type: Point Name: Lafarge SPV Limited	Annual Volume (m^3): 45000 Max Daily Volume (m^3): 200 Original Application No: NPS/WR/011560 Original Start Date: 8/3/1966 Expiry Date: - Issue No: 105 Version Start Date: 27/11/2012 Version End Date:
Not shown	1440	S	438700 275700	Status: Active Licence No: 18/54/10/0026 Details: Process Water Direct Source: Groundwater Midlands Region Point: Brandon Quarry, Coventry - Catchpits Data Type: Point Name: Breedon Southern Limited	Annual Volume (m^3): 15000 Max Daily Volume (m^3): 400 Original Application No: NPS/WR/025982 Original Start Date: 8/3/1966 Expiry Date: - Issue No: 107 Version Start Date: 15/8/2017 Version End Date:
Not shown	1612	S	438500 275500	Status: Historical Licence No: 18/54/10/0026 Details: Process water Direct Source: Groundwater Midlands Region Point: Brandon Quarry, Coventry - Catchpits Data Type: Point Name: LAFARGE REDLAND AGGREGATES LIMITED	Annual Volume (m^3): - Max Daily Volume (m^3): - Original Application No: - Original Start Date: 8/3/1966 Expiry Date: - Issue No: 101 Version Start Date: 1/4/2001 Version End Date:

6.4 Surface Water Abstraction Licences

Are there any Surface Water Abstraction Licences within 2000m of the study site? Yes

The following Surface Water Abstraction Licences records are represented as points, lines and regions on the Aquifer within Bedrock Geology Map (6b):

ID	Distance (m)	Direction	NGR	Details	
8	865	E	439650 278570	Status: Active Licence No: 18/54/11/0122 Details: Spray Irrigation - Storage Direct Source: Surface Water Midlands Region Point: Old Lodge Farm, Binley - Tributary Of River Sowe Data Type: Point Name: ROLAND HILL & SON	Annual Volume (m^3): 40730 Max Daily Volume (m^3): 605 Application No: - Original Start Date: 15/5/1985 Expiry Date: - Issue No: 100 Version Start Date: 15/5/1985 Version End Date:
Not shown	1981	SE	440310 275740	Status: Active Licence No: 18/54/10/0169 Details: Spray Irrigation - Direct Direct Source: Surface Water Midlands Region Point: Land At Grove Farm, Wolston - River Avon (2) Data Type: Line Name: GOLDSTRAW	Annual Volume (m^3): 4340 Max Daily Volume (m^3): 310 Application No: - Original Start Date: 20/3/1984 Expiry Date: - Issue No: 100 Version Start Date: 7/12/1995 Version End Date:

6.5 Potable Water Abstraction Licences

Are there any Potable Water Abstraction Licences within 2000m of the study site? No

Database searched and no data found.

6.6 Source Protection Zones

Are there any Source Protection Zones within 500m of the study site? No

Database searched and no data found.

6.7 Source Protection Zones within Confined Aquifer

Are there any Source Protection Zones within the Confined Aquifer within 500m of the study site? No

Historically, Source Protection Zone maps have been focused on regulation of activities which occur at or near the ground surface, such as prevention of point source pollution and bacterial contamination of water supplies. Sources in confined aquifers were often considered to be protected from these surface pressures due to the presence of a low permeability confining layer (e.g. glacial till, clay). The increased interest in subsurface activities such as onshore oil and gas exploration, ground source heating and cooling requires protection zones for confined sources to be marked on SPZ maps where this has not already been done.

Database searched and no data found.

6.8 Groundwater Vulnerability and Soil Leaching Potential

Is there any Environment Agency/Natural Resources Wales information on groundwater vulnerability and soil leaching potential within 500m of the study site? Yes

Distance (m)	Direction	Classification	Soil Vulnerability Category	Description
0	On Site	Minor Aquifer/High Leaching Potential	HU	Soil information for urban areas and restored mineral workings. These soils are therefore assumed to be highly permeable in the absence of site-specific information.
0	On Site	Minor Aquifer/High Leaching Potential	H2	Deep, permeable, coarse textured soils which readily transmit a wide range of pollutants because of their rapid drainage and low attenuation potential.
163	NW	Minor Aquifer/High Leaching Potential	H2	Deep, permeable, coarse textured soils which readily transmit a wide range of pollutants because of their rapid drainage and low attenuation potential.
300	SE	Minor Aquifer/High Leaching Potential	H2	Deep, permeable, coarse textured soils which readily transmit a wide range of pollutants because of their rapid drainage and low attenuation potential.
312	SE	Minor Aquifer/High Leaching Potential	H2	Deep, permeable, coarse textured soils which readily transmit a wide range of pollutants because of their rapid drainage and low attenuation potential.
440	N	Minor Aquifer/High Leaching Potential	H2	Deep, permeable, coarse textured soils which readily transmit a wide range of pollutants because of their rapid drainage and low attenuation potential.

6.9 River Quality

Is there any Environment Agency/Natural Resources Wales information on river quality within 1500m of the study site? Yes

6.9.1 Biological Quality:

Database searched and no data found.

6.9.2 Chemical Quality:

Chemical quality data is based on the General Quality Assessment Headline Indicators scheme (GQAHI). In England, each chemical sample is measured for ammonia and dissolved oxygen. In Wales, the samples are measured for biological oxygen demand (BOD), ammonia and dissolved oxygen. The results are graded from A ('Very Good') to F ('Bad').

The following Chemical Quality records are shown on the Hydrology Map (6e):

					Chemical Quality Grade				
ID	Distance (m)	Direction	NGR	River Quality Grade	2005	2006	2007	2008	2009
Not shown	723	N	438480 279220	River Name: Smite Bk Reach: Coombe Pool Outlet To Conf R Sowe End/Start of Stretch: Start of Stretch NGR	C	C	C	C	C
Not shown	723	N	438480 279220	River Name: Smite Bk Reach: Fb Nr Smeaton Lane To Coombe Pool Outlet End/Start of Stretch: End of Stretch NGR	B	B	B	B	B
Not shown	1104	NW	438030 279410	River Name: Smite Bk Reach: Coombe Pool Outlet To Conf R Sowe End/Start of Stretch: Sample Point NGR	C	C	C	C	C
Not shown	1179	NW	438000 279480	River Name: Smite Bk Reach: Coombe Pool Outlet To Conf R Sowe End/Start of Stretch: End of Stretch NGR	C	C	C	C	C

6.10 Detailed River Network

Are there any Detailed River Network entries within 500m of the study site? Yes

The following Detailed River Network records are represented on the Hydrology Map (6e):

ID	Distance (m)	Direction	Details	
1	3	NE	River Name: - Welsh River Name: - Alternative Name: -	River Type: Secondary River Main River Status: Currently Undefined
2	128	W	River Name: - Welsh River Name: - Alternative Name: -	River Type: Tertiary River Main River Status: Currently Undefined
3	138	E	River Name: - Welsh River Name: - Alternative Name: -	River Type: Tertiary River Main River Status: Currently Undefined
4	139	NE	River Name: - Welsh River Name: - Alternative Name: -	River Type: Secondary River Main River Status: Currently Undefined
5	139	NE	River Name: - Welsh River Name: - Alternative Name: -	River Type: Tertiary River Main River Status: Currently Undefined
6	140	NE	River Name: - Welsh River Name: - Alternative Name: -	River Type: Secondary River Main River Status: Currently Undefined
7	143	E	River Name: - Welsh River Name: - Alternative Name: -	River Type: Tertiary River Main River Status: Currently Undefined
8	200	W	River Name: - Welsh River Name: - Alternative Name: -	River Type: Secondary River Main River Status: Currently Undefined
9	281	N	River Name: - Welsh River Name: - Alternative Name: -	River Type: Secondary River Main River Status: Currently Undefined
10	281	N	River Name: - Welsh River Name: - Alternative Name: -	River Type: Secondary River Main River Status: Currently Undefined
11	344	SW	River Name: - Welsh River Name: - Alternative Name: -	River Type: Culvert Main River Status: Currently Undefined
12	440	SE	River Name: - Welsh River Name: - Alternative Name: -	River Type: Tertiary River Main River Status: Currently Undefined
13	458	SW	River Name: - Welsh River Name: - Alternative Name: -	River Type: Secondary River Main River Status: Currently Undefined
14A	471	SE	River Name: - Welsh River Name: - Alternative Name: -	River Type: Lake/Reservoir Main River Status: Currently Undefined
15A	489	SE	River Name: - Welsh River Name: - Alternative Name: -	River Type: Tertiary River Main River Status: Currently Undefined
16A	491	SE	River Name: - Welsh River Name: - Alternative Name: -	River Type: Lake/Reservoir Main River Status: Currently Undefined
17B	495	SW	River Name: - Welsh River Name: - Alternative Name: -	River Type: Tertiary River Main River Status: Currently Undefined

6.11 Surface Water Features

Are there any surface water features within 250m of the study site? Yes

The following surface water records are not represented on mapping:

Distance (m)	Direction
3	NW
58	SE
128	W
138	NE
139	NE
140	E
142	E
166	NE
226	NW

7a. Environment Agency/Natural Resources Wales Flood Map for Planning (from rivers and the sea)



© Crown copyright and database rights 2017.
Ordnance Survey license 100035207.

Site Outline

100
250
Search Buffers (m)

Zone 2 Floodplain

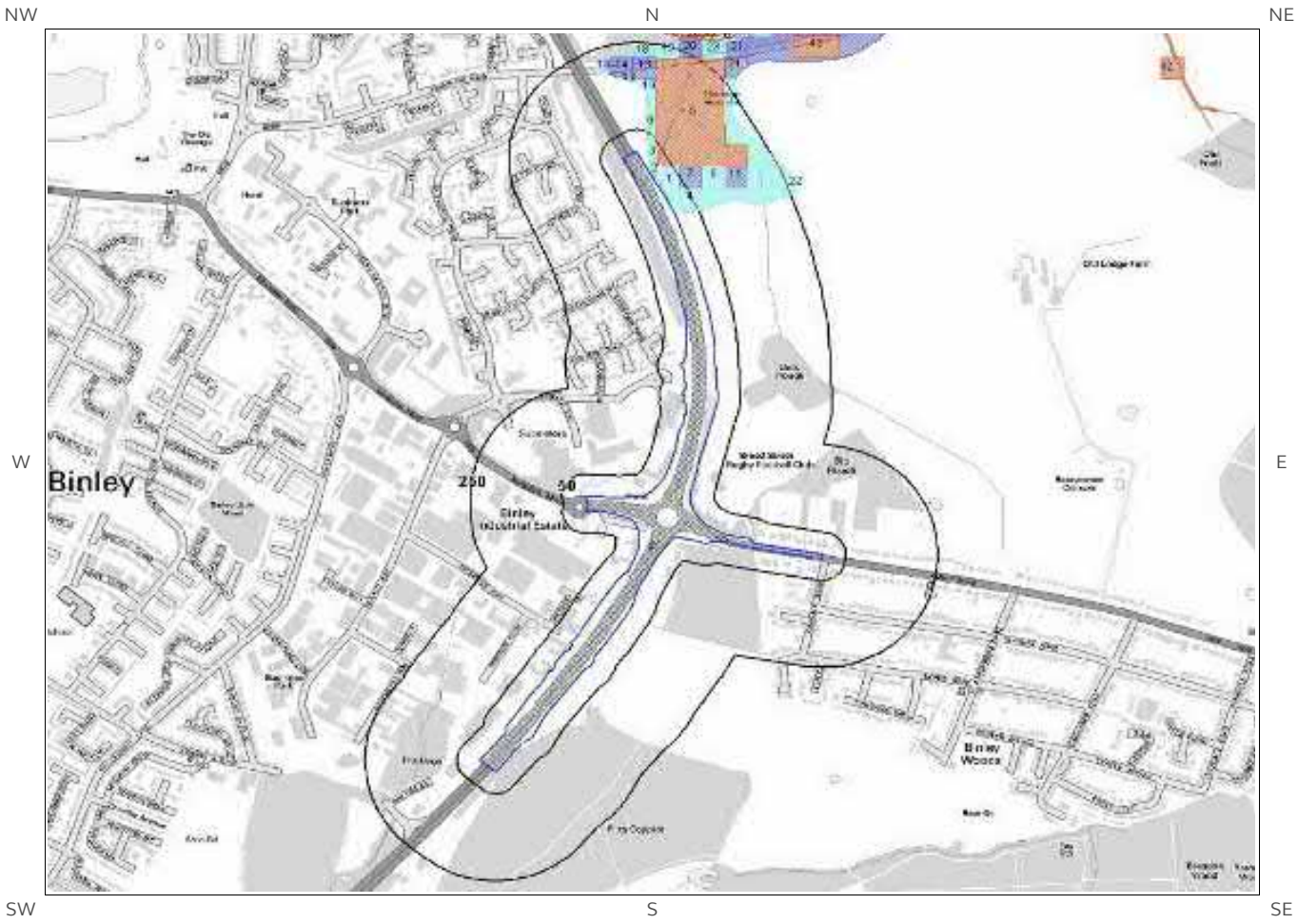
Zone 3 Floodplain

Flood Defences

Area used for Flood Storage

Area Benefiting from Flood Defences

7b. Environment Agency/Natural Resources Wales Risk of Flooding from Rivers and the Sea (RoFRaS) Map



© Crown copyright and database rights 2017.
Ordnance Survey license 100035207.

Site Outline

100
250
Search Buffers (m)

RoFRaS Rating

Very Low

Low

Medium

High

7 Flooding

7.1 River and Coastal Zone 2 Flooding

Is the site within 250m of an Environment Agency/Natural Resources Wales Zone 2 floodplain? Yes

Environment Agency/Natural Resources Wales Zone 2 floodplains estimate the annual probability of flooding as between 1 in 1000 (0.1%) and 1 in 100 (1%) from rivers and between 1 in 1000 (0.1%) and 1 in 200 (0.5%) from the sea. Any relevant data is represented on Map 7a – Flood Map for Planning:

ID	Distance (m)	Direction	Update	Type
1A	0	NE	17-Aug-2017	Zone 2 - (Fluvial /Tidal Models)

7.2 River and Coastal Zone 3 Flooding

Is the site within 250m of an Environment Agency/Natural Resources Wales Zone 3 floodplain? Yes

Zone 3 shows the extent of a river flood with a 1 in 100 (1%) or greater chance of occurring in any year or a sea flood with a 1 in 200 (0.5%) or greater chance of occurring in any year. Any relevant data is represented on Map 7a – Flood Map for Planning.

ID	Distance (m)	Direction	Update	Type
1A	20	NE	22-Aug-2017	Zone 3 - (Fluvial Models)

7.3 Risk of Flooding from Rivers and the Sea (RoFRaS) Flood Rating

What is the highest risk of flooding onsite? Low

The Environment Agency/Natural Resources Wales RoFRaS database provides an indication of river and coastal flood risk at a national level on a 50m grid with the flood rating at the centre of the grid calculated and given above. The data considers the probability that the flood defences will overtop or breach by considering their location, type, condition and standard of protection.

RoFRaS data for the study site indicates the property is in an area with a Low (greater than 1 in 1000 but less than 1 in 100) chance of flooding in any given year.

Any relevant data within 250m is represented on the RoFRaS Flood map. Data to 50m is reported in the table below.

ID	Distance (m)	Direction	RoFRas flood Risk
1	0.0	NE	Low
2	1.0	NE	Low

3	10.0	NE	Low
4	11.0	NE	Low
5	18.0	NE	High
6	27.0	NE	Low
7	35.0	NE	Medium

7.4 Flood Defences

Are there any Flood Defences within 250m of the study site? No

Database searched and no data found.

7.5 Areas benefiting from Flood Defences

Are there any areas benefiting from Flood Defences within 250m of the study site? No

7.6 Areas benefiting from Flood Storage

Are there any areas used for Flood Storage within 250m of the study site? No

7.7 Groundwater Flooding Susceptibility Areas

7.7.1 Are there any British Geological Survey groundwater flooding susceptibility areas within 50m of the boundary of the study site? Yes

Does this relate to Clearwater Flooding or Superficial Deposits Flooding? Superficial Deposits Flooding

Notes: Groundwater flooding may either be associated with shallow unconsolidated sedimentary aquifers which overlie unproductive aquifers (Superficial Deposits Flooding), or with unconfined aquifers (Clearwater Flooding).

7.7.2 What is the highest susceptibility to groundwater flooding in the search area based on the underlying geological conditions?

Potential at Surface

Where potential for groundwater flooding to occur at surface is indicated, this means that given the geological conditions in the area groundwater flooding hazard should be considered in all land-use planning decisions. It is recommended that other relevant information e.g. records of previous incidence of groundwater flooding, rainfall, property type, and land drainage information be investigated in order to establish relative, but not absolute, risk of groundwater flooding.

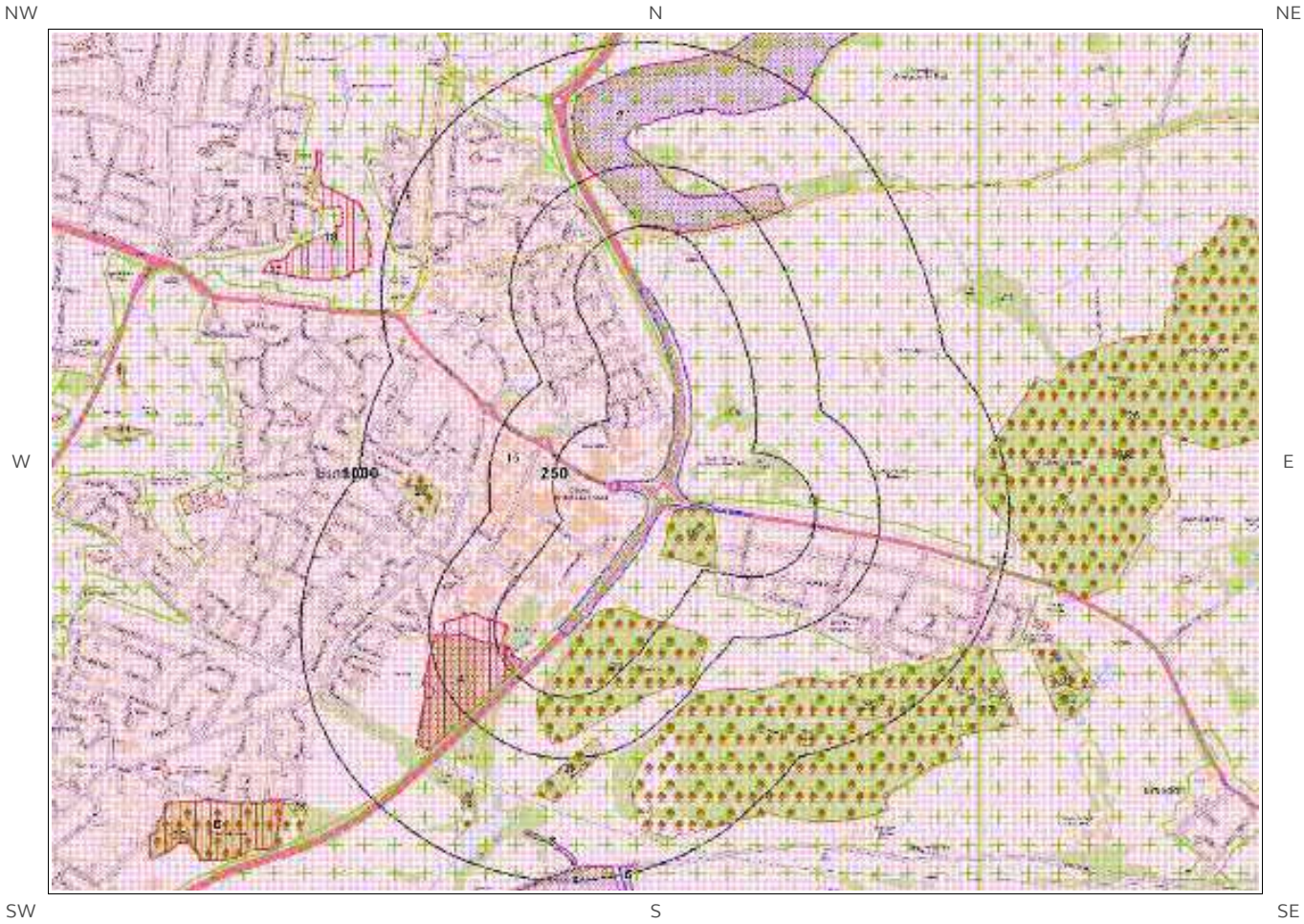
7.8 Groundwater Flooding Confidence Areas

What is the British Geological Survey confidence rating in this result?	High

Notes: Groundwater flooding is defined as the emergence of groundwater at the ground surface or the rising of groundwater into man-made ground under conditions where the normal range of groundwater levels is exceeded.

The confidence rating is on a threefold scale - Low, Moderate and High. This provides a relative indication of the BGS confidence in the accuracy of the susceptibility result for groundwater flooding. This is based on the amount and precision of the information used in the assessment. In areas with a relatively lower level of confidence the susceptibility result should be treated with more caution. In other areas with higher levels of confidence the susceptibility result can be used with more confidence.

8. Designated Environmentally Sensitive Sites Map



© Crown copyright and database rights 2017.
Ordnance Survey license 100035207.



8. Designated Environmentally Sensitive Sites

Presence of Designated Environmentally Sensitive Sites within 2000m of the study site? Yes

8.1 Records of Sites of Special Scientific Interest (SSSI) within 2000m of the study site:

11

The following Site of Special Scientific Interest (SSSI) records provided by Natural England/Natural Resources Wales are represented as polygons on the Designated Environmentally Sensitive Sites Map:

ID	Distance (m)	Direction	SSSI Name	Data Source
1A	193	SW	Herald Way Marsh	Natural England
2	241	N	Combe Pool	Natural England
3	810	S	Ryton and Brandon Gravel Pits	Natural England
4	945	S	Brandon Marsh	Natural England
5	963	S	Ryton and Brandon Gravel Pits	Natural England
Not shown	1226	S	Brandon Marsh	Natural England
Not shown	1256	S	Brandon Marsh	Natural England
Not shown	1547	S	Brandon Marsh	Natural England
Not shown	1745	NE	Combe Pool	Natural England
Not shown	1780	S	Brandon Marsh	Natural England
Not shown	1795	S	Brandon Marsh	Natural England

8.2 Records of National Nature Reserves (NNR) within 2000m of the study site:

0

Database searched and no data found.

8.3 Records of Special Areas of Conservation (SAC) within 2000m of the study site:

0

Database searched and no data found.

8.4 Records of Special Protection Areas (SPA) within 2000m of the study site:

0

Database searched and no data found.

8.5 Records of Ramsar sites within 2000m of the study site:

0

Database searched and no data found.

8.6 Records of Ancient Woodland within 2000m of the study site:

17

The following records of Designated Ancient Woodland provided by Natural England/Natural Resources Wales are represented as polygons on the Designated Environmentally Sensitive Sites Map:

ID	Distance (m)	Direction	Ancient Woodland Name	Data Source
19	3	S	UNKNOWN	Ancient and Semi-Natural Woodland
20	16	SE	UNKNOWN	Ancient and Semi-Natural Woodland
21	429	S	UNKNOWN	Ancient and Semi-Natural Woodland
22	517	SE	UNKNOWN	Ancient Replanted Woodland
23	661	NW	UNKNOWN	Ancient and Semi-Natural Woodland
24	705	SW	UNKNOWN	Ancient and Semi-Natural Woodland
25	834	SE	UNKNOWN	Ancient and Semi-Natural Woodland
26	875	E	UNKNOWN	Ancient and Semi-Natural Woodland
27	1117	SE	UNKNOWN	Ancient and Semi-Natural Woodland
28	1208	SW	UNKNOWN	Ancient Replanted Woodland
29	1217	SE	UNKNOWN	Ancient and Semi-Natural Woodland
30B	1271	SW	UNKNOWN	Ancient and Semi-Natural Woodland
31	1307	SE	UNKNOWN	Ancient Replanted Woodland
32	1366	SE	UNKNOWN	Ancient and Semi-Natural Woodland
33	1654	SW	UNKNOWN	Ancient Replanted Woodland
34	1774	NW	UNKNOWN	Ancient and Semi-Natural Woodland
35	1948	W	UNKNOWN	Ancient and Semi-Natural Woodland

8.7 Records of Local Nature Reserves (LNR) within 2000m of the study site:

3

The following Local Nature Reserve (LNR) records provided by Natural England/Natural Resources Wales are represented as polygons on the Designated Environmentally Sensitive Sites Map:

ID	Distance (m)	Direction	LNR Name	Data Source
12A	196	W	Herald Way Marsh	Natural England
13	1052	W	Stoke Floods	Natural England
14B	1276	SW	Willenhall Wood	Natural England

8.8 Records of World Heritage Sites within 2000m of the study site:

0

Database searched and no data found.

8.9 Records of Environmentally Sensitive Areas within 2000m of the study site:

0

Database searched and no data found.

8.10 Records of Areas of Outstanding Natural Beauty (AONB) within 2000m of the study site:

0

Database searched and no data found.

8.11 Records of National Parks (NP) within 2000m of the study site:

0

Database searched and no data found.

8.12 Records of Nitrate Sensitive Areas within 2000m of the study site:

0

Database searched and no data found.

8.13 Records of Nitrate Vulnerable Zones within 2000m of the study site:

4

The following Nitrate Vulnerable Zone records produced by DEFRA are represented as polygons on the Designated Environmentally Sensitive Sites Map:

ID	Distance (m)	Direction	NVZ Name	Data Source
15	0	On Site	Existing	DEFRA
16	885	E	Existing	DEFRA
Not shown	1466	N	Existing	DEFRA

ID	Distance (m)	Direction	NVZ Name	Data Source
Not shown	1954	NE	Existing	DEFRA

8.14 Records of Green Belt land within 2000m of the study site:

5

Green Belt data contains Ordnance Survey data © Crown copyright and database right [2015].

ID	Distance	Direction	Green Belt Name	Local Authority Name
36	0	On Site	Birmingham Greenbelt	Rugby District (B)
37	585	NW	Birmingham Greenbelt	Coventry District (B)
38	885	E	Birmingham Greenbelt	Rugby District (B)
Not shown	1466	N	Birmingham Greenbelt	Rugby District (B)
Not shown	1954	NE	Birmingham Greenbelt	Rugby District (B)

9. Natural Hazards Findings

9.1 Detailed BGS GeoSure Data

BGS GeoSure Data has been searched to 50m. The data is included in tabular format. If you require further information on geology and ground stability, please obtain a Groundsure Geo Insight, available from our website. The following information has been found:

9.1.1 Shrink Swell

What is the maximum Shrink-Swell*[*] hazard rating identified on the study site? Low

The following natural subsidence information provided by the British Geological Survey is not represented on mapping:

Hazard
Ground conditions predominantly medium plasticity. Do not plant trees with high soil moisture demands near to buildings. For new build, consideration should be given to advice published by the National House Building Council (NHBC) and the Building Research Establishment (BRE). There is a possible increase in construction cost to reduce potential shrink-swell problems. For existing property, there is a possible increase in insurance risk, especially during droughts or where vegetation with high moisture demands is present.

9.1.2 Landslides

What is the maximum Landslide* hazard rating identified on the study site? Very Low

The following natural subsidence information provided by the British Geological Survey is not represented on mapping:

Hazard
Slope instability problems are unlikely to be present. No special actions required to avoid problems due to landslides. No special ground investigation required, and increased construction costs or increased financial risks are unlikely due to potential problems with landslides.

9.1.3 Soluble Rocks

What is the maximum Soluble Rocks* hazard rating identified on the study site? Negligible

The following natural subsidence information provided by the British Geological Survey is not represented on mapping:

Hazard
Soluble rocks are present, but unlikely to cause problems except under exceptional conditions. No special actions required to avoid problems due to soluble rocks. No special ground investigation required, and increased construction costs or increased financial risks are unlikely due to potential problems with soluble rocks.

* This indicates an automatically generated 50m buffer and site.

9.1.4 Compressible Ground

What is the maximum Compressible Ground* hazard rating identified on the study site? Moderate

The following natural subsidence information provided by the British Geological Survey is not represented on mapping:

Hazard
Significant potential for compressibility problems. Avoid large differential loadings of ground. Do not drain or de-water ground near the property without technical advice. For new build consider possibility of compressible ground in ground investigation, construction and building design. Consider effects of groundwater changes. Extra construction costs are likely. For existing property possible increase in insurance risk from compressibility, especially if water conditions or loading of the ground change significantly.

9.1.5 Collapsible Rocks

What is the maximum Collapsible Rocks* hazard rating identified on the study site? Very Low

The following natural subsidence information provided by the British Geological Survey is not represented on mapping:

Hazard
Deposits with potential to collapse when loaded and saturated are unlikely to be present. No special ground investigation required or increased construction costs or increased financial risk due to potential problems with collapsible deposits.

9.1.6 Running Sand

What is the maximum Running Sand** hazard rating identified on the study site? Very Low

The following natural subsidence information provided by the British Geological Survey is not represented on mapping:

Hazard
Very low potential for running sand problems if water table rises or if sandy strata are exposed to water. No special actions required, to avoid problems due to running sand. No special ground investigation required, and increased construction costs or increased financial risks are unlikely due to potential problems with running sand.

* This indicates an automatically generated 50m buffer and site.

9.2 Radon

9.2.1 Radon Affected Areas

Is the property in a Radon Affected Area as defined by the Health Protection Agency (HPA) and if so what percentage of homes are above the Action Level? The property is not in a Radon Affected Area, as less than 1% of properties are above the Action Level.

The radon data in this report is supplied by the BGS/Public Health England and is the definitive map of Radon Affected Areas in Great Britain and Northern Ireland. The dataset was created using long-term radon measurements in over 479,000 homes across Great Britain and 23,000 homes across Northern Ireland, combined with geological data. The dataset is considered accurate to 50m to allow for the margin of error in geological lines, and the findings of this report supercede any answer given in the less accurate Indicative Atlas of Radon in Great Britain, which simplifies the data to give the highest risk within any given 1km grid square. As such, the radon atlas is considered indicative, whereas the data given in this report is considered definitive.

9.2.2 Radon Protection

Is the property in an area where Radon Protection are required for new properties or extensions to existing
ones as described in publication BR211 by the Building Research Establishment? No radon protective measures are necessary.

10. Mining

10.1 Coal Mining

Are there any coal mining areas within 75m of the study site? Yes

The following coal mining information provided by the Coal Authority is not represented on Mapping:

Distance (m)	Direction	Details
0	On Site	The study site is located within the specified search distance of an identified mining area. Further details concerning this can be obtained from the Coal Authority Helpline on 0845 762 6848.

10.2 Non-Coal Mining

Are there any Non-Coal Mining areas within 50m of the study site boundary? No

Database searched and no data found.

10.3 Brine Affected Areas

Are there any brine affected areas within 75m of the study site? No
Guidance: No Guidance Required.

Contact Details

Groundsure Helpline
Telephone: 08444 159 000
info@groundsure.com

British Geological Survey Enquiries
Kingsley Dunham Centre
Keyworth, Nottingham NG12 5GG
Tel: 0115 936 3143.
Fax: 0115 936 3276.
Email:
Web:**www.bgs.ac.uk**
BGS Geological Hazards Reports and general geological enquiries:
enquiries@bgs.ac.uk

Environment Agency
National Customer Contact Centre, PO Box 544
Rotherham, S60 1BY
Tel: 03708 506 506
Web: **www.environment-agency.gov.uk**
Email: enquiries@environment-agency.gov.uk

Public Health England
Public information access office
Public Health England, Wellington House
133-155 Waterloo Road, London, SE1 8UG
www.gov.uk/phe
Email:**enquiries@phe.gov.uk**
Main switchboard**: 020 7654 8000**

The Coal Authority
200 Lichfield Lane
Mansfield
Notts NG18 4RG
Tel: 0345 7626 848
DX 716176 Mansfield 5
www.coal.gov.uk

Ordnance Survey
Adanac Drive, Southampton
SO16 0AS
Tel: 08456 050505

Local Authority
Authority: Coventry City Council
Phone: 024 7683 3333
Web: http://www.coventry.gov.uk/
Address: Council House, Earl Street, Coventry, CV1 5RR

Gemapping PLC
Virginia Villas, High Street, Hartley Witney,
Hampshire RG27 8NW
Tel: 01252 845444

Acknowledgements: Site of Special Scientific Interest, National Nature Reserve, Ramsar Site, Special Protection Area, Special Area of Conservation data is provided by, and used with the permission of, Natural England who retain the Copyright and Intellectual Property Rights for the data.
PointX © Database Right/Copyright, Thomson Directories Limited © Copyright Link Interchange Network Limited © Database Right/Copyright and Ordnance Survey © Crown Copyright and/or Database Right. All Rights Reserved. Licence Number [03421028].
This report has been prepared in accordance with the Groundsure Ltd standard Terms and Conditions of business for work of this nature.

Standard Terms and Conditions

Groundsure's Terms and Conditions can be viewed online at this link:
https://www.groundsure.com/terms-and-conditions-sept-2016

Mouchel Limited

Kier Shared Services, PO Box 685,
Oldham, OL1 9LH

Groundsure Reference:	GS-3445084
Your Reference:	4500147166
Report Date	14 Nov 2016
Report Delivery Method:	Email - pdf

Groundsure Geo Insight

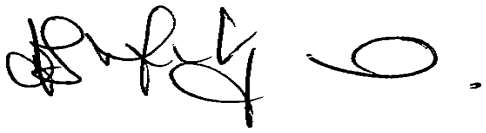
Address: 438775, 277698,

Dear Sir/ Madam,

Thank you for placing your order with Groundsure. Please find enclosed the **Groundsure Geo Insight** as requested.

If you need any further assistance, please do not hesitate to contact our helpline on 08444 159000 quoting the above Groundsure reference number.

Yours faithfully,



Managing Director
Groundsure Limited

Enc.
Groundsure Geoinsight

Groundsure Geo Insight

Address:	**438775, 277698,**
Date:	**14 Nov 2016**
Reference:	**GS-3445084**
Client:	**Mouchel Limited**

NW N NE

W E



SW S SE

Aerial Photograph Capture date:	09-Jul-2013
Grid Reference:	438602,277664
Site Size:	49.34ha

Contents Page

Overview of Findings 5
1 Geology 8
1.1 Artificial Ground Map 8
1 Geology 9
1.1 Artificial Ground 9
1.1.1 Artificial/ Made Ground 9
1.1.2 Permeability of Artificial Ground 9
1.2 Superficial Deposits and Landslips Map 10
1.2 Superficial Deposits and Landslips 11
1.2.1 Superficial Deposits/ Drift Geology 11
1.2.2 Permeability of Superficial Ground 12
1.2.3 Landslip 12
1.2.4 Landslip Permeability 12
1.3 Bedrock and Faults Map 13
1.3 Bedrock, Solid Geology & Faults 14
1.3.1 Bedrock/ Solid Geology 14
1.3.2 Permeability of Bedrock Ground 14
1.3.3 Faults 14
1.4 Radon Data 15
1.4.1 Radon Affected Areas 15
1.4.2 Radon Protection 15
2 Ground Workings Map 16
2 Ground Workings 17
2.1 Historical Surface Ground Working Features derived from Historical Mapping 17
2.2 Historical Underground Working Features derived from Historical Mapping 21
2.3 Current Ground Workings 21
3 Mining, Extraction & Natural Cavities Map 23
3 Mining, Extraction & Natural Cavities 24
3.1 Historical Mining 24
3.2 Coal Mining 24
3.3 Johnson Poole and Bloomer 25
3.4 Non-Coal Mining 25
3.5 Non-Coal Mining Cavities 25
3.6 Natural Cavities 25
3.7 Brine Extraction 25
3.8 Gypsum Extraction 26
3.9 Tin Mining 26
3.10 Clay Mining 26
4 Natural Ground Subsidence 27
4.1 Shrink-Swell Clay Map 27
4.2 Landslides Map 28
4.3 Ground Dissolution Soluble Rocks Map 29
4.4 Compressible Deposits Map 30
4.5 Collapsible Deposits Map 31
4.6 Running Sand Map 32
4 Natural Ground Subsidence 33
4.1 Shrink-Swell Clays 33
4.2 Landslides 33
4.3 Ground Dissolution of Soluble Rocks 34

4.4 Compressible Deposits....34
4.5 Collapsible Deposits....35
4.6 Running Sands....35
5 Borehole Records Map....36
5 Borehole Records....37
6 Estimated Background Soil Chemistry....45
7 Railways and Tunnels Map....47
7 Railways and Tunnels....48
7.1 Tunnels....48
7.2 Historical Railway and Tunnel Features....48
7.3 Historical Railways....49
7.4 Active Railways....49
7.5 Railway Projects....49

Overview of Findings

The Groundsure Geo Insight provides high quality geo-environmental information that allows geo-environmental professionals and their clients to make informed decisions and be forewarned of potential ground instability problems that may affect the ground investigation, foundation design and possibly remediation options that could lead to possible additional costs.

The report is based on the BGS 1:50,000 Digital Geological Map of Great Britain, BGS Geosure data; BRITPITS database; Shallow Mining data and Borehole Records, Coal Authority data including brine extraction areas, PBA non-coal mining and natural cavities database, Johnson Poole and Bloomer mining data and Groundsure's unique database including historical surface ground and underground workings.

For further details on each dataset, please refer to each individual section in the report as listed. Where the database has been searched a numerical result will be recorded. Where the database has not been searched '-' will be recorded.

Section 1:Geology		
1.1 Artificial Ground	1.1.1 Is there any Artificial Ground/ Made Ground present beneath the study site?	Yes
	1.1.2 Are there any records relating to permeability of artificial ground within the study site* boundary?	Yes
1.2 Superficial Geology and Landslips	1.2.1 Is there any Superficial Ground/Drift Geology present beneath the study site?	Yes
	1.2.2 Are there any records relating to permeability of superficial geology within the study site boundary?	Yes
	1.2.3 Are there any records of landslip within 500m of the study site boundary?	No
	1.2.4 Are there any records relating to permeability of landslips within the study site boundary?	No
1.3 Bedrock, Solid Geology & Faults	1.3.1 For records of Bedrock and Solid Geology beneath the study site* see the detailed findings section.	
	1.3.2 Are there any records relating to permeability of bedrock within the study site boundary?	Yes
	1.3.3 Are there any records of faults within 500m of the study site boundary?	Yes
1.4 Radon data	1.4.1 Is the property in a Radon Affected Area as defined by the Health Protection Agency (HPA) and if so what percentage of homes are above the Action Level?	The property is not in a Radon Affected Area, as less than 1% of properties are above the Action Level
	1.4.2 Is the property in an area where Radon Protection Measures are required for new properties or extensions to existing ones as described in publication BR211 by the Building Research Establishment?	No radon protective measures are necessary

Section 2:Ground Workings	On-site	0-50m	51-250	251-500	501-1000
2.1 Historical Surface Ground Working Features from Small Scale Mapping	28	7	65	Not Searched	Not Searched
2.2 Historical Underground Workings from Small Scale Mapping	0	0	4	0	0
2.3 Current Ground Workings	1	0	2	6	3

Section 3: Mining, Extraction & Natural Cavities	On-site	0-50m	51-250	251-500	501-1000
3.1 Historical Mining	0	0	4	0	0
3.2 Coal Mining	1	0	0	0	0
3.3 Johnson Poole and Bloomer Mining Area	0	0	0	1	1
3.4 Non-Coal Mining	0	0	0	0	0
3.5 Non-Coal Mining Cavities	0	0	0	0	0
3.6 Natural Cavities	0	0	0	0	0
3.7 Brine Extraction	0	0	0	0	0
3.8 Gypsum Extraction	0	0	0	0	0
3.9 Tin Mining	0	0	0	0	0
3.10 Clay Mining	0	0	0	0	0

Section 4: Natural Ground Subsidence	On-site
4.1 Shrink Swell Clay	Low
4.2 Landslides	Moderate
4.3 Ground Dissolution of Soluble Rocks	Negligible
4.4 Compressible Deposits	Moderate
4.5 Collapsible Deposits	Very Low
4.6 Running Sand	Low

Section 5: Borehole Records	On-site	0-50m	51-250
5 BGS Recorded Boreholes	70	20	56

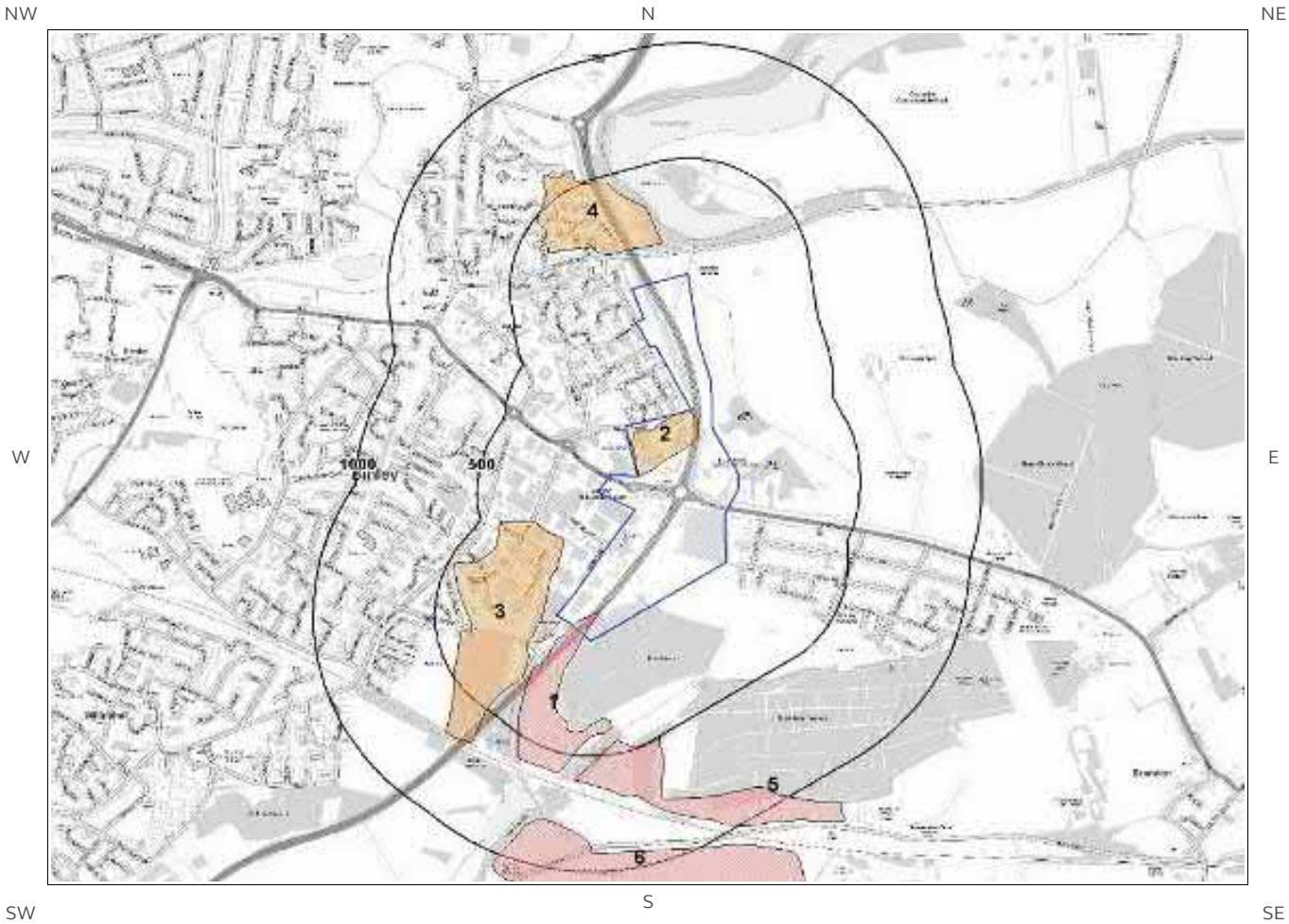
Section 6: Estimated Background Soil Chemistry	On-site	0-50m	51-250
6 Records of Background Soil Chemistry	23	7	33

Section 7: Railways and Tunnels	On-site	0-50m	51-250	251-500
7.1 Tunnels	0	0	0	Not Searched
7.2 Historical Railway and Tunnel Features	0	0	8	Not Searched
7.3 Historical Railways	0	0	3	Not Searched
7.4 Active Railways	0	0	0	Not Searched

Section 7:Railways and Tunnels	On-site	0-50m	51-250	251-500
7.5 Railway Projects	0	0	0	0

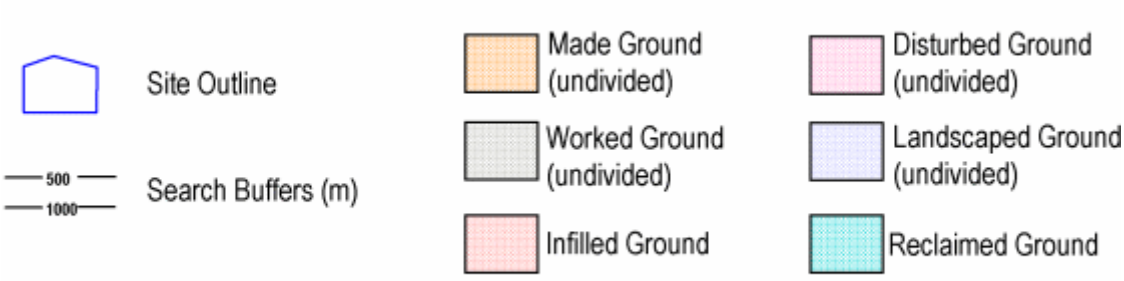
1 Geology

1.1 Artificial Ground Map



Artificial Ground Legend

© Crown copyright and database rights 2016.
Ordnance Survey license 100035207.



1 Geology

1.1 Artificial Ground

1.1.1 Artificial/ Made Ground

The following geological information represented on the mapping is derived from 1:50,000 scale BGS Geological mapping, Sheet No:184

Are there any records of Artificial/Made Ground within 500m of the study site boundary? Yes

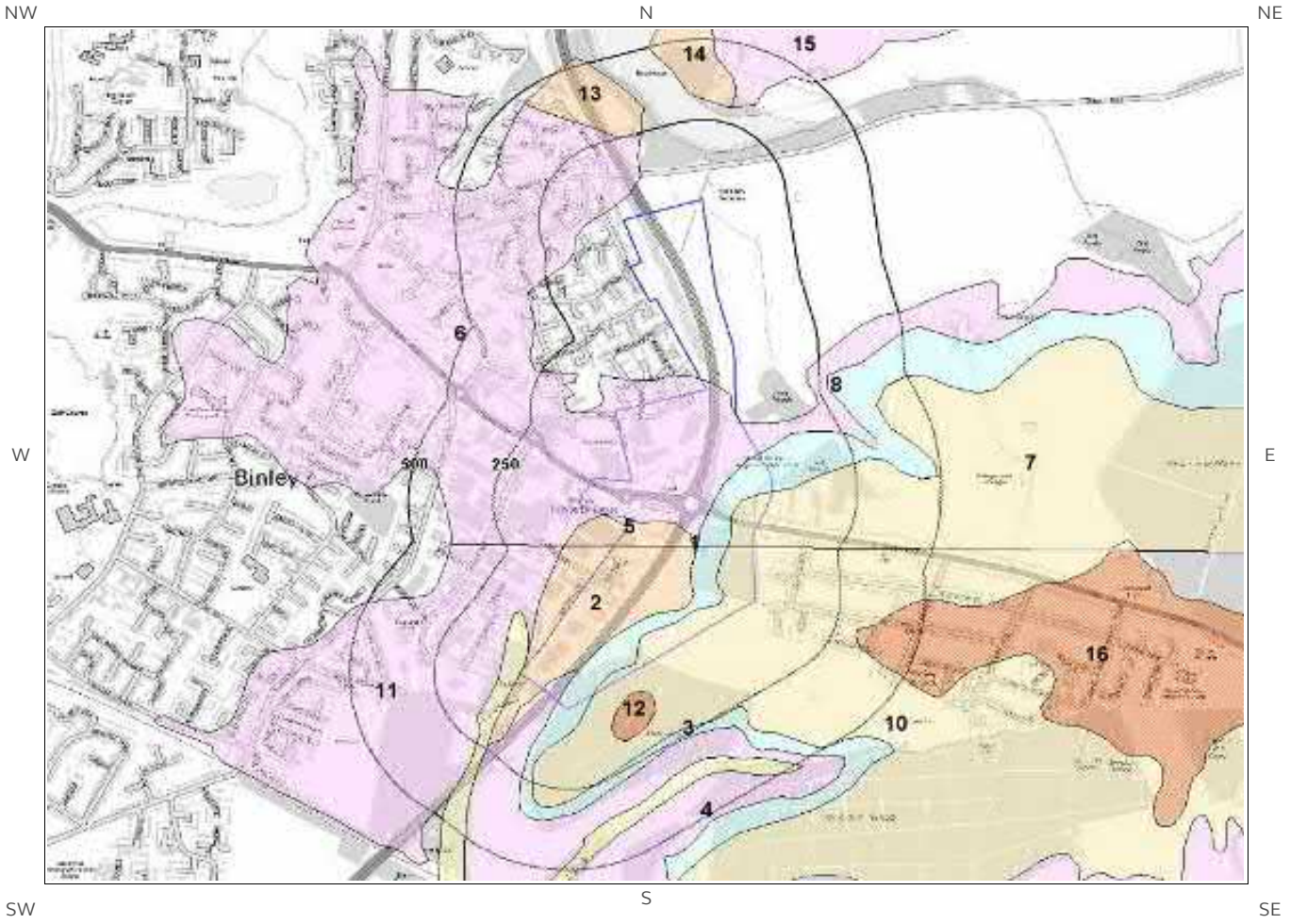
ID	Distance (m)	Direction	LEX Code	Description	Rock Description
1	0.0	On Site	WMGR-MGRD	INFILLED GROUND	ARTIFICIAL DEPOSIT
2	0.0	On Site	MGR-MGRD	MADE GROUND (UNDIVIDED)	ARTIFICIAL DEPOSIT
3	57.0	W	MGR-MGRD	MADE GROUND (UNDIVIDED)	ARTIFICIAL DEPOSIT
4	159.0	N	MGR-MGRD	MADE GROUND (UNDIVIDED)	ARTIFICIAL DEPOSIT
5	444.0	S	WMGR-MGRD	INFILLED GROUND	ARTIFICIAL DEPOSIT

1.1.2 Permeability of Artificial Ground

Are there any records relating to permeability of artificial ground within the study site boundary? Yes

Distance (m)	Direction	Flow Type	Maximum Permeability	Minimum Permeability
0.0	On Site	Mixed	Very High	Low
0.0	On Site	Mixed	Very High	Low

1.2 Superficial Deposits and Landslips Map



Superficial Deposits and Landslips Legend

© Crown copyright and database rights 2016.
Ordnance Survey license 100035207.

Site Outline

500
1000
Search Buffers (m)

1.2 Superficial Deposits and Landslips

1.2.1 Superficial Deposits/ Drift Geology

Are there any records of Superficial Deposits/ Drift Geology within 500m of the study site boundary? Yes

ID	Distance (m)	Direction	LEX Code	Description	Rock Description
1	0.0	On Site	BGSG	BAGINTON SAND AND GRAVEL FORMATION	SAND AND GRAVEL [UNLITHIFIED DEPOSITS CODING SCHEME]
2	0.0	On Site	RTD4	RIVER TERRACE DEPOSITS, 4	SAND AND GRAVEL [UNLITHIFIED DEPOSITS CODING SCHEME]
3	0.0	On Site	THT	THRUSSINGTON MEMBER	DIAMICTON
4	0.0	On Site	BGSG	BAGINTON SAND AND GRAVEL FORMATION	SAND AND GRAVEL [UNLITHIFIED DEPOSITS CODING SCHEME]
5	0.0	On Site	RTD4	RIVER TERRACE DEPOSITS, 4	SAND AND GRAVEL [UNLITHIFIED DEPOSITS CODING SCHEME]
6	0.0	On Site	BGSG	BAGINTON SAND AND GRAVEL FORMATION	SAND AND GRAVEL [UNLITHIFIED DEPOSITS CODING SCHEME]
7	0.0	On Site	BOSW	BOSWORTH CLAY MEMBER	CLAY AND SILT [UNLITHIFIED DEPOSITS CODING SCHEME]
8	0.0	On Site	THT	THRUSSINGTON MEMBER	DIAMICTON
9	0.0	On Site	ALV	ALLUVIUM	CLAY, SILT, SAND AND GRAVEL [UNLITHIFIED DEPOSITS CODING SCHEME]
10	0.0	On Site	BOSW	BOSWORTH CLAY MEMBER	CLAY AND SILT [UNLITHIFIED DEPOSITS CODING SCHEME]
11	22.0	NW	BGSG	BAGINTON SAND AND GRAVEL FORMATION	SAND AND GRAVEL [UNLITHIFIED DEPOSITS CODING SCHEME]
12	56.0	SE	DMG	DUNSMORE GRAVEL	SAND AND GRAVEL [UNLITHIFIED DEPOSITS CODING SCHEME]
13	243.0	N	RTD3	RIVER TERRACE DEPOSITS, 3	SAND AND GRAVEL [UNLITHIFIED DEPOSITS CODING SCHEME]
14	298.0	N	RTD3	RIVER TERRACE DEPOSITS, 3	SAND AND GRAVEL [UNLITHIFIED DEPOSITS CODING SCHEME]
15	300.0	N	BGSG	BAGINTON SAND AND GRAVEL FORMATION	SAND AND GRAVEL [UNLITHIFIED DEPOSITS CODING SCHEME]
16	315.0	E	DMG	DUNSMORE GRAVEL	SAND AND GRAVEL [UNLITHIFIED DEPOSITS CODING SCHEME]

1.2.2 Permeability of Superficial Ground

Are there any records relating to permeability of superficial ground within the study site boundary? Yes

Distance (m)	Direction	Flow Type	Maximum Permeability	Minimum Permeability
0.0	On Site	Intergranular	Very High	High
0.0	On Site	Intergranular	Very High	High
0.0	On Site	Mixed	Low	Very Low
0.0	On Site	Mixed	High	Low
0.0	On Site	Intergranular	Very High	High
0.0	On Site	Intergranular	High	Very Low

1.2.3 Landslip

Are there any records of Landslip within 500m of the study site boundary? No

Database searched and no data found.

This Geology shows the main components as discrete layers, these are: Artificial / Made Ground, Superficial / Drift Geology and Landslips. These are all displayed with the BGS Lexicon code for the rock unit and BGS sheet number. Not all of the main geological components have nationwide coverage.

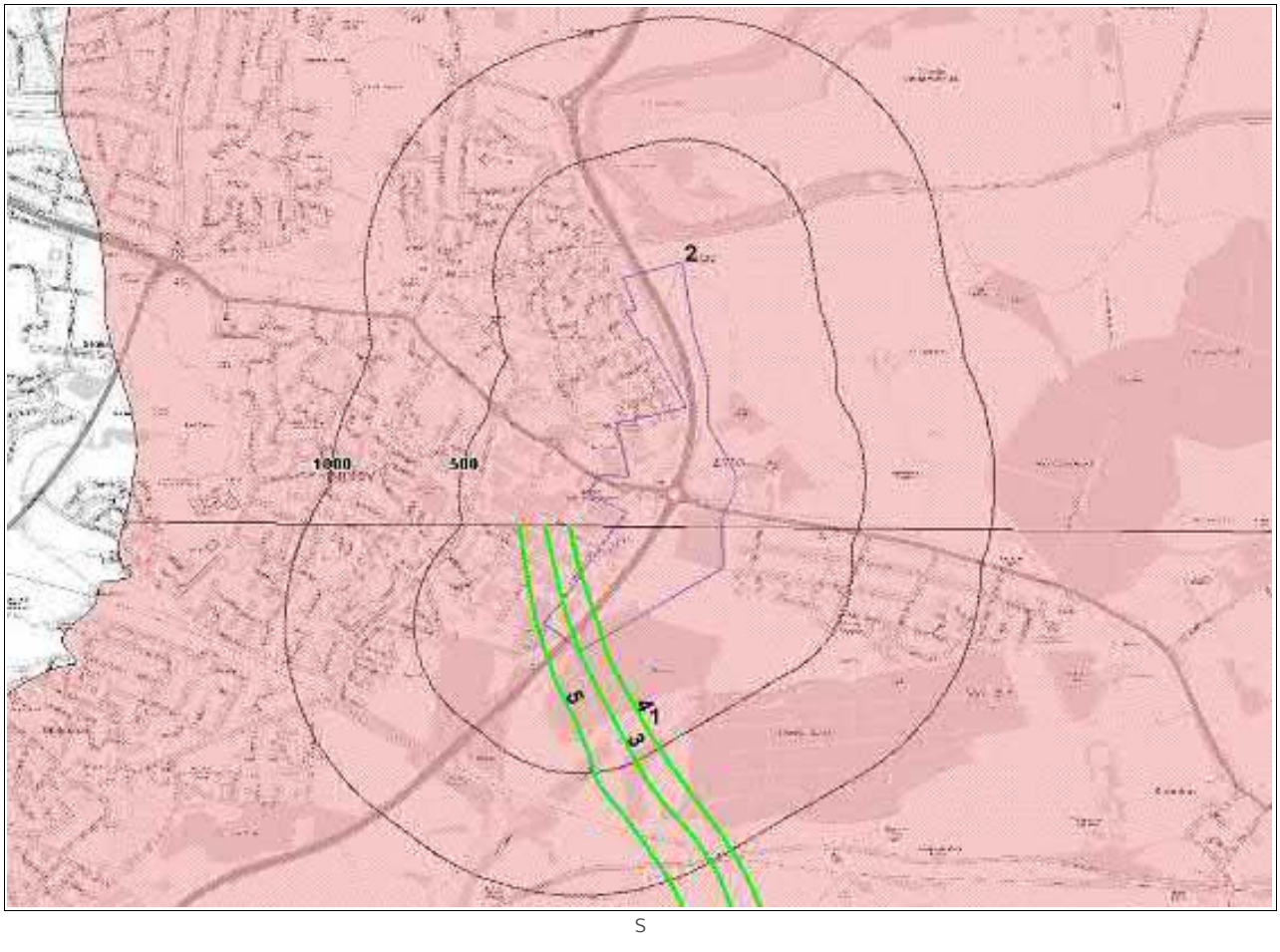
1.2.4 Landslip Permeability

Are there any records relating to permeability of landslips within the study site* boundary? No

Database searched and no data found.

* This includes an automatically generated 50m buffer zone around the site

1.3 Bedrock and Faults Map



Bedrock and Faults Legend

© Crown copyright and database rights 2016.
Ordnance Survey license 100035207.

Site Outline

500
1000
Search Buffers (m)

1.3 Bedrock, Solid Geology & Faults

The following geological information represented on the mapping is derived from 1:50,000 scale BGS Geological mapping, Sheet No:184

1.3.1 Bedrock/ Solid Geology

Records of Bedrock/ Solid Geology within 500m of the study site boundary:

ID	Distance (m)	Direction	LEX Code	Description	Rock Age
1	0.0	On Site	MMG-MDST	Mercia Mudstone Group - Mudstone	Rhaetian /
2	0.0	On Site	MMG-MDST	Mercia Mudstone Group - Mudstone	Rhaetian /

1.3.2 Permeability of Bedrock Ground

Are there any records relating to permeability of bedrock ground within the study site* boundary? Yes

Distance (m)	Direction	Flow Type	Maximum Permeability	Minimum Permeability
0.0	On Site	Fracture	Low	Low

1.3.3 Faults

Are there any records of Faults within 500m of the study site boundary? Yes

ID	Distance (m)	Direction	Category Description	Feature Description
3	0.0	On Site	ROCK	Coal seam, inferred
4	0.0	On Site	ROCK	Coal seam, inferred
5	23.0	W	ROCK	Coal seam, inferred

The geology map for the site and surrounding area are extracted from the BGS Digital Geological Map of Great Britain at 1:50,000 scale.

This Geology shows the main components as discrete layers, these are: Bedrock/ Solid Geology and linear features such as Faults. These are all displayed with the BGS Lexicon code for the rock unit and BGS sheet number. Not all of the main geological components have nationwide coverage.

* This includes an automatically generated 50m buffer zone around the site

1.4 Radon Data

1.4.1 Radon Affected Areas

Is the property in a Radon Affected Area as defined by the Health Protection Agency (HPA) and if so what percentage of homes are above the Action Level? The property is not in a Radon Affected Area, as less than 1% of properties are above the Action Level

---

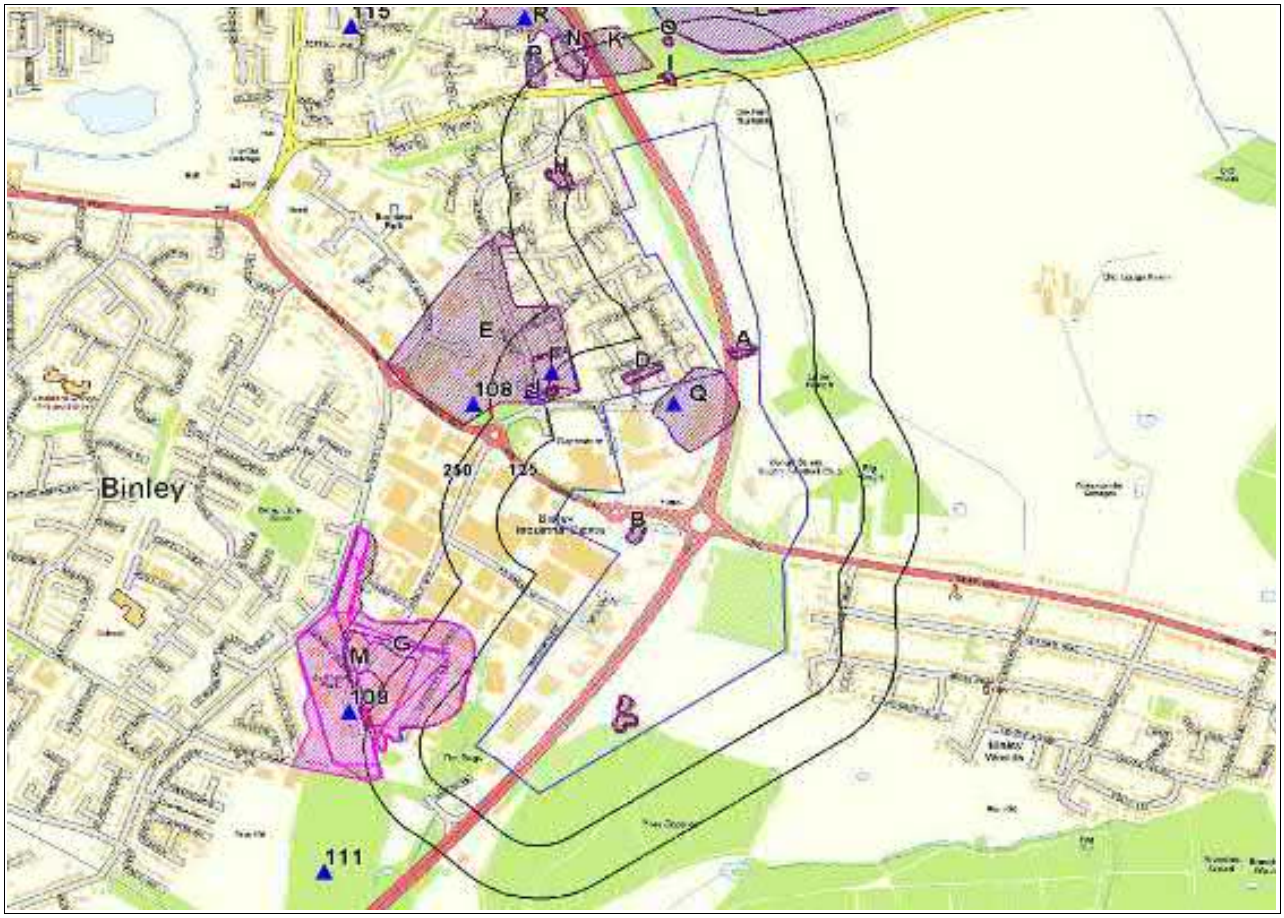
1.4.2 Radon Protection

Is the property in an area where Radon Protection are required for new properties or extensions to existing ones as described in publication BR211 by the Building Research Establishment? No radon protective measures are necessary

---

2 Ground Workings Map

NW N NE



W E

SW S SE

Ground Workings Legend

© Crown copyright and database rights 2016.
Ordnance Survey license 100035207.

Site Outline

125
250
Search Buffers (m)

Historic Surface Ground Workings

Historic Underground Workings

Current Ground Workings

2 Ground Workings

2.1 Historical Surface Ground Working Features derived from Historical Mapping

This dataset is based on Groundsure's unique Historical Land Use Database derived from 1:10,560 and 1:10,000 scale historical mapping.

Are there any Historical Surface Ground Working Features within 250m of the study site boundary? Yes

The following Historical Surface Ground Working Features are provided by Groundsure:

ID	Distance (m)	Direction	NGR	Use	Date
1Q	0.0	On Site	438765 277962	Refuse Heap	1973
2C	0.0	On Site	438599 277241	Unspecified Pits	1903
3A	0.0	On Site	438873 278096	Pond	1912
4A	0.0	On Site	438873 278096	Pond	1886
5A	0.0	On Site	438873 278096	Pond	1938
6A	0.0	On Site	438873 278096	Pond	1886
7A	0.0	On Site	438866 278101	Pond	1950
8B	0.0	On Site	438632 277665	Pond	1886
9B	0.0	On Site	438632 277665	Pond	1886
10B	0.0	On Site	438629 277670	Pond	1967
11B	0.0	On Site	438629 277670	Pond	1950
12C	0.0	On Site	438599 277241	Unspecified Pits	1886
13A	0.0	On Site	438873 278096	Pond	1903
14C	0.0	On Site	438605 277220	Unspecified Pit	1950
15C	0.0	On Site	438599 277241	Unspecified Pits	1938
16C	0.0	On Site	438599 277241	Unspecified Pits	1912
17C	0.0	On Site	438599 277241	Unspecified Pits	1886
18C	0.0	On Site	438604 277263	Unspecified Pit	1950
19B	0.0	On Site	438632 277665	Pond	1912
20B	0.0	On Site	438632 277665	Pond	1938

ID	Distance (m)	Direction	NGR	Use	Date
21C	0.0	On Site	438599 277241	Unspecified Pits	1903
22B	0.0	On Site	438632 277665	Pond	1903
23A	0.0	On Site	438873 278096	Pond	1903
24A	0.0	On Site	438868 278095	Pond	1967
25B	0.0	On Site	438632 277665	Pond	1903
26B	0.0	On Site	438629 277670	Pond	1980
27B	0.0	On Site	438629 277670	Pond	1973
28B	0.0	On Site	438629 277670	Pond	1991
29D	21.0	N	438633 278040	Ponds	1912
30D	21.0	N	438633 278040	Ponds	1938
31D	21.0	N	438633 278040	Ponds	1886
32D	21.0	N	438633 278040	Ponds	1886
33D	21.0	N	438633 278040	Ponds	1903
34D	21.0	N	438633 278040	Ponds	1903
35D	28.0	N	438642 278051	Ponds	1950
36E	54.0	NW	438288 278154	Disused Brick Works	1886
37E	54.0	NW	438288 278154	Disused Brick Works	1886
38F	58.0	NW	438448 278055	Unspecified Pit	1903
39F	58.0	NW	438448 278055	Unspecified Pit	1903
40G	81.0	NW	438110 277410	Unspecified Disused Tip	1973
41G	82.0	NW	438119 277316	Refuse Heap	1967
42F	98.0	W	438443 277999	Unspecified Heap	1938
43F	98.0	W	438443 277999	Unspecified Heap	1912
44F	98.0	W	438443 277999	Unspecified Heap	1903
45F	98.0	W	438443 277999	Unspecified Heap	1903
46F	102.0	W	438441 278007	Unspecified Ground Workings	1950
47H	108.0	W	438460 278503	Pond	1912
48H	108.0	W	438460 278503	Pond	1903

ID	Distance (m)	Direction	NGR	Use	Date
49H	108.0	W	438460 278503	Pond	1903
50H	108.0	W	438460 278503	Pond	1938
51I	108.0	N	438713 278746	Ponds	1912
52I	108.0	N	438713 278746	Ponds	1903
53I	108.0	N	438713 278746	Ponds	1886
54I	108.0	N	438713 278746	Ponds	1886
55I	108.0	N	438713 278746	Ponds	1903
56H	109.0	W	438459 278510	Pond	1967
57H	109.0	W	438459 278510	Pond	1950
58H	109.0	W	438459 278510	Pond	1973
59I	109.0	N	438704 278746	Ponds	1938
60I	110.0	N	438704 278747	Ponds	1967
61I	110.0	N	438704 278747	Ponds	1973
62J	131.0	W	438404 277982	Unspecified Ground Workings	1903
63J	131.0	W	438404 277982	Unspecified Ground Workings	1903
64F	136.0	W	438401 278003	Pond	1938
65F	136.0	W	438401 278003	Pond	1912
66F	136.0	W	438401 278003	Pond	1903
67F	136.0	W	438401 278003	Pond	1903
68F	139.0	W	438399 278011	Pond	1950
69F	139.0	W	438399 278011	Pond	1967
70F	140.0	NW	438441 278093	Pond	1886
71F	140.0	NW	438441 278093	Pond	1886
72H	144.0	W	438435 278519	Unspecified Heap	1886
73H	144.0	W	438435 278519	Unspecified Heap	1886
74K	164.0	N	438591 278809	Refuse Heap	1973
75K	164.0	N	438591 278809	Refuse Heap	1967
76L	166.0	N	439297 279327	Pool	1886

ID	Distance (m)	Direction	NGR	Use	Date
77L	166.0	N	439297 279327	Pool	1886
78L	166.0	N	439297 279327	Pool	1903
79L	166.0	N	439297 279327	Pool	1912
80L	166.0	N	439297 279327	Fish Pond	1938
81L	166.0	N	439297 279327	Pool	1903
82L	172.0	N	439237 279292	Fish Pond	1967
83L	172.0	N	439237 279292	Fish Pond	1950
84L	172.0	N	439237 279292	Fish Pond	1991
85L	172.0	N	439237 279292	Fish Pond	1980
86L	172.0	N	439237 279292	Fish Pond	1973
87M	175.0	NW	438042 277385	Colliery	1950
88M	175.0	NW	438095 277323	Refuse Heap	1950
89R	180.0	N	438394 278852	Gravel Pit	1950
90N	183.0	N	438489 278802	Unspecified Pit	1967
91N	183.0	N	438489 278802	Unspecified Pit	1973
92M	202.0	NW	438006 277345	Colliery	1938
93G	202.0	NW	438056 277315	Refuse Heap	1938
94O	202.0	N	438704 278832	Unspecified Pit	1938
95O	202.0	N	438704 278832	Unspecified Pit	1912
96M	202.0	NW	438006 277345	Colliery	1912
97O	207.0	N	438702 278837	Unspecified Pit	1950
98P	215.0	NW	438405 278773	Refuse Heap	1967
99P	215.0	NW	438405 278773	Unspecified Pit	1950
100M	237.0	NW	438031 277301	Unspecified Heap	1912

2.2 Historical Underground Working Features derived from Historical Mapping

This data is derived from the Groundsure unique Historical Land Use Database. It contains data derived from 1:10,000 and 1:10,560 historical Ordnance Survey Mapping and includes some natural topographical features (Shake Holes for example) as well as manmade features that may have implications for ground stability. Underground and mining features have been identified from surface features such as shafts. The distance that these extend underground is not shown.

Are there any Historical Underground Working Features within 1000m of the study site boundary? Yes

The following Historical Underground Working Features are provided by Groundsure:

ID	Distance (m)	Direction	NGR	Use	Date
101G	82.0	NW	438069 277301	Unspecified Mine	1967
102M	175.0	NW	438042 277385	Colliery	1950
103M	202.0	NW	438006 277345	Colliery	1938
104M	202.0	NW	438006 277345	Colliery	1912

2.3 Current Ground Workings

This dataset is derived from the BGS BRITPITS database covering active; inactive mines; quarries; oil wells; gas wells and mineral wharves; and rail deposits throughout the British Isles.

Are there any BGS Current Ground Workings within 1000m of the study site boundary? Yes

The following Current Ground Workings information is provided by British Geological Survey:

ID	Distance (m)	Direction	NGR	Commodity Produced	Pit Name	Type of working	Status
105Q	0.0	On Site	438715 277975	Sand & Gravel	Brinklow Road	A surface mineral working. It may be termed Quarry, Sand Pit, Clay Pit or Opencast Coal Site	Ceased
106F	132.0	NW	438440 278050	Clay & Shale	Binley Brick Works	A surface mineral working. It may be termed Quarry, Sand Pit, Clay Pit or Opencast Coal Site	Ceased
107F	160.0	W	438395 278008	Clay & Shale	Binley Brick Works	A surface mineral working. It may be termed Quarry, Sand Pit, Clay Pit or Opencast Coal Site	Ceased
108	289.0	W	438264 277973	Clay & Shale	Binley Brick Works	A surface mineral working. It may be termed Quarry, Sand Pit, Clay Pit or Opencast Coal Site	Ceased
109	295.0	W	437985 277245	Coal, Deep	Binley Colliery	Working is wholly underground, access by shaft, adit or drift. Working may be termed Colliery, Mine, Drift Mine, Slant, Level, Adit or Ingoing Eye (Ingaun Ee - Scots)	Ceased
110R	370.0	NW	438380 278890	Sand & Gravel	Binley	A surface mineral working. It may be termed Quarry, Sand Pit, Clay Pit or Opencast Coal Site	Ceased

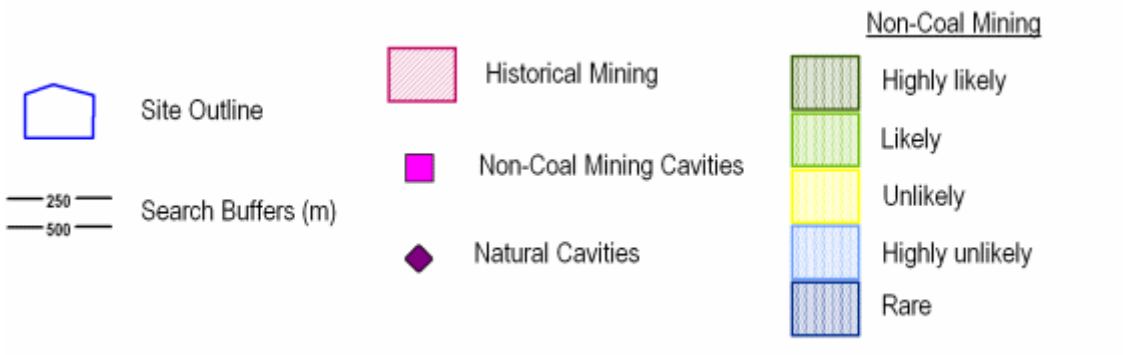
ID	Distance (m)	Direction	NGR	Commodity Produced	Pit Name	Type of working	Status
111	452.0	SW	437930 276865	Coal, Surface Mined	Binley Colliery Tip	A surface mineral working. It may be termed Quarry, Sand Pit, Clay Pit or Opencast Coal Site	Ceased
Not shown	457.0	N	438433 279010	Sand & Gravel	Coombe Woods	A surface mineral working. It may be termed Quarry, Sand Pit, Clay Pit or Opencast Coal Site	Ceased
Not shown	472.0	SW	438200 276630	Sand & Gravel	Piles Coppice	A surface mineral working. It may be termed Quarry, Sand Pit, Clay Pit or Opencast Coal Site	Ceased
Not shown	588.0	S	438585 276490	Sand & Gravel	Brandon Wood	A surface mineral working. It may be termed Quarry, Sand Pit, Clay Pit or Opencast Coal Site	Ceased
115	657.0	NW	437990 278870	Sand & Gravel	Binley	A surface mineral working. It may be termed Quarry, Sand Pit, Clay Pit or Opencast Coal Site	Ceased
Not shown	861.0	S	438230 276210	Sand & Gravel	Brandon Grounds	A surface mineral working. It may be termed Quarry, Sand Pit, Clay Pit or Opencast Coal Site	Ceased

3 Mining, Extraction & Natural Cavities Map



Mining, Extraction and Natural Cavities Legend

© Crown copyright and database rights 2016.
Ordnance Survey license 100035207.



3 Mining, Extraction & Natural Cavities

3.1 Historical Mining

This dataset is derived from Groundsure unique Historical Land-use Database that are indicative of mining or extraction activities.

Are there any Historical Mining areas within 1000m of the study site boundary? Yes

The following Historical Mining information is provided by Groundsure:

ID	Distance (m)	Direction	NGR	Details	Date
1A	82.0	NW	438069 277301	Unspecified Mine	1967
2A	175.0	NW	438042 277385	Colliery	1950
3B	202.0	NW	438006 277345	Colliery	1938
4B	202.0	NW	438006 277345	Colliery	1912

3.2 Coal Mining

This dataset provides information as to whether the study site lies within a known coal mining affected area as defined by the coal authority.

Are there any Coal Mining areas within 1000m of the study site boundary? Yes

The following Coal Mining information provided by the Coal Authority is not represented on Mapping:

Distance (m)	Direction	Details
0.0	On Site	The study site is located within the specified search distance of an identified mining area. Further details concerning this can be obtained from the Coal Authority Helpline on 0845 762 6848.

3.3 Johnson Poole and Bloomer

This dataset provides information as to whether the study site lies within an area where JPB hold information relating to mining.

Are there any JPB Mining areas within 1000m of the study site boundary? Yes

The following information provided by JPB is not represented on mapping: In addition to being located inside an area where The Coal Authority have information on coal mining activities, Johnson Poole & Bloomer (JPB) have information such as mining plans and maps held within their archive of mining activities that have occurred within 1km of this property which may supplement this information. Further details and a quote for services can be obtained by emailing this report to enquiries.gs@jpb.co.uk.

3.4 Non-Coal Mining

This dataset provides information as to whether the study site lies within an area which may have been subject to non-coal historic mining.

Are there any Non-Coal Mining areas within 1000m of the study site boundary? No

Database searched and no data found.

3.5 Non-Coal Mining Cavities

This dataset provides information from the Peter Brett Associates (PBA) mining cavities database (compiled for the national study entitled “Review of mining instability in Great Britain, 1990” PBA has also continued adding to this database) on mineral extraction by mining.

Are there any Non-Coal Mining cavities within 1000m of the study site boundary? No

Database searched and no data found.

3.6 Natural Cavities

This dataset provides information based on Peter Brett Associates natural cavities database.

Are there any Natural Cavities within 1000m of the study site boundary? No

Database searched and no data found.

3.7 Brine Extraction

This data provides information from the Coal Authority issued on behalf of the Cheshire Brine Subsidence Compensation Board.

Are there any Brine Extraction areas within 1000m of the study site boundary? No

Database searched and no data found.

3.8 Gypsum Extraction

This dataset provides information on Gypsum extraction from British Gypsum records.

Are there any Gypsum Extraction areas within 1000m of the study site boundary? No

Database searched and no data found.

3.9 Tin Mining

This dataset provides information on tin mining areas and is derived from tin mining records. This search is based upon postcode information to a sector level.

Are there any Tin Mining areas within 1000m of the study site boundary? No

Database searched and no data found.

3.10 Clay Mining

This dataset provides information on Kaolin and Ball Clay mining from relevant mining records.

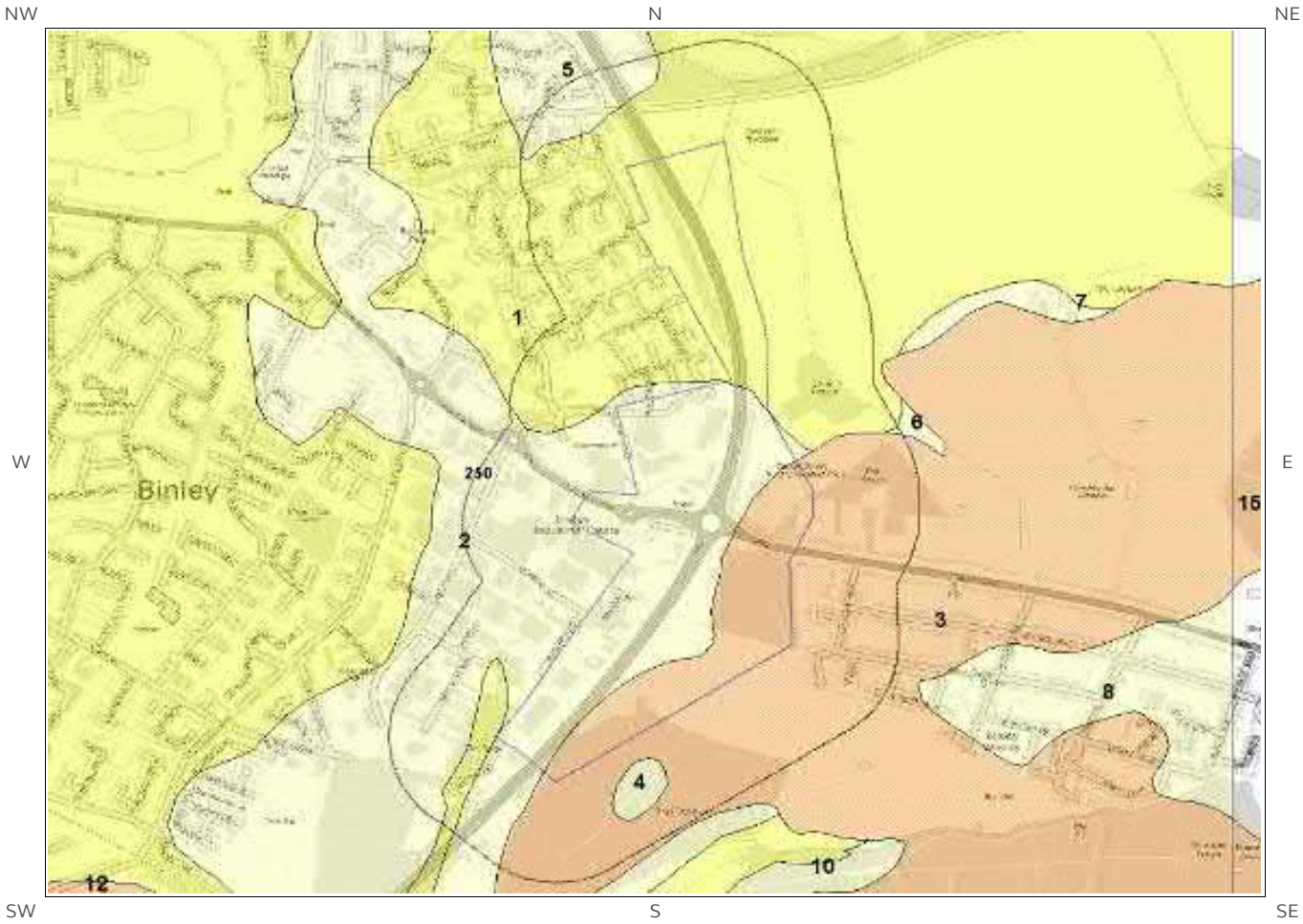
Are there any Clay Mining areas within 1000m of the study site boundary? No

Database searched and no data found.

---

4 Natural Ground Subsidence

4.1 Shrink-Swell Clay Map

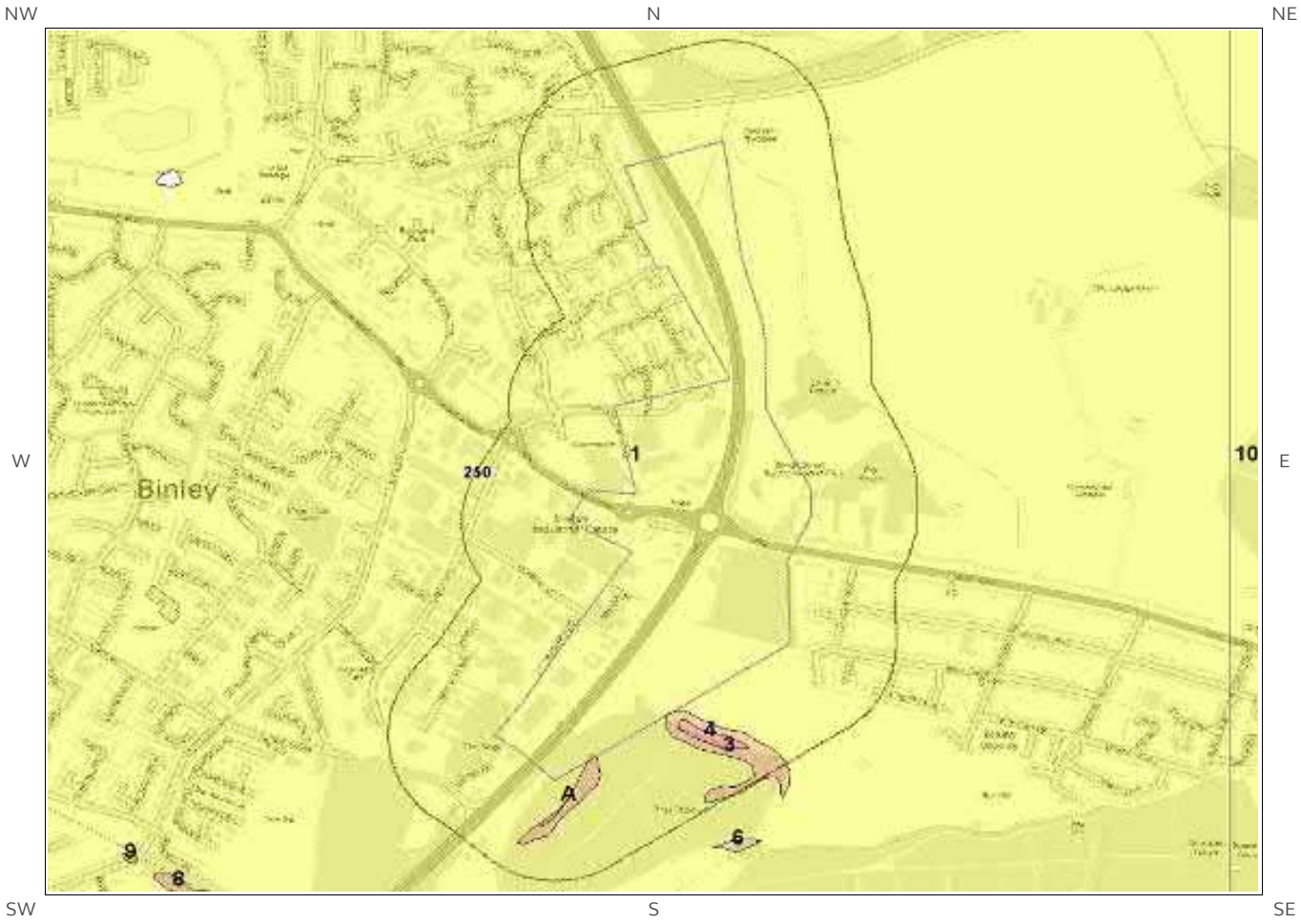


Shrink Swell Clay Legend

© Crown copyright and database rights 2016.
Ordnance Survey license 100035207.



4.2 Landslides Map

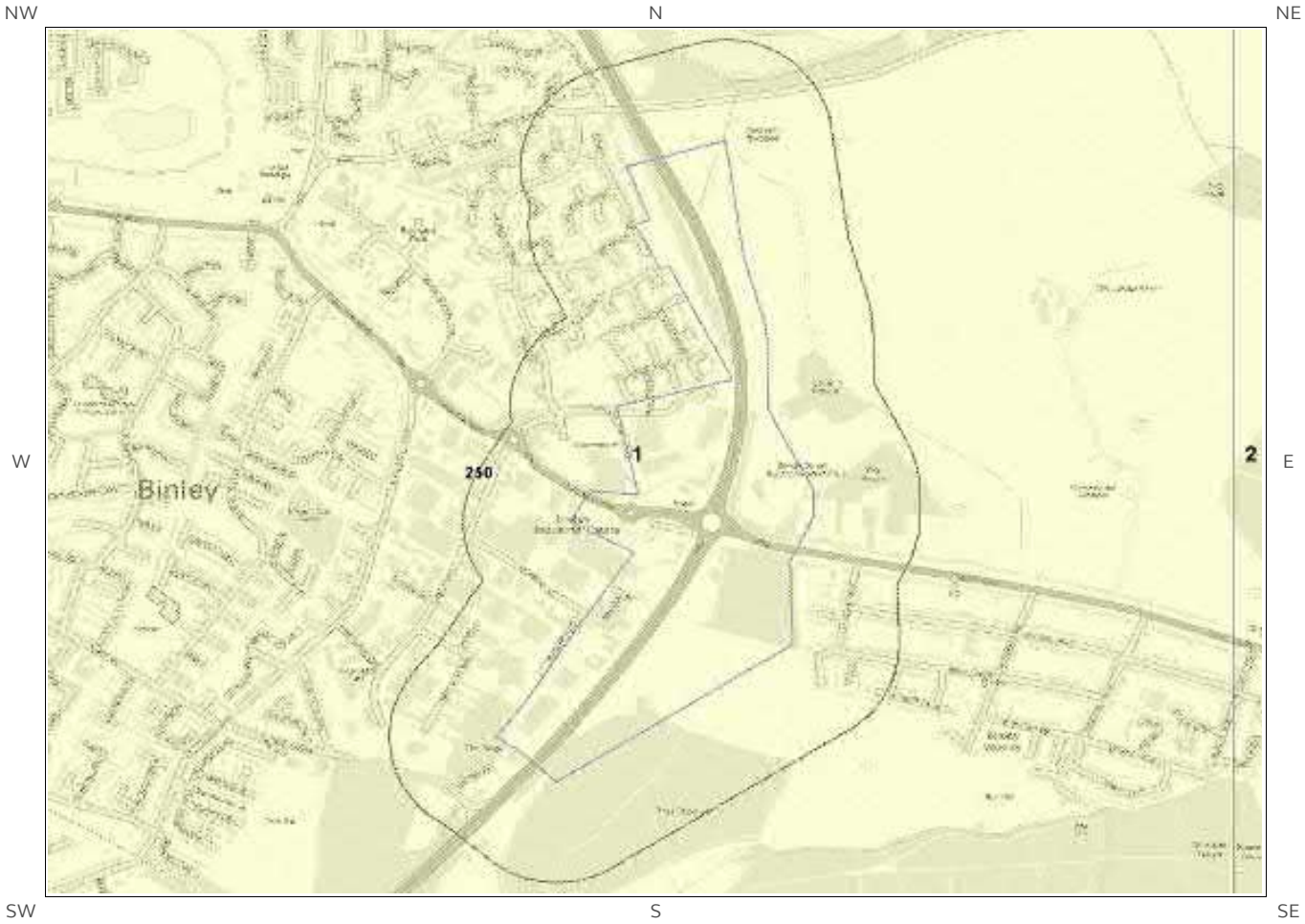


Landslides Legend

© Crown copyright and database rights 2016.
Ordnance Survey license 100035207.



4.3 Ground Dissolution Soluble Rocks Map

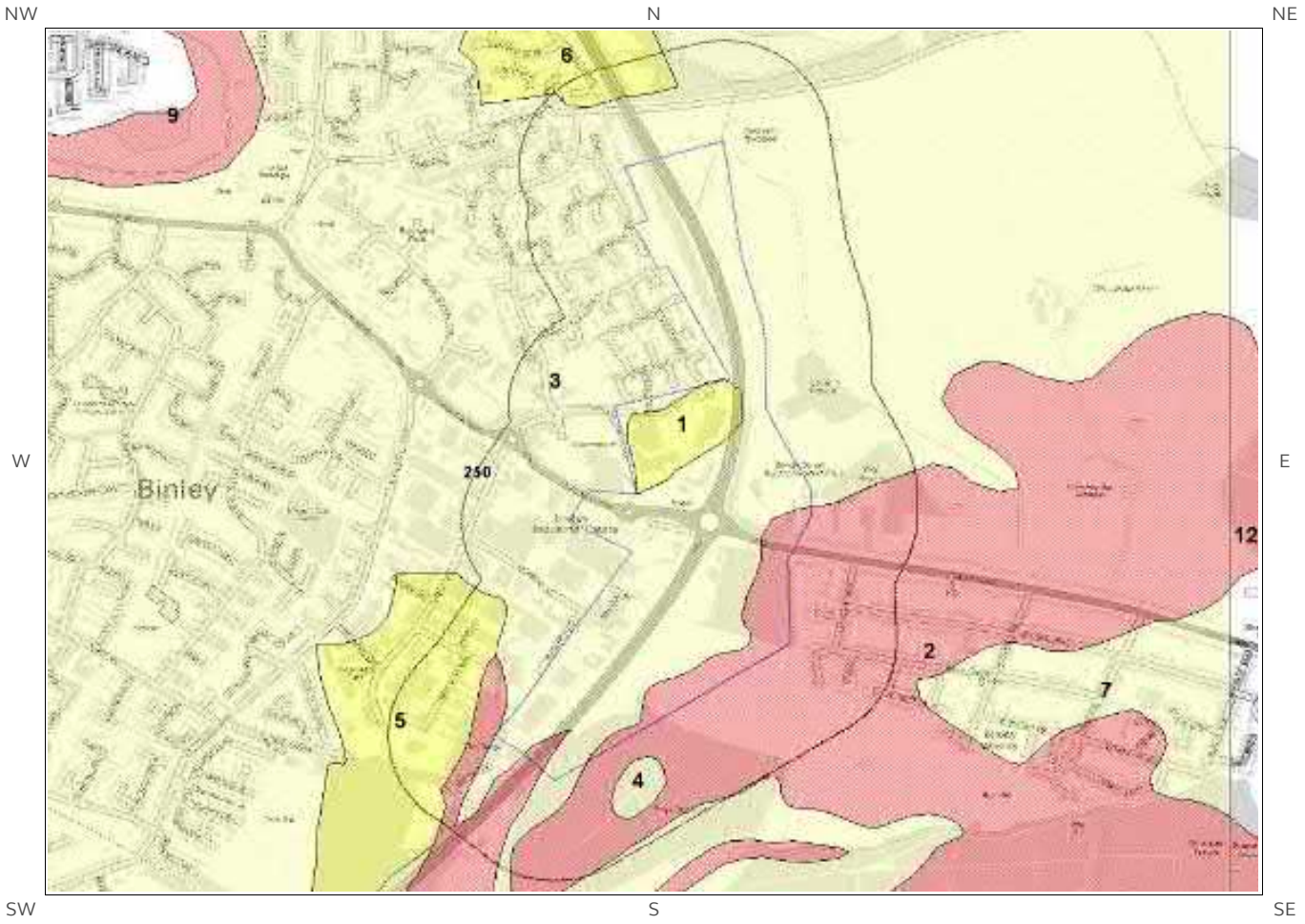


Ground Dissolution Soluble Rocks Legend

© Crown copyright and database rights 2016. Ordnance Survey license 100035207.



4.4 Compressible Deposits Map

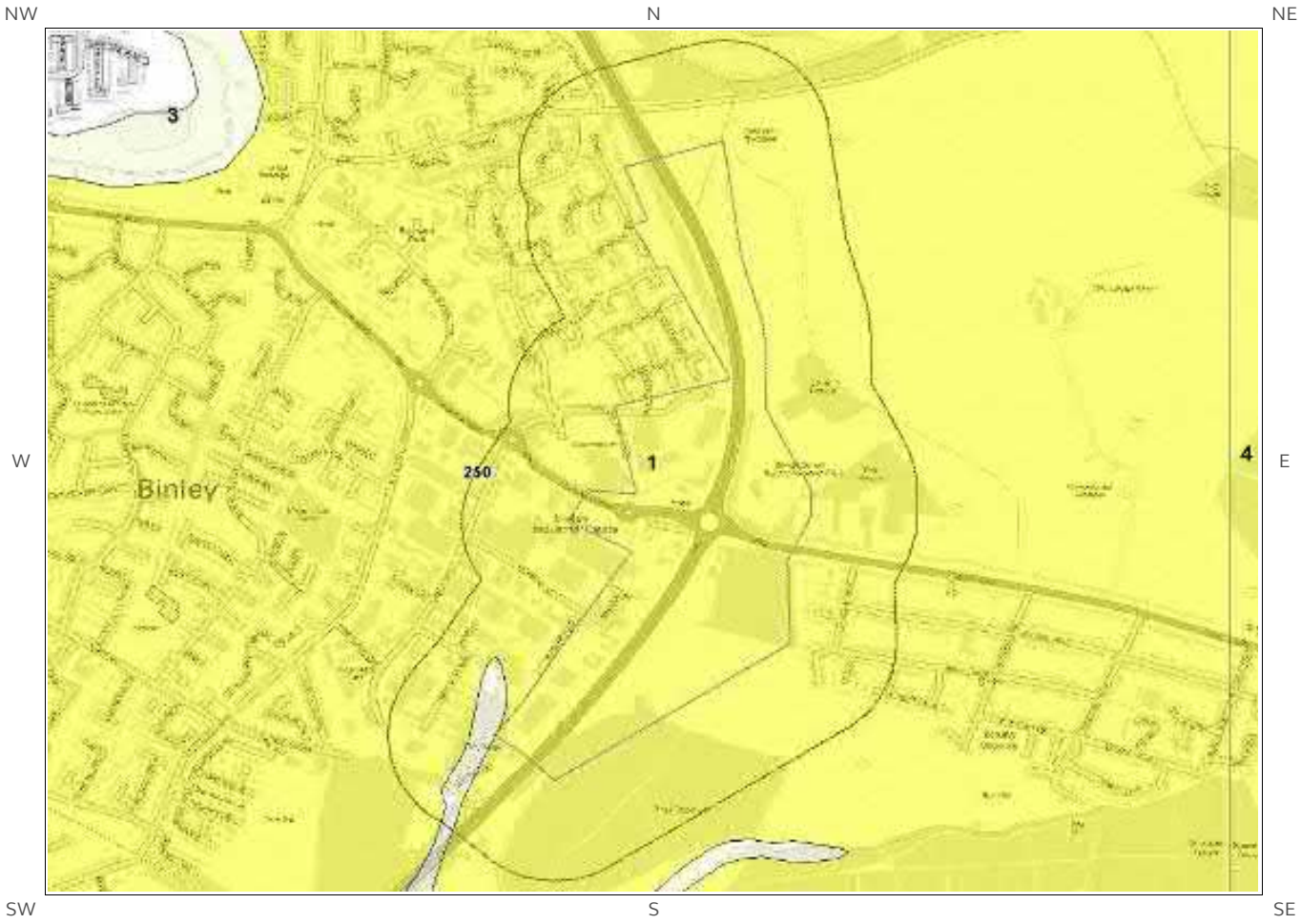


© Crown copyright and database rights 2016.
Ordnance Survey license 100035207.

Compressible Deposits Legend



4.5 Collapsible Deposits Map

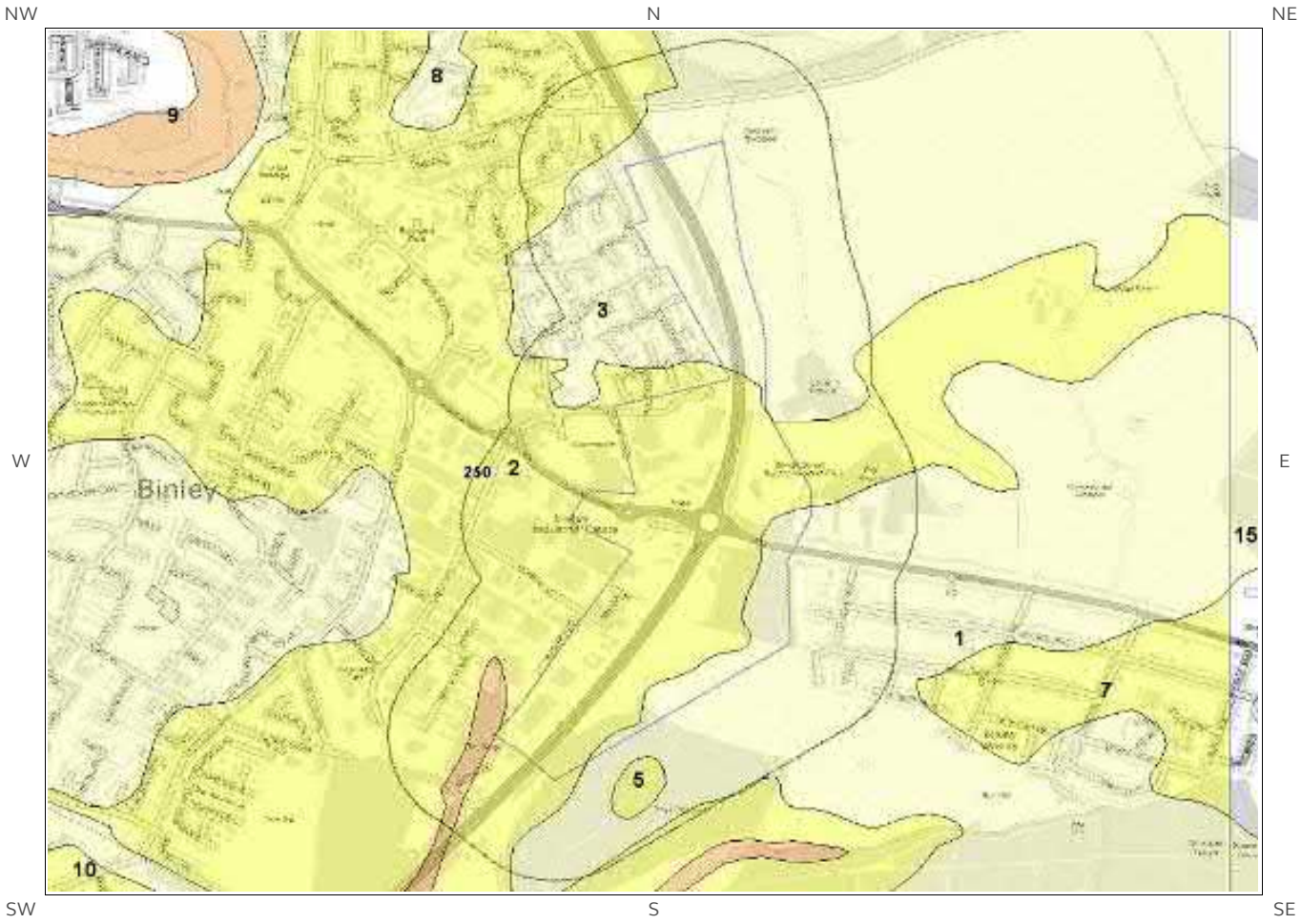


Collapsible Deposits Legend

© Crown copyright and database rights 2016.
Ordnance Survey license 100035207.



4.6 Running Sand Map



Running Sand Legend

© Crown copyright and database rights 2016.
Ordnance Survey license 100035207.



4 Natural Ground Subsidence

The National Ground Subsidence rating is obtained through the 6 natural ground stability hazard datasets, which are supplied by the British Geological Survey (BGS).

The following GeoSure data represented on the mapping is derived from the BGS Digital Geological map of Great Britain at 1:50,000 scale.

What is the maximum hazard rating of natural subsidence within the study site*[*] boundary? Moderate

4.1 Shrink-Swell Clays

The following Shrink Swell information provided by the British Geological Survey:

ID	Distance (m)	Direction	Hazard Rating	Details
1	0.0	On Site	Very Low	Ground conditions predominantly low plasticity. No special actions required to avoid problems due to shrink-swell clays. No special ground investigation required, and increased construction costs or increased financial risks are unlikely due to potential problems with shrink-swell clays.
2	0.0	On Site	Negligible	Ground conditions predominantly non-plastic. No special actions required to avoid problems due to shrink-swell clays. No special ground investigation required, and increased construction costs or increased financial risks are unlikely due to potential problems with shrink-swell clays.
3	0.0	On Site	Low	Ground conditions predominantly medium plasticity. Do not plant trees with high soil moisture demands near to buildings. For new build, consideration should be given to advice published by the National House Building Council (NHBC) and the Building Research Establishment (BRE). There is a possible increase in construction cost to reduce potential shrink swell problems. For existing property, there is a possible increase in insurance risk, especially during droughts or where vegetation with high moisture demands is present.

4.2 Landslides

The following Landslides information provided by the British Geological Survey:

ID	Distance (m)	Direction	Hazard Rating	Details
1	0.0	On Site	Very Low	Slope instability problems are unlikely to be present. No special actions required to avoid problems due to landslides. No special ground investigation required, and increased construction costs or increased financial risks are unlikely due to potential problems with landslides.
2A	0.0	On Site	Low	Possibility of slope instability problems after major changes in ground conditions. Consideration should be given to stability if changes to the ground, such as drainage or excavations, take place. Possible increase in construction cost to reduce potential slope stability problems. For existing property, no significant increase in insurance risk due to natural slope instability problems.

* This includes an automatically generated 50m buffer zone around the site

ID	Distance (m)	Direction	Hazard Rating	Details
3	0.0	On Site	Low	Possibility of slope instability problems after major changes in ground conditions. Consideration should be given to stability if changes to the ground, such as drainage or excavations, take place. Possible increase in construction cost to reduce potential slope stability problems. For existing property, no significant increase in insurance risk due to natural slope instability problems.
4	26.0	SE	Moderate	Significant potential for slope instability with relatively small changes in ground conditions. Avoid large amounts of water entering the ground through pipe leakage or soak-aways. Do not cut or place material on slopes without technical advice. For new build, consider the potential and consequences of ground movement during excavations, or consequence of changes to loading or drainage. For existing property, probable increase in insurance risk is likely due to potential natural slope instability after changes to ground conditions such as a very long, excessively wet winter.
5A	37.0	SE	Moderate	Significant potential for slope instability with relatively small changes in ground conditions. Avoid large amounts of water entering the ground through pipe leakage or soak-aways. Do not cut or place material on slopes without technical advice. For new build, consider the potential and consequences of ground movement during excavations, or consequence of changes to loading or drainage. For existing property, probable increase in insurance risk is likely due to potential natural slope instability after changes to ground conditions such as a very long, excessively wet winter.

4.3 Ground Dissolution of Soluble Rocks

The following Ground Dissolution information provided by the British Geological Survey:

ID	Distance (m)	Direction	Hazard Rating	Details
1	0.0	On Site	Negligible	Soluble rocks are present, but unlikely to cause problems except under exceptional conditions. No special actions required to avoid problems due to soluble rocks. No special ground investigation required, and increased construction costs or increased financial risks are unlikely due to potential problems with soluble rocks.

4.4 Compressible Deposits

The following Compressible Deposits information provided by the British Geological Survey:

ID	Distance (m)	Direction	Hazard Rating	Details
1	0.0	On Site	Very Low	Very low potential for compressible ground to be present. No special actions required to avoid problems due to compressible ground. No special ground investigation required, and increased construction costs or increased financial risks are unlikely due to potential problems with compressible ground.
2	0.0	On Site	Moderate	Significant potential for compressibility problems. Do not drain, load or de-water ground near the property without technical advice. For new build, consider possibility of compressible ground in ground investigation, construction and building design. Consider effects of groundwater changes. Extra construction costs are likely. For existing property, possible increase in insurance risk from compressibility, especially if water conditions or loading of the ground change significantly.
3	0.0	On Site	Negligible	No indicators for compressible ground identified. No special actions required to avoid problems due to compressible ground. No special ground investigation required, and increased construction costs or increased financial risks are unlikely due to potential problems with compressible ground.

4.5 Collapsible Deposits

The following Collapsible Rocks information provided by the British Geological Survey:

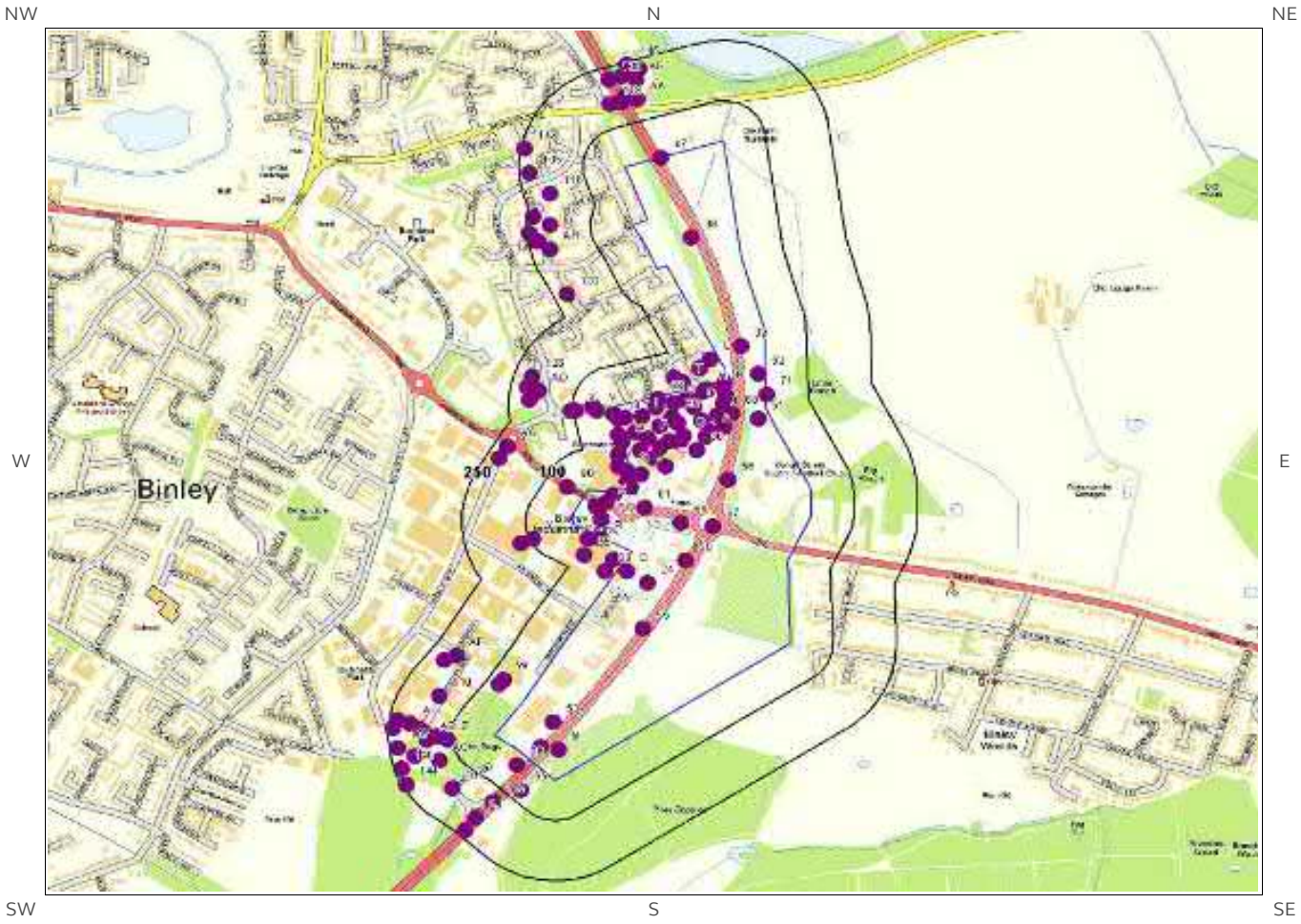
ID	Distance (m)	Direction	Hazard Rating	Details
1	0.0	On Site	Very Low	Deposits with potential to collapse when loaded and saturated are unlikely to be present. No special ground investigation required or increased construction costs or increased financial risk due to potential problems with collapsible deposits.
2	0.0	On Site	Negligible	No indicators for collapsible deposits identified. No actions required to avoid problems due to collapsible deposits. No special ground investigation required, or increased construction costs or increased financial risk due to potential problems with collapsible deposits.

4.6 Running Sands

The following Running Sands information provided by the British Geological Survey:

ID	Distance (m)	Direction	Hazard Rating	Details
1	0.0	On Site	Negligible	No indicators for running sand identified. No special actions required to avoid problems due to running sand. No special ground investigation required, and increased construction costs or increased financial risks are unlikely due to potential problems with running sand.
2	0.0	On Site	Very Low	Very low potential for running sand problems if water table rises or if sandy strata are exposed to water. No special actions required to avoid problems due to running sand. No special ground investigation required, and increased construction costs or increased financial risks are unlikely due to potential problems with running sand.
3	0.0	On Site	Negligible	No indicators for running sand identified. No special actions required to avoid problems due to running sand. No special ground investigation required, and increased construction costs or increased financial risks are unlikely due to potential problems with running sand.
4	0.0	On Site	Low	Possibility of running sand problems after major changes in ground conditions. Normal maintenance to avoid leakage of water-bearing services or water bodies (ponds, swimming pools) should reduce likelihood of problems due to running sand. For new build, consider possibility of running sand into trenches or excavations if water table is high or sandy strata are exposed to water. Avoid concentrated water inputs to site. Unlikely to be an increase in construction costs due to potential for running sand. For existing property, no significant increase in insurance risk due to running sand problems is likely.

5 Borehole Records Map



Borehole Records Legend

© Crown copyright and database rights 2016.
Ordnance Survey license 100035207.

Site Outline

Borehole Locations

125
250
Search Buffers (m)

5 Borehole Records

The systematic analysis of data extracted from the BGS Borehole Records database provides the following information.

Records of boreholes within 250m of the study site boundary: 146

ID	Distance (m)	Direction	NGR	BGS Reference	Drilled Length	Borehole Name
1B	0.0	On Site	438809 278025	SP37NE1092	1.5	PROPOSED IKEA STORE OAK FARM BINLEY COVENTRY TPAB
2J	0.0	On Site	438795 277957	SP37NE1079	3.0	PROPOSED IKEA STORE OAK FARM BINLEY COVENTRY CS2
3A	0.0	On Site	438777 277918	SP37NE1105	2.5	PROPOSED IKEA STORE OAK FARM BINLEY COVENTRY TP109
4A	0.0	On Site	438768 277904	SP37NE1078	3.0	PROPOSED IKEA STORE OAK FARM BINLEY COVENTRY CS1
5B	0.0	On Site	438814 278004	SP37NE1074	8.0	PROPOSED IKEA STORE OAK FARM BINLEY COVENTRY G
6A	0.0	On Site	438756 277945	SP37NE1087	2.0	PROPOSED IKEA STORE OAK FARM BINLEY COVENTRY CS10
7C	0.0	On Site	438715 277907	SP37NE1076	5.0	PROPOSED IKEA STORE OAK FARM BINLEY COVENTRY I
8H	0.0	On Site	438765 278022	SP37NE1093	1.2	PROPOSED IKEA STORE OAK FARM BINLEY COVENTRY TPBA
9C	0.0	On Site	438706 277890	SP37NE1088	2.2	PROPOSED IKEA STORE OAK FARM BINLEY COVENTRY CS11
10D	0.0	On Site	438739 277977	SP37NE1075	5.0	PROPOSED IKEA STORE OAK FARM BINLEY COVENTRY H
11E	0.0	On Site	438671 277831	SP37NE1086	3.0	PROPOSED IKEA STORE OAK FARM BINLEY COVENTRY CS9
12D	0.0	On Site	438739 278006	SP37NE1095	1.5	PROPOSED IKEA STORE OAK FARM BINLEY COVENTRY TPC
13C	0.0	On Site	438700 277937	SP37NE1090	2.0	PROPOSED IKEA STORE OAK FARM BINLEY COVENTRY CS12A
14C	0.0	On Site	438700 277937	SP37NE1089	1.0	PROPOSED IKEA STORE OAK FARM BINLEY COVENTRY CS12
15D	0.0	On Site	438719 277995	SP37NE1096	1.3	PROPOSED IKEA STORE OAK FARM BINLEY COVENTRY TPD

ID	Distance (m)	Direction	NGR	BGS Reference	Drilled Length	Borehole Name
16E	0.0	On Site	438645 277850	SP37NE1102	3.3	PROPOSED IKEA STORE OAK FARM BINLEY COVENTRY TP106
17P	0.0	On Site	438614 277811	SP37NE1071	14.0	PROPOSED IKEA STORE OAK FARM BINLEY COVENTRY D
18G	0.0	On Site	438691 277989	SP37NE1081	3.0	PROPOSED IKEA STORE OAK FARM BINLEY COVENTRY CS4
19F	0.0	On Site	438629 277901	SP37NE1101	2.9	PROPOSED IKEA STORE OAK FARM BINLEY COVENTRY TP105
20F	0.0	On Site	438612 277870	SP37NE1084	3.0	PROPOSED IKEA STORE OAK FARM BINLEY COVENTRY CS7
21G	0.0	On Site	438649 277978	SP37NE1082	3.0	PROPOSED IKEA STORE OAK FARM BINLEY COVENTRY CS5
22	0.0	On Site	438654 277998	SP37NE1099	2.7	PROPOSED IKEA STORE OAK FARM BINLEY COVENTRY TP103
23H	0.0	On Site	438764 278016	SP37NE1094	1.6	PROPOSED IKEA STORE OAK FARM BINLEY COVENTRY TPBB
24	0.0	On Site	438630 277540	SP37NE877	-1.0	TOYS R US COVENTRY TP 3
25I	0.0	On Site	438616 277956	SP37NE1100	3.3	PROPOSED IKEA STORE OAK FARM BINLEY COVENTRY TP104
26	0.0	On Site	438687 277953	SP37NE1104	2.6	PROPOSED IKEA STORE OAK FARM BINLEY COVENTRY TP108
27I	0.0	On Site	438575 277952	SP37NE1070	7.2	PROPOSED IKEA STORE OAK FARM BINLEY COVENTRY C
28H	0.0	On Site	438771 278023	SP37NE1080	3.0	PROPOSED IKEA STORE OAK FARM BINLEY COVENTRY CS3
29F	0.0	On Site	438659 277932	SP37NE1077	5.8	PROPOSED IKEA STORE OAK FARM BINLEY COVENTRY J
30J	0.0	On Site	438811 277928	SP37NE1073	14.0	PROPOSED IKEA STORE OAK FARM BINLEY COVENTRY F
31S	0.0	On Site	438580 277570	SP37NE878	-1.0	TOYS R US COVENTRY TP 4
32F	0.0	On Site	438600 277916	SP37NE1083	3.0	PROPOSED IKEA STORE OAK FARM BINLEY COVENTRY CS6
33C	0.0	On Site	438681 277893	SP37NE1103	2.9	PROPOSED IKEA STORE OAK FARM BINLEY COVENTRY TP107
34J	0.0	On Site	438808 277986	SP37NE1106	2.6	PROPOSED IKEA STORE OAK FARM BINLEY COVENTRY TP110
35F	0.0	On Site	438659 277878	SP37NE1085	3.0	PROPOSED IKEA STORE OAK FARM BINLEY COVENTRY CS8

ID	Distance (m)	Direction	NGR	BGS Reference	Drilled Length	Borehole Name
36	0.0	On Site	438745 277870	SP37NE1072	15.0	PROPOSED IKEA STORE OAK FARM BINLEY COVENTRY E
37B	0.0	On Site	438810 278039	SP37NE1091	1.0	PROPOSED IKEA STORE OAK FARM BINLEY COVENTRY TPAA
38	0.0	On Site	438732 278400	SP37NE577	4.95	COVENTRY EASTERN BYPASS II
39	0.0	On Site	438850 278130	SP37NE576	3.0	COVENTRY EASTERN BYPASS II
40K	0.0	On Site	438530 277740	SP37NE709	-1.0	BINLEY BUSINESS PARK
41K	0.0	On Site	438550 277760	SP37NE717	-1.0	OAK FARM BINLEY PHASE II
42K	0.0	On Site	438510 277730	SP37NE617	13.95	PROGRESS WAY BINLEY COVENTRY
43L	0.0	On Site	438520 277700	SP37NE602	2.5	BRANDON ROAD COVENTRY
44L	0.0	On Site	438520 277700	SP37NE606	2.5	BRANDON ROAD COVENTRY
45L	0.0	On Site	438520 277700	SP37NE600	2.5	BRANDON ROAD COVENTRY
46L	0.0	On Site	438520 277700	SP37NE601	3.3	BRANDON ROAD COVENTRY
47	0.0	On Site	438660 278598	SP37NE578	3.0	COVENTRY EASTERN BYPASS II
48K	0.0	On Site	438510 277730	SP37NE618	14.8	PROGRESS WAY BINLEY COVENTRY
49K	0.0	On Site	438510 277730	SP37NE619	6.1	PROGRESS WAY BINLEY COVENTRY
50	0.0	On Site	438718 277597	SP37NE573	3.0	COVENTRY EASTERN BYPASS II
51	0.0	On Site	438890 277950	SP37NE443	12.3	COVENTRY EASTERN BY-PASS & M40 A1
52	0.0	On Site	438890 278060	SP37NE445	6.0	COVENTRY EASTERN BY-PASS & M40 A3
53	0.0	On Site	438406 277195	SP37NE425	8.0	COVENTRY EASTERN BY-PASS BH26
54L	0.0	On Site	438520 277700	SP37NE605	2.5	BRANDON ROAD COVENTRY
55	0.0	On Site	438618 277428	SP37NE572	4.0	COVENTRY EASTERN BYPASS II
56	0.0	On Site	438820 277798	SP37NE427	3.3	COVENTRY EASTERN BY-PASS TP28+28A
57L	0.0	On Site	438520 277700	SP37NE599	2.5	BRANDON ROAD COVENTRY
58M	0.0	On Site	438420 277126	SP37NE571	9.0	COVENTRY EASTERN BYPASS II
59M	0.0	On Site	438378 277132	SP37NE424	9.0	COVENTRY EASTERN BY-PASS BH25
60L	0.0	On Site	438520 277700	SP37NE604	2.85	BRANDON ROAD COVENTRY
61	0.0	On Site	438622 277728	SP37NE574	2.0	COVENTRY EASTERN BYPASS II
62K	0.0	On Site	438510 277730	SP37NE616	13.65	PROGRESS WAY BINLEY COVENTRY
63L	0.0	On Site	438520 277700	SP37NE603	2.5	BRANDON ROAD COVENTRY

ID	Distance (m)	Direction	NGR	BGS Reference	Drilled Length	Borehole Name
64L	0.0	On Site	438520 277700	SP37NE607	3.0	BRANDON ROAD COVENTRY
65L	0.0	On Site	438520 277700	SP37NE598	3.4	BRANDON ROAD COVENTRY
66	0.0	On Site	438708 277691	SP37NE426	3.0	COVENTRY EASTERN BY-PASS TP27
67	0.0	On Site	438784 277682	SP37NE575	3.2	COVENTRY EASTERN BYPASS II
68	0.0	On Site	438828 277963	SP37NE441	6.0	COVENTRY EASTERN BY-PASS BH51
69L	0.0	On Site	438520 277700	SP37NE597	3.4	BRANDON ROAD COVENTRY
70N	0.0	W	438560 277950	SP37NE921	-1.0	WILLIAM MORRISONS SUPERMARKET BINLEY 4
71	1.0	E	438910 278010	SP37NE444	7.0	COVENTRY EASTERN BY-PASS & M40 A2
72O	4.0	W	438570 277890	SP37NE920	-1.0	WILLIAM MORRISONS SUPERMARKET BINLEY 3
73R	6.0	SW	438520 277650	SP37NE873	-1.0	TOYS R US COVENTRY 2
74N	8.0	W	438550 277960	SP37NE713	-1.0	OAK FARM BINLEY PHASE II
75O	9.0	W	438560 277910	SP37NE712	-1.0	OAK FARM BINLEY PHASE II
76P	10.0	W	438590 277780	SP37NE716	-1.0	OAK FARM BINLEY PHASE II
77Q	10.0	W	438580 277820	SP37NE710	-1.0	OAK FARM BINLEY PHASE II
78Q	17.0	W	438580 277790	SP37NE918	-1.0	WILLIAM MORRISONS SUPERMARKET BINLEY 1
79T	19.0	N	438711 278040	SP37NE1098	3.0	PROPOSED IKEA STORE OAK FARM BINLEY COVENTRY TP102
80R	19.0	SW	438490 277650	SP37NE875	-1.0	TOYS R US COVENTRY TP 1
81U	20.0	SW	438777 278097	SP37NE1068	4.5	PROPOSED IKEA STORE OAK FARM BINLEY COVENTRY A
82O	21.0	W	438560 277860	SP37NE711	-1.0	OAK FARM BINLEY PHASE II
83	21.0	NW	438530 277570	SP37NE876	-1.0	TOYS R US COVENTRY TP 2
84S	22.0	NW	438550 277600	SP37NE874	-1.0	TOYS R US COVENTRY 3
85Q	28.0	W	438560 277830	SP37NE919	-1.0	WILLIAM MORRISONS SUPERMARKET BINLEY 2
86	31.0	SW	438322 277089	SP37NE570	9.1	COVENTRY EASTERN BYPASS II
87T	34.0	N	438693 278051	SP37NE1069	5.4	PROPOSED IKEA STORE OAK FARM BINLEY COVENTRY B
88U	42.0	N	438753 278075	SP37NE1097	3.0	PROPOSED IKEA STORE OAK FARM BINLEY COVENTRY TP101
89V	44.0	W	438510 277970	SP37NE922	-1.0	WILLIAM MORRISONS SUPERMARKET BINLEY 5
90	47.0	NW	438440 277780	SP37NE708	-1.0	BINLEY BUSINESS PARK

ID	Distance (m)	Direction	NGR	BGS Reference	Drilled Length	Borehole Name
91V	53.0	W	438500 277980	SP37NE714	-1.0	OAK FARM BINLEY PHASE II
92	59.0	SW	438480 277610	SP37NE872	-1.0	TOYS R US COVENTRY 1
93W	69.0	NW	438290 277300	SP37NE17	117.88	BINLEY COLLIERY NO.17 COVENTRY
94W	71.0	NW	438280 277290	SP37NE844	117.68	BINLEY COLLIERY NO.17
95	74.0	SW	438330 277025	SP37NE569	9.0	COVENTRY EASTERN BYPASS II
96X	94.0	W	438460 277970	SP37NE923	-1.0	WILLIAM MORRISONS SUPERMARKET BINLEY 6
97Y	94.0	SW	438360 277650	SP37NE869	152.4	BINLEY NO.16
98X	104.0	W	438450 277970	SP37NE715	-1.0	OAK FARM BINLEY PHASE II
99Z	110.0	W	438160 277150	SP37NE829	-1.0	BINLEY RAILHEAD TP 42
100Y	126.0	SW	438330 277640	SP37NE16	152.24	BINLEY COLLIERY NO.16 COVENTRY
101Z	129.0	W	438140 277160	SP37NE769	-1.0	BINLEY RAILHEAD 1
102	138.0	SW	438265 276996	SP37NE423	5.8	COVENTRY EASTERN BY-PASS BH24
103Z	139.0	W	438130 277160	SP37NE827	-1.0	BINLEY RAILHEAD TP 40
104AC	144.0	SW	438140 277100	SP37NE830	-1.0	BINLEY RAILHEAD TP 43
105AA	154.0	N	438604 278744	SP37NE579	8.0	COVENTRY EASTERN BYPASS II
106AA	156.0	N	438560 278734	SP37NE581	11.5	COVENTRY EASTERN BYPASS II
107AA	157.0	N	438569 278737	SP37NE428	16.3	COVENTRY EASTERN BY-PASS BH29+29R
108	160.0	N	438540 278732	SP37NE582	7.8	COVENTRY EASTERN BYPASS II
109AB	160.0	W	438110 277150	SP37NE807	-1.0	BINLEY RAILHEAD TP 20
110	161.0	NW	438140 277260	SP37NE784	-1.0	BINLEY RAILHEAD 16
111	167.0	SW	438170 277030	SP37NE779	-1.0	BINLEY RAILHEAD 11
112AB	169.0	W	438100 277170	SP37NE826	-1.0	BINLEY RAILHEAD TP 39
113AA	169.0	N	438579 278753	SP37NE580	8.8	COVENTRY EASTERN BYPASS II
114AB	180.0	W	438090 277180	SP37NE783	-1.0	BINLEY RAILHEAD 15
115AD	184.0	W	438373 278019	SP37NE931	3.1	SITE AT SKIPWORTH ROAD COVENTRY TP 2
116	190.0	W	438400 278510	SP37NE655	3.0	BINLEY COVENTRY
117AF	193.0	NW	438180 277360	SP37NE462	11.0	S4155 BINLEY MONOBUILD LTD NO.2
118AJ	195.0	SW	438224 276956	SP37NE568	5.0	COVENTRY EASTERN BYPASS II

ID	Distance (m)	Direction	NGR	BGS Reference	Drilled Length	Borehole Name
119AK	196.0	W	438400 278430	SP37NE657	2.7	BINLEY COVENTRY
120AC	197.0	W	438080 277110	SP37NE828	-1.0	BINLEY RAILHEAD TP 41
121AI	201.0	W	438070 277190	SP37NE841	-1.0	BINLEY RAILHEAD TP 54
122AE	201.0	N	438603 278793	SP37NE429	12.0	COVENTRY EASTERN BY-PASS BH30
123AD	203.0	W	438351 277997	SP37NE930	3.2	SITE AT SKIPWORTH ROAD COVENTRY TP 1
124AH	206.0	W	438400 278370	SP37NE658	1.7	BINLEY COVENTRY
125AE	209.0	N	438600 278800	SP37NE1203	-1.0	BRINKLOW ROAD COVENTRY TP106
126	209.0	W	438357 278054	SP37NE932	2.9	SITE AT SKIPWORTH ROAD COVENTRY TP 3
127AF	210.0	NW	438150 277350	SP37NE461	10.0	S4155 BINLEY MONOBUILD LTD NO.1
128AD	211.0	W	438347 278028	SP37NE933	2.4	SITE AT SKIPWORTH ROAD COVENTRY TP 4
129AE	217.0	N	438570 278800	SP37NE1202	-1.0	BRINKLOW ROAD COVENTRY TP105
130	218.0	N	438539 278792	SP37NE430	9.0	COVENTRY EASTERN BY-PASS BH31R
131AG	219.0	NW	438300 277880	SP37NE707	-1.0	BINLEY BUSINESS PARK
132AG	220.0	NW	438280 277850	SP37NE38	7.62	BRANDON ROAD BH22 COVENTRY
133	220.0	SW	438440 278260	SP37NE646	1.9	BINLEY COVENTRY
134AE	226.0	N	438610 278820	SP37NE1201	-1.0	BRINKLOW ROAD COVENTRY TP104
135	229.0	W	438350 278560	SP37NE639	3.2	BINLEY COVENTRY
136AH	230.0	W	438370 278390	SP37NE660	0.8	BINLEY COVENTRY
137	232.0	W	438040 277130	SP37NE770	-1.0	BINLEY RAILHEAD 2
138AI	232.0	W	438040 277200	SP37NE838	-1.0	BINLEY RAILHEAD TP 51
139AJ	234.0	SW	438200 276926	SP37NE567	5.0	COVENTRY EASTERN BYPASS II
140	235.0	W	438050 277080	SP37NE831	-1.0	BINLEY RAILHEAD TP 44
141AK	237.0	W	438360 278450	SP37NE656	2.3	BINLEY COVENTRY
142AI	240.0	W	438030 277180	SP37NE806	-1.0	BINLEY RAILHEAD TP 19
143	242.0	W	438340 278620	SP37NE638	3.2	BINLEY COVENTRY
144	243.0	SW	438060 277040	SP37NE832	-1.0	BINLEY RAILHEAD TP 45
145	243.0	N	438580 278830	SP37NE1200	-1.0	BRINKLOW ROAD COVENTRY TP103
146AK	247.0	W	438350 278410	SP37NE659	2.7	BINLEY COVENTRY

The borehole records are available using the hyperlinks below: Please note that if the donor of the borehole record has requested the information be held as commercial-in-confidence, the additional data will be held separately by the BGS and a formal request must be made for its release.

#1B: scans.bgs.ac.uk/sobi_scans/boreholes/17266152
#2J: scans.bgs.ac.uk/sobi_scans/boreholes/17266135
#3A: scans.bgs.ac.uk/sobi_scans/boreholes/17266165
#4A: scans.bgs.ac.uk/sobi_scans/boreholes/17266133
#5B: scans.bgs.ac.uk/sobi_scans/boreholes/17266127
#6A: scans.bgs.ac.uk/sobi_scans/boreholes/17266147
#7C: scans.bgs.ac.uk/sobi_scans/boreholes/17266130
#8H: scans.bgs.ac.uk/sobi_scans/boreholes/17266153
#9C: scans.bgs.ac.uk/sobi_scans/boreholes/17266148
#10D: scans.bgs.ac.uk/sobi_scans/boreholes/17266129
#11E: scans.bgs.ac.uk/sobi_scans/boreholes/17266146
#12D: scans.bgs.ac.uk/sobi_scans/boreholes/17266155
#13C: scans.bgs.ac.uk/sobi_scans/boreholes/17266150
#14C: scans.bgs.ac.uk/sobi_scans/boreholes/17266149
#15D: scans.bgs.ac.uk/sobi_scans/boreholes/17266156
#16E: scans.bgs.ac.uk/sobi_scans/boreholes/17266162
#17P: scans.bgs.ac.uk/sobi_scans/boreholes/17266122
#18G: scans.bgs.ac.uk/sobi_scans/boreholes/17266138
#19F: scans.bgs.ac.uk/sobi_scans/boreholes/17266161
#20F: scans.bgs.ac.uk/sobi_scans/boreholes/17266143
#21G: scans.bgs.ac.uk/sobi_scans/boreholes/17266139
#22: scans.bgs.ac.uk/sobi_scans/boreholes/17266159
#23H: scans.bgs.ac.uk/sobi_scans/boreholes/17266154
#25I: scans.bgs.ac.uk/sobi_scans/boreholes/17266160
#26: scans.bgs.ac.uk/sobi_scans/boreholes/17266164
#27I: scans.bgs.ac.uk/sobi_scans/boreholes/17266121
#28H: scans.bgs.ac.uk/sobi_scans/boreholes/17266136
#29F: scans.bgs.ac.uk/sobi_scans/boreholes/17266131
#30J: scans.bgs.ac.uk/sobi_scans/boreholes/17266125
#32F: scans.bgs.ac.uk/sobi_scans/boreholes/17266141
#33C: scans.bgs.ac.uk/sobi_scans/boreholes/17266163
#34J: scans.bgs.ac.uk/sobi_scans/boreholes/17266166
#35F: scans.bgs.ac.uk/sobi_scans/boreholes/17266144
#36: scans.bgs.ac.uk/sobi_scans/boreholes/17266123
#37B: scans.bgs.ac.uk/sobi_scans/boreholes/17266151
#38: scans.bgs.ac.uk/sobi_scans/boreholes/322353
#39: scans.bgs.ac.uk/sobi_scans/boreholes/322352
#42K: scans.bgs.ac.uk/sobi_scans/boreholes/322393
#43L: scans.bgs.ac.uk/sobi_scans/boreholes/322378
#44L: scans.bgs.ac.uk/sobi_scans/boreholes/322382
#45L: scans.bgs.ac.uk/sobi_scans/boreholes/322376
#46L: scans.bgs.ac.uk/sobi_scans/boreholes/322377
#47: scans.bgs.ac.uk/sobi_scans/boreholes/322354
#48K: scans.bgs.ac.uk/sobi_scans/boreholes/322394
#49K: scans.bgs.ac.uk/sobi_scans/boreholes/322395
#50: scans.bgs.ac.uk/sobi_scans/boreholes/322349
#51: scans.bgs.ac.uk/sobi_scans/boreholes/322218
#52: scans.bgs.ac.uk/sobi_scans/boreholes/322220
#53: scans.bgs.ac.uk/sobi_scans/boreholes/322200
#54L: scans.bgs.ac.uk/sobi_scans/boreholes/322381

#55: scans.bgs.ac.uk/sobi_scans/boreholes/322348
#56: scans.bgs.ac.uk/sobi_scans/boreholes/322202
#57L: scans.bgs.ac.uk/sobi_scans/boreholes/322375
#58M: scans.bgs.ac.uk/sobi_scans/boreholes/322347
#59M: scans.bgs.ac.uk/sobi_scans/boreholes/322199
#60L: scans.bgs.ac.uk/sobi_scans/boreholes/322380
#61: scans.bgs.ac.uk/sobi_scans/boreholes/322350
#62K: scans.bgs.ac.uk/sobi_scans/boreholes/322392
#63L: scans.bgs.ac.uk/sobi_scans/boreholes/322379
#64L: scans.bgs.ac.uk/sobi_scans/boreholes/322383
#65L: scans.bgs.ac.uk/sobi_scans/boreholes/322374
#66: scans.bgs.ac.uk/sobi_scans/boreholes/322201
#67: scans.bgs.ac.uk/sobi_scans/boreholes/322351
#68: scans.bgs.ac.uk/sobi_scans/boreholes/322216
#69L: scans.bgs.ac.uk/sobi_scans/boreholes/322373
#71: scans.bgs.ac.uk/sobi_scans/boreholes/322219
#79T: scans.bgs.ac.uk/sobi_scans/boreholes/17266158
#81U: scans.bgs.ac.uk/sobi_scans/boreholes/17266119
#86: scans.bgs.ac.uk/sobi_scans/boreholes/322346
#87T: scans.bgs.ac.uk/sobi_scans/boreholes/17266120
#88U: scans.bgs.ac.uk/sobi_scans/boreholes/17266157
#93W: scans.bgs.ac.uk/sobi_scans/boreholes/321792
#94W: scans.bgs.ac.uk/sobi_scans/boreholes/322620
#95: scans.bgs.ac.uk/sobi_scans/boreholes/322345
#97Y: scans.bgs.ac.uk/sobi_scans/boreholes/322645
#100Y: scans.bgs.ac.uk/sobi_scans/boreholes/321791
#102: scans.bgs.ac.uk/sobi_scans/boreholes/322198
#105AA: scans.bgs.ac.uk/sobi_scans/boreholes/322355
#106AA: scans.bgs.ac.uk/sobi_scans/boreholes/322357
#107AA: scans.bgs.ac.uk/sobi_scans/boreholes/322203
#108: scans.bgs.ac.uk/sobi_scans/boreholes/322358
#113AA: scans.bgs.ac.uk/sobi_scans/boreholes/322356
#115AD: scans.bgs.ac.uk/sobi_scans/boreholes/15640237
#116: scans.bgs.ac.uk/sobi_scans/boreholes/322431
#117AF: scans.bgs.ac.uk/sobi_scans/boreholes/322237
#118AJ: scans.bgs.ac.uk/sobi_scans/boreholes/322344
#119AK: scans.bgs.ac.uk/sobi_scans/boreholes/322433
#122AE: scans.bgs.ac.uk/sobi_scans/boreholes/322204
#123AD: scans.bgs.ac.uk/sobi_scans/boreholes/15640236
#124AH: scans.bgs.ac.uk/sobi_scans/boreholes/322434
#126: scans.bgs.ac.uk/sobi_scans/boreholes/15640238
#127AF: scans.bgs.ac.uk/sobi_scans/boreholes/322236
#128AD: scans.bgs.ac.uk/sobi_scans/boreholes/15640239
#130: scans.bgs.ac.uk/sobi_scans/boreholes/322205
#132AG: scans.bgs.ac.uk/sobi_scans/boreholes/321813
#133: scans.bgs.ac.uk/sobi_scans/boreholes/322422
#135: scans.bgs.ac.uk/sobi_scans/boreholes/322415
#136AH: scans.bgs.ac.uk/sobi_scans/boreholes/322436
#139AJ: scans.bgs.ac.uk/sobi_scans/boreholes/322343
#141AK: scans.bgs.ac.uk/sobi_scans/boreholes/322432
#143: scans.bgs.ac.uk/sobi_scans/boreholes/322414
#146AK: scans.bgs.ac.uk/sobi_scans/boreholes/322435

6 Estimated Background Soil Chemistry

Records of background estimated soil chemistry within 250m of the study site boundary: 63

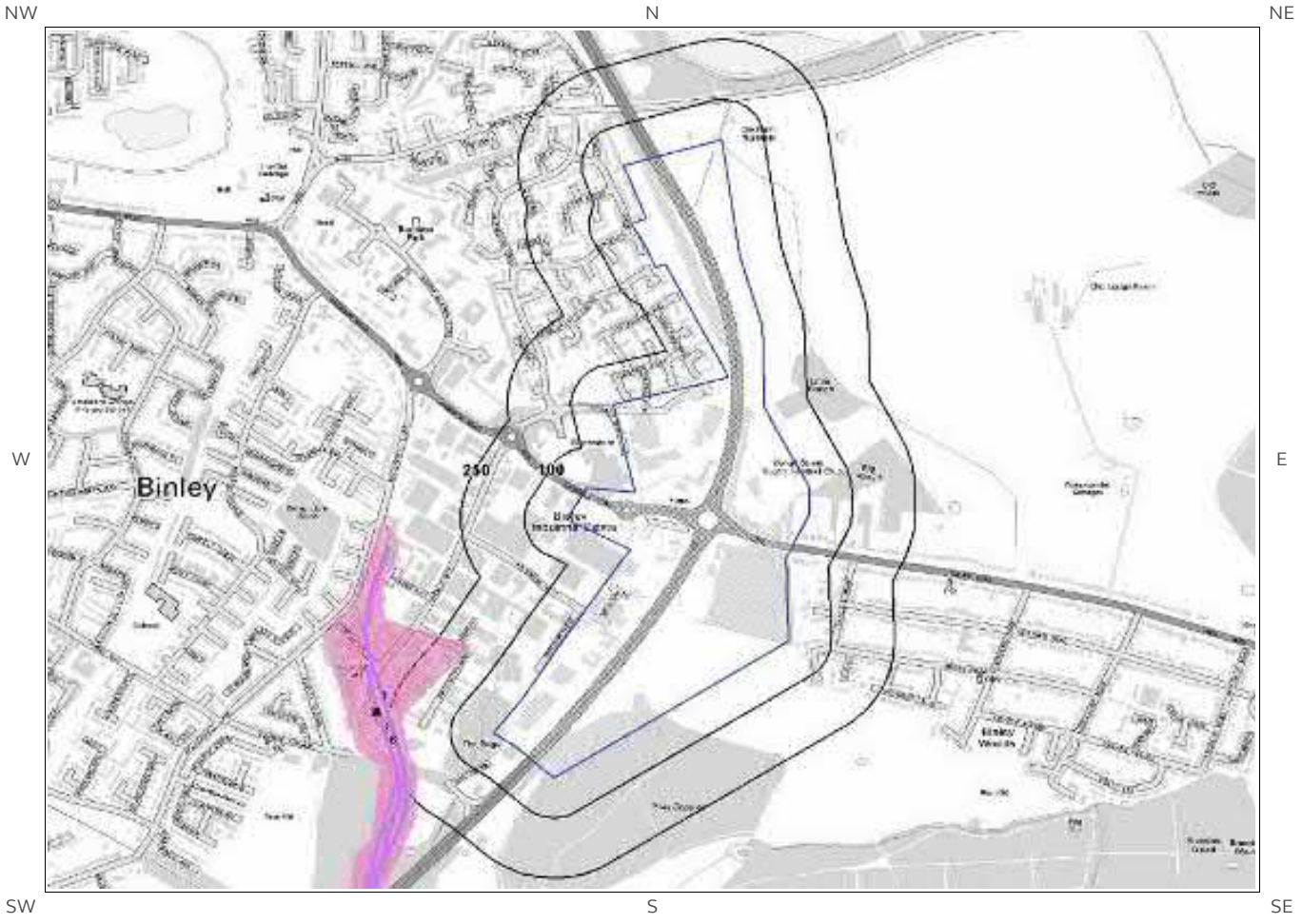
For further information on how this data is calculated and limitations upon its use, please see the Groundsure Geo Insight User Guide, available on request.

Distance (m)	Direction	Sample Type	Arsenic (As)	Cadmium (Cd)	Chromium (Cr)	Nickel (Ni)	Lead (Pb)
0.0	On Site	RuralSoil	<15 mg/kg	<1.8 mg/kg	60 - 90 mg/kg	15 - 30 mg/kg	<100 mg/kg
0.0	On Site	RuralSoil	<15 mg/kg	<1.8 mg/kg	60 - 90 mg/kg	15 - 30 mg/kg	<100 mg/kg
0.0	On Site	RuralSoil	<15 mg/kg	<1.8 mg/kg	20 - 40 mg/kg	<15 mg/kg	<100 mg/kg
0.0	On Site	RuralSoil	<15 mg/kg	<1.8 mg/kg	60 - 90 mg/kg	15 - 30 mg/kg	<100 mg/kg
0.0	On Site	RuralSoil	<15 mg/kg	<1.8 mg/kg	60 - 90 mg/kg	15 - 30 mg/kg	<100 mg/kg
0.0	On Site	RuralSoil	<15 mg/kg	<1.8 mg/kg	20 - 40 mg/kg	<15 mg/kg	<100 mg/kg
0.0	On Site	RuralSoil	<15 mg/kg	<1.8 mg/kg	20 - 40 mg/kg	<15 mg/kg	<100 mg/kg
0.0	On Site	RuralSoil	<15 mg/kg	<1.8 mg/kg	60 - 90 mg/kg	15 - 30 mg/kg	<100 mg/kg
0.0	On Site	RuralSoil	<15 mg/kg	<1.8 mg/kg	60 - 90 mg/kg	15 - 30 mg/kg	<100 mg/kg
0.0	On Site	RuralSoil	<15 mg/kg	<1.8 mg/kg	20 - 40 mg/kg	<15 mg/kg	<100 mg/kg
0.0	On Site	RuralSoil	<15 mg/kg	<1.8 mg/kg	60 - 90 mg/kg	15 - 30 mg/kg	<100 mg/kg
0.0	On Site	RuralSoil	<15 mg/kg	<1.8 mg/kg	20 - 40 mg/kg	<15 mg/kg	<100 mg/kg
0.0	On Site	RuralSoil	<15 mg/kg	<1.8 mg/kg	60 - 90 mg/kg	15 - 30 mg/kg	<100 mg/kg
0.0	On Site	RuralSoil	<15 mg/kg	<1.8 mg/kg	60 - 90 mg/kg	15 - 30 mg/kg	<100 mg/kg
0.0	On Site	RuralSoil	<15 mg/kg	<1.8 mg/kg	60 - 90 mg/kg	15 - 30 mg/kg	<100 mg/kg
0.0	On Site	RuralSoil	<15 mg/kg	<1.8 mg/kg	60 - 90 mg/kg	15 - 30 mg/kg	<100 mg/kg
0.0	On Site	RuralSoil	<15 mg/kg	<1.8 mg/kg	60 - 90 mg/kg	15 - 30 mg/kg	<100 mg/kg
0.0	On Site	RuralSoil	<15 mg/kg	<1.8 mg/kg	20 - 40 mg/kg	<15 mg/kg	<100 mg/kg
0.0	On Site	RuralSoil	<15 mg/kg	<1.8 mg/kg	60 - 90 mg/kg	15 - 30 mg/kg	<100 mg/kg
0.0	On Site	RuralSoil	<15 mg/kg	<1.8 mg/kg	20 - 40 mg/kg	<15 mg/kg	<100 mg/kg
0.0	On Site	RuralSoil	<15 mg/kg	<1.8 mg/kg	60 - 90 mg/kg	15 - 30 mg/kg	<100 mg/kg
0.0	On Site	RuralSoil	<15 mg/kg	<1.8 mg/kg	20 - 40 mg/kg	<15 mg/kg	<100 mg/kg
0.0	On Site	RuralSoil	<15 mg/kg	<1.8 mg/kg	20 - 40 mg/kg	<15 mg/kg	<100 mg/kg
6.0	NW	RuralSoil	<15 mg/kg	<1.8 mg/kg	20 - 40 mg/kg	<15 mg/kg	<100 mg/kg
11.0	SW	RuralSoil	<15 mg/kg	<1.8 mg/kg	20 - 40 mg/kg	<15 mg/kg	<100 mg/kg
22.0	NW	RuralSoil	<15 mg/kg	<1.8 mg/kg	20 - 40 mg/kg	<15 mg/kg	<100 mg/kg
28.0	NE	RuralSoil	<15 mg/kg	<1.8 mg/kg	20 - 40 mg/kg	<15 mg/kg	<100 mg/kg
33.0	E	RuralSoil	<15 mg/kg	<1.8 mg/kg	60 - 90 mg/kg	15 - 30 mg/kg	<100 mg/kg
37.0	E	RuralSoil	<15 mg/kg	<1.8 mg/kg	60 - 90 mg/kg	15 - 30 mg/kg	<100 mg/kg
50.0	NW	RuralSoil	<15 mg/kg	<1.8 mg/kg	60 - 90 mg/kg	15 - 30 mg/kg	<100 mg/kg
52.0	S	RuralSoil	<15 mg/kg	<1.8 mg/kg	60 - 90 mg/kg	15 - 30 mg/kg	<100 mg/kg
52.0	S	RuralSoil	<15 mg/kg	<1.8 mg/kg	60 - 90 mg/kg	15 - 30 mg/kg	<100 mg/kg
52.0	NW	RuralSoil	<15 mg/kg	<1.8 mg/kg	20 - 40 mg/kg	<15 mg/kg	<100 mg/kg
55.0	W	RuralSoil	<15 mg/kg	<1.8 mg/kg	60 - 90 mg/kg	15 - 30 mg/kg	<100 mg/kg
56.0	SE	RuralSoil	<15 mg/kg	<1.8 mg/kg	20 - 40 mg/kg	<15 mg/kg	<100 mg/kg
56.0	W	RuralSoil	<15 mg/kg	<1.8 mg/kg	60 - 90 mg/kg	15 - 30 mg/kg	<100 mg/kg
57.0	SE	RuralSoil	<15 mg/kg	<1.8 mg/kg	60 - 90 mg/kg	15 - 30 mg/kg	<100 mg/kg
57.0	SE	RuralSoil	<15 mg/kg	<1.8 mg/kg	60 - 90 mg/kg	15 - 30 mg/kg	<100 mg/kg
67.0	NE	RuralSoil	<15 mg/kg	<1.8 mg/kg	60 - 90 mg/kg	15 - 30 mg/kg	<100 mg/kg

Distance (m)	Direction	Sample Type	Arsenic (As)	Cadmium (Cd)	Chromium (Cr)	Nickel (Ni)	Lead (Pb)
78.0	W	RuralSoil	<15 mg/kg	<1.8 mg/kg	60 - 90 mg/kg	15 - 30 mg/kg	<100 mg/kg
79.0	W	RuralSoil	<15 mg/kg	<1.8 mg/kg	20 - 40 mg/kg	<15 mg/kg	<100 mg/kg
83.0	SW	RuralSoil	<15 mg/kg	<1.8 mg/kg	40 - 60 mg/kg	<15 mg/kg	<100 mg/kg
83.0	SW	RuralSoil	<15 mg/kg	<1.8 mg/kg	40 - 60 mg/kg	<15 mg/kg	<100 mg/kg
90.0	SE	RuralSoil	<15 mg/kg	<1.8 mg/kg	60 - 90 mg/kg	15 - 30 mg/kg	<100 mg/kg
90.0	SE	RuralSoil	<15 mg/kg	<1.8 mg/kg	60 - 90 mg/kg	15 - 30 mg/kg	<100 mg/kg
91.0	E	RuralSoil	<15 mg/kg	<1.8 mg/kg	60 - 90 mg/kg	15 - 30 mg/kg	<100 mg/kg
111.0	NW	RuralSoil	<15 mg/kg	<1.8 mg/kg	20 - 40 mg/kg	<15 mg/kg	<100 mg/kg
113.0	SE	RuralSoil	<15 mg/kg	<1.8 mg/kg	40 - 60 mg/kg	<15 mg/kg	<100 mg/kg
113.0	SE	RuralSoil	<15 mg/kg	<1.8 mg/kg	40 - 60 mg/kg	<15 mg/kg	<100 mg/kg
134.0	NW	RuralSoil	<15 mg/kg	<1.8 mg/kg	20 - 40 mg/kg	<15 mg/kg	<100 mg/kg
150.0	SW	RuralSoil	<15 mg/kg	<1.8 mg/kg	40 - 60 mg/kg	<15 mg/kg	<100 mg/kg
150.0	SW	RuralSoil	<15 mg/kg	<1.8 mg/kg	40 - 60 mg/kg	<15 mg/kg	<100 mg/kg
166.0	SE	RuralSoil	<15 mg/kg	<1.8 mg/kg	60 - 90 mg/kg	15 - 30 mg/kg	<100 mg/kg
168.0	E	RuralSoil	<15 mg/kg	<1.8 mg/kg	60 - 90 mg/kg	15 - 30 mg/kg	<100 mg/kg
178.0	SW	RuralSoil	<15 mg/kg	<1.8 mg/kg	60 - 90 mg/kg	15 - 30 mg/kg	<100 mg/kg
178.0	SW	RuralSoil	<15 mg/kg	<1.8 mg/kg	60 - 90 mg/kg	15 - 30 mg/kg	<100 mg/kg
202.0	SW	RuralSoil	<15 mg/kg	<1.8 mg/kg	40 - 60 mg/kg	<15 mg/kg	<100 mg/kg
202.0	SW	RuralSoil	<15 mg/kg	<1.8 mg/kg	40 - 60 mg/kg	<15 mg/kg	<100 mg/kg
212.0	E	RuralSoil	<15 mg/kg	<1.8 mg/kg	20 - 40 mg/kg	15 - 30 mg/kg	<100 mg/kg
227.0	SE	RuralSoil	<15 mg/kg	<1.8 mg/kg	60 - 90 mg/kg	15 - 30 mg/kg	<100 mg/kg
239.0	SE	RuralSoil	<15 mg/kg	<1.8 mg/kg	60 - 90 mg/kg	15 - 30 mg/kg	<100 mg/kg
239.0	SE	RuralSoil	<15 mg/kg	<1.8 mg/kg	60 - 90 mg/kg	15 - 30 mg/kg	<100 mg/kg
243.0	N	RuralSoil	<15 mg/kg	<1.8 mg/kg	20 - 40 mg/kg	<15 mg/kg	<100 mg/kg

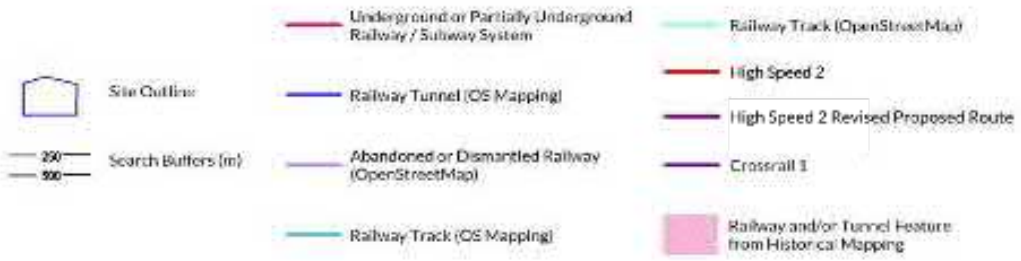
*As this data is based upon underlying 1:50,000 scale geological information, a 50m buffer has been added to the search radius.

7 Railways and Tunnels Map



Railways and Tunnels Legend

© Crown copyright and database rights 2016.
Ordnance Survey license 100035207.
© OpenStreetMapContributors



7 Railways and Tunnels

7.1 Tunnels

This data is derived from OpenStreetMap and provides information on the possible locations of underground railway systems in the UK - the London Underground, the Tyne & Wear Metro and the Glasgow Subway.

Have any underground railway lines been identified within the study site boundary? No

Have any underground railway lines been identified within 250m of the study site boundary? No

Database searched and no data found.

Any records that have been identified are represented on the Railways and Tunnels Map.

This data is derived from Ordnance Survey mapping and provides information on the possible locations of railway tunnels forming part of the UK overground railway network.

Have any other railway tunnels been identified within the site boundary? No

Have any other railway tunnels been identified within 250m of the site boundary? No

Database searched and no data found.

Any records that have been identified are represented on the Railways and Tunnels Map.

7.2 Historical Railway and Tunnel Features

This data is derived from Groundsure's unique Historical Land-use Database and contains features relating to tunnels, railway tracks or associated works that have been identified from historical Ordnance Survey mapping.

Have any historical railway or tunnel features been identified within the study site boundary? No

Have any historical railway or tunnel features been identified within 250m of the study site boundary? Yes

ID	Distance (m)	Direction	NGR	Details	Date
1	175	NW	438021 277031	Mineral Railway Sidings	1950
2B	205	W	438028 277097	Railway Sidings	1967
3A	220	W	438002 277154	Mineral Railway Sidings	1938
4A	220	W	438002 277154	Railway Sidings	1912
5A	220	W	437994 277169	Mineral Railway Sidings	1926
6	221	W	438036 277153	Railway Sidings	1959

ID	Distance (m)	Direction	NGR	Details	Date
7B	223	W	438032 277122	Railway Sidings	1913
8B	223	W	437996 277147	Mineral Railway Sidings	1925

Any records that have been identified are represented on the Railways and Tunnels Map.

7.3 Historical Railways

This data is derived from OpenStreetMap and provides information on the possible alignments of abandoned or dismantled railway lines in proximity to the study site.

Have any historical railway lines been identified within the study site boundary? No

Have any historical railway lines been identified within 250m of the study site boundary? Yes

Distance (m)	Direction	Status
227	W	Dismantled
245	W	Dismantled
249	SW	Dismantled

Note: multiple sections of the same track may be listed in the detail above

Any records that have been identified are represented on the Railways and Tunnels Map.

7.4 Active Railways

These datasets are derived from Ordnance Survey mapping and OpenStreetMap and provide information on the possible locations of active railway lines in proximity to the study site.

Have any active railway lines been identified within the study site boundary? No

Have any active railway lines been identified within 250m of the study site boundary? No

Database searched and no data found.

Note: multiple sections of the same track may be listed in the detail above
Any records that have been identified are represented on the Railways and Tunnels Map.

7.5 Railway Projects

These datasets provide information on the location of large scale railway projects High Speed 2 and Crossrail 1 .

Is the study site within 5km of the route of the High Speed 2 rail project? No

Is the study site within 5km of the proposed alternative route of the High Speed 2 rail project? No

Is the study site within 500m of the route of the Crossrail 1 rail project? No

Further information on proximity to these routes, the project construction status and associated works can be obtained through the purchase of a Groundsure HS2 and Crossrail 1 Report.

The route data has been digitised from publicly available maps by Groundsure. The route as provided relates to the Crossrail 1 project only, and does not include any details of the Crossrail 2 project, as final details of the route for Crossrail 2 are still under consultation.

Contact Details

Groundsure Helpline

Telephone: 08444 159 000
info@groundsure.com

British Geological Survey Enquiries

Kingsley Dunham Centre
Keyworth, Nottingham NG12 5GG
Tel: 0115 936 3143.
Fax: 0115 936 3276.
Email:**enquiries@bgs.ac.uk**
Web:**www.bgs.ac.uk**
BGS Geological Hazards Reports and general geological enquiries

British Gypsum

British Gypsum Ltd
East Leake
Loughborough
Leicestershire
LE12 6HX

The Coal Authority

200 Lichfield Lane
Mansfield
Notts NG18 4RG
Tel: 0345 7626 848
DX 716176 Mansfield 5
www.coal.gov.uk

Public Health England

Public information access office
Public Health England, Wellington House
133-155 Waterloo Road, London, SE1 8UG
https://www.gov.uk/government/organisations/public-health-england
Email: **enquiries@phe.gov.uk**
Main switchboard: 020 7654 8000

Johnson Poole & Bloomer Limited

Harris and Pearson Building, Brettel Lane
Brierley Hill, West Midlands
DY5 3LH
Tel: +44 (0) 1384 262 000
Email:**enquiries.gs@jpb.co.uk**
Website: **www.jpb.co.uk**

Ordnance Survey

Adanac Drive, Southampton
SO16 0AS

Tel: 08456 050505
Website: http://www.ordnancesurvey.co.uk/

Getmapping PLC

Virginia Villas, High Street, Hartley Witney,
Hampshire RG27 8NW
Tel: 01252 845444
Website:**http://www1.getmapping.com/**

Contact Details

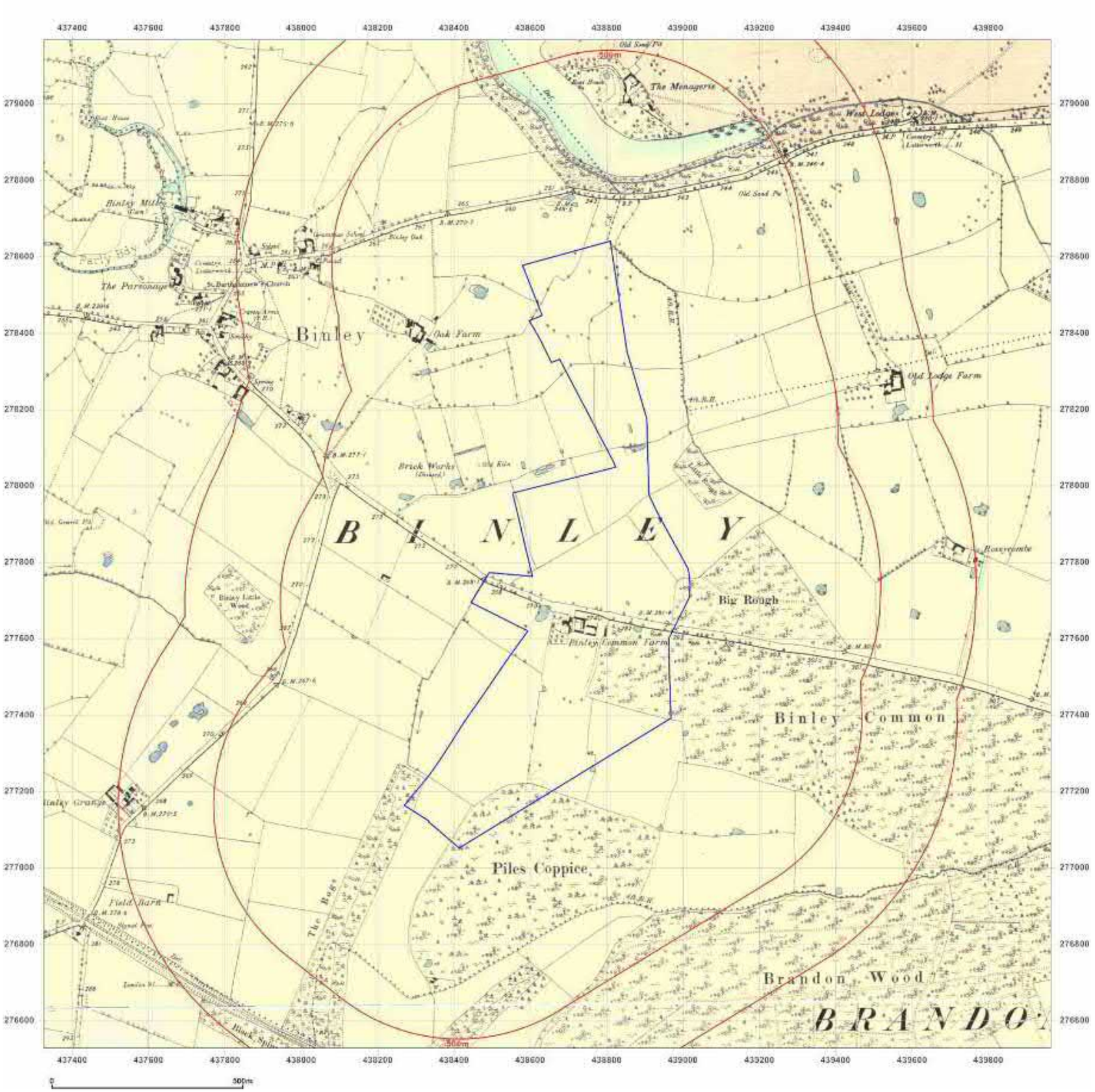
Peter Brett Associates

Caversham Bridge House
Waterman Place
Reading
Berkshire RG1 8DN
Tel: +44 (0)118 950 0761 E-mail:**reading@pba.co.uk**
Website:**http://www.peterbrett.com/home**

Acknowledgements: Ordnance Survey © Crown Copyright and/or Database Right. All Rights Reserved. Licence Number [03421028]. This report has been prepared in accordance with the Groundsure Ltd standard Terms and Conditions of business for work of this nature.

Standard Terms and Conditions

Groundsure's Terms and Conditions can be viewed online at this link:
https://www.groundsure.com/terms-and-conditions-sept-2016/



Groundsure INSIGHTS

Site Details:

438775, 277698

Client Ref: 4500147166
Report Ref: GS-3445085
Grid Ref: 438643, 277846

Map Name: County Series

Map date: **1886**

Scale: 1:10,560

Printed at: 1:10,560

N
W E
S

Surveyed 1886
Revised 1886
Edition N/A
Copyright N/A
Levelled N/A

Surveyed 1886
Revised 1886
Edition N/A
Copyright N/A
Levelled N/A

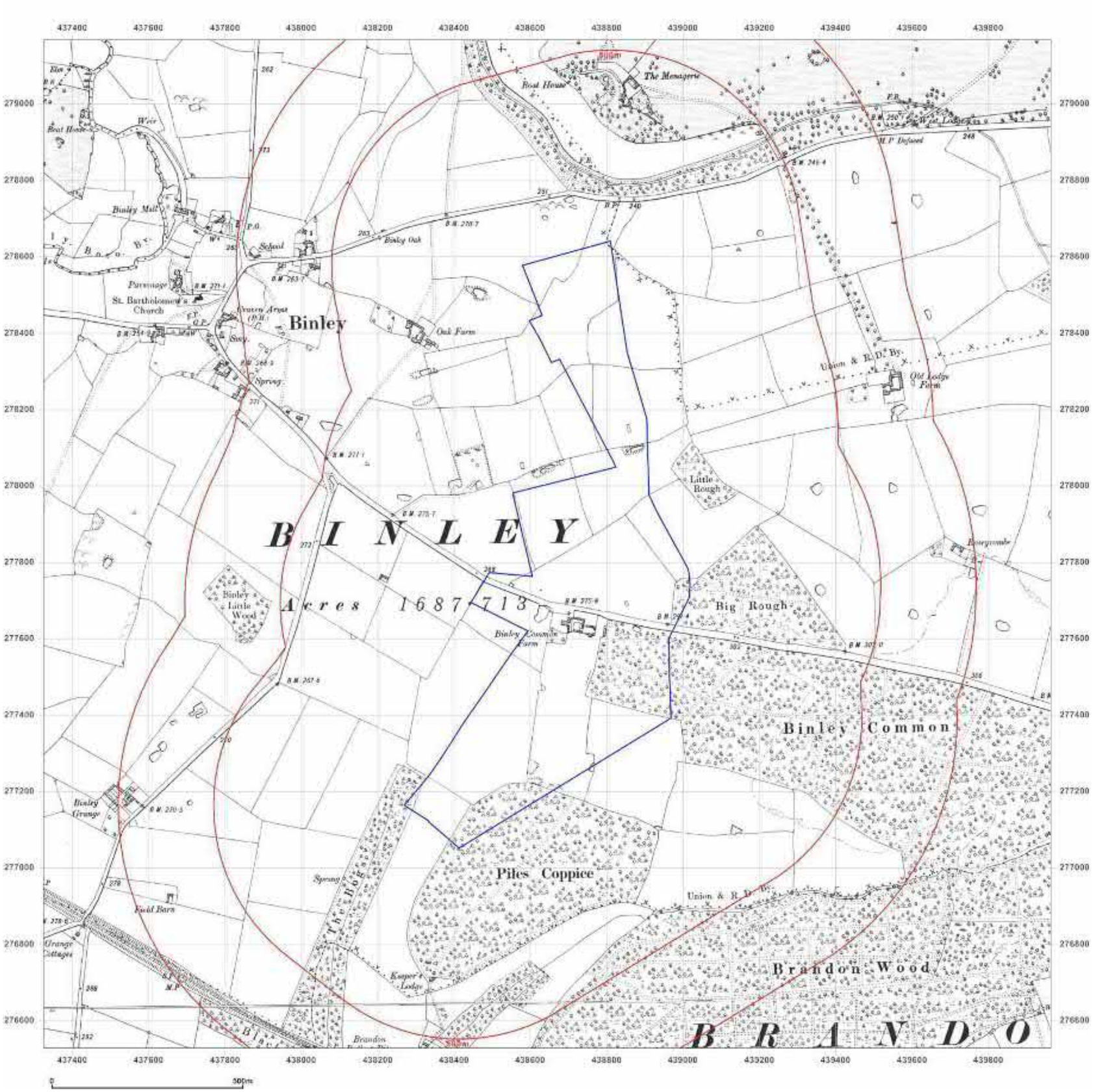
Powered by OS

Produced by
Groundsure Insights
T: 08444 159000
E: info@groundsure.com
W: www.groundsure.com

© Crown copyright and database rights 2015 Ordnance Survey 100035207

Production date: 14 November 2016

To view map legend click here *Legend*



Groundsure INSIGHTS

Site Details:

438775, 277698

Client Ref: 4500147166
Report Ref: GS-3445085
Grid Ref: 438643, 277846

Map Name: County Series

Map date: **1903**

Scale: 1:10,560

Printed at: 1:10,560

N
W E
S

Surveyed 1903
Revised 1903
Edition N/A
Copyright N/A
Levelled N/A

Surveyed 1886
Revised 1903
Edition N/A
Copyright N/A
Levelled N/A

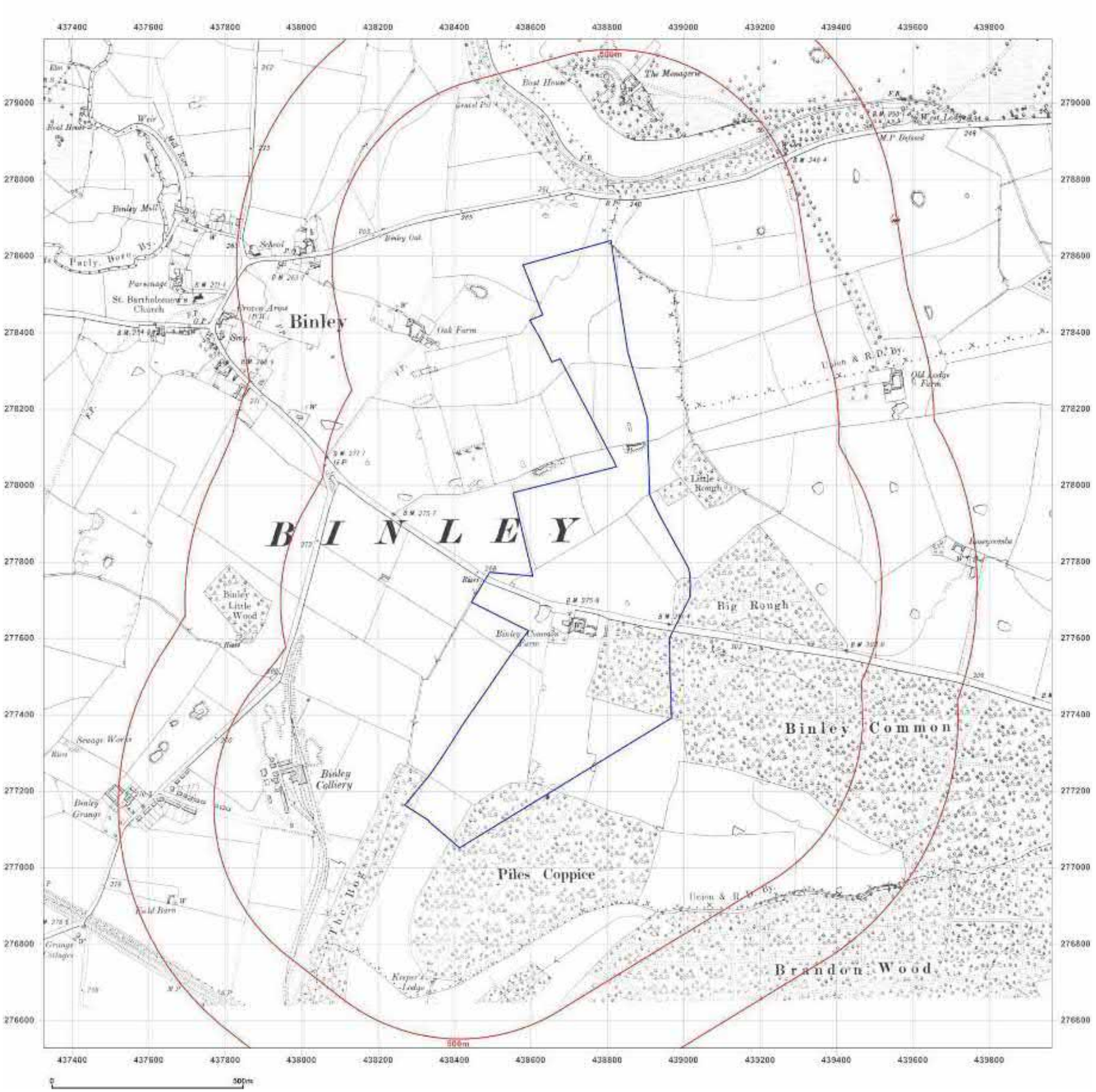
Powered by OS

Produced by
Groundsure Insights
T: 08444 159000
E: info@groundsure.com
W: www.groundsure.com

© Crown copyright and database rights 2015 Ordnance Survey 100035207

Production date: 14 November 2016

To view map legend click here *Legend*



Groundsure INSIGHTS

Site Details:

438775, 277698

Client Ref: 4500147166
Report Ref: GS-3445085
Grid Ref: 438643, 277846

Map Name: County Series

Map date: **1912**

Scale: 1:10,560

Printed at: 1:10,560

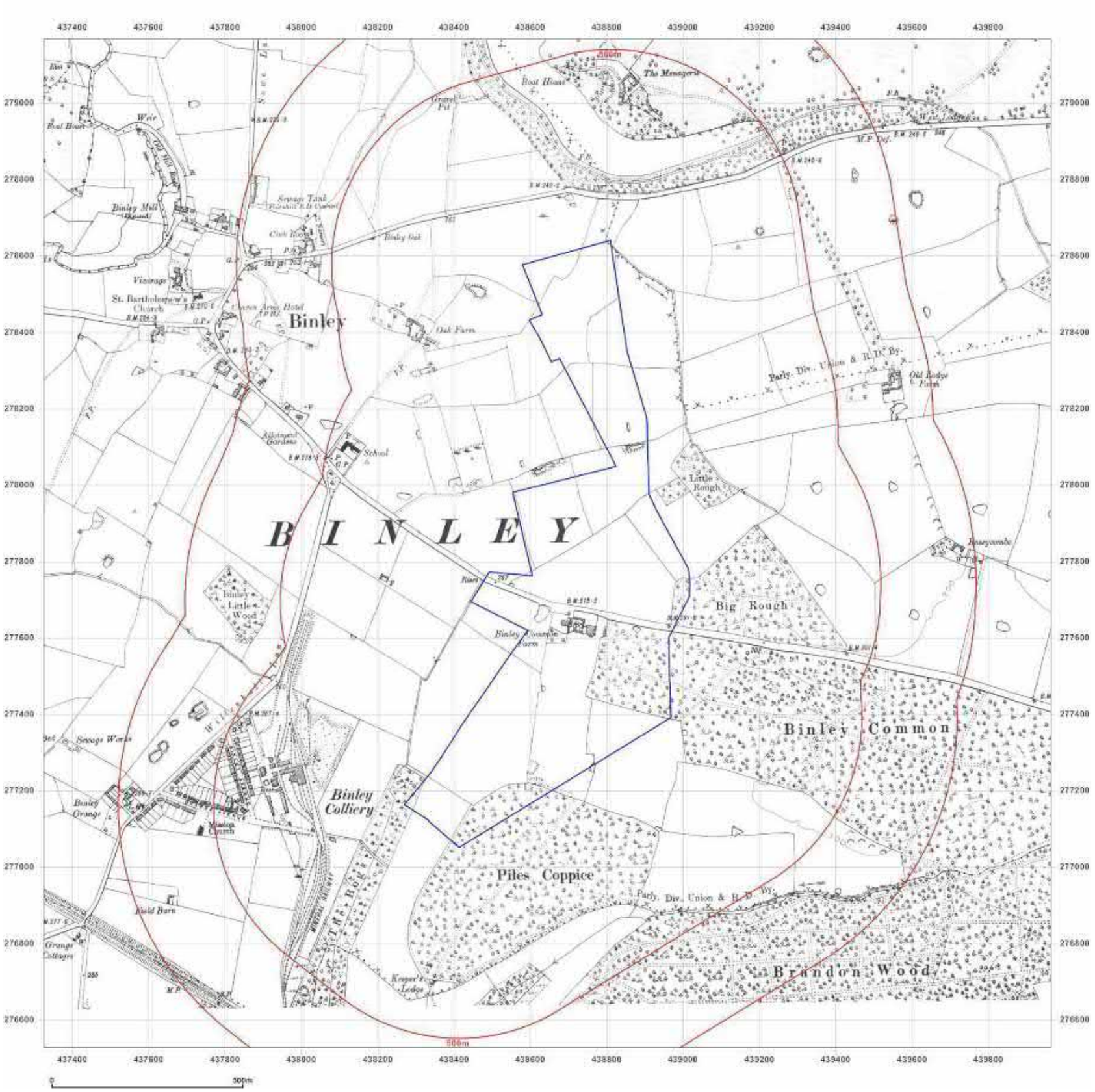
N
W E
S

Produced by
Groundsure Insights
T: 08444 159000
E: info@groundsure.com
W: www.groundsure.com

© Crown copyright and database rights 2015 Ordnance Survey 100035207

Production date: 14 November 2016

To view map legend click here *Legend*



Groundsure INSIGHTS

Site Details:

438775, 277698

Client Ref: 4500147166
Report Ref: GS-3445085
Grid Ref: 438643, 277846

Map Name: County Series

Map date: **1926**

Scale: 1:10,560

Printed at: 1:10,560

N
W E
S

Surveyed 1886
Revised 1926
Edition 1926
Copyright N/A
Levelled N/A

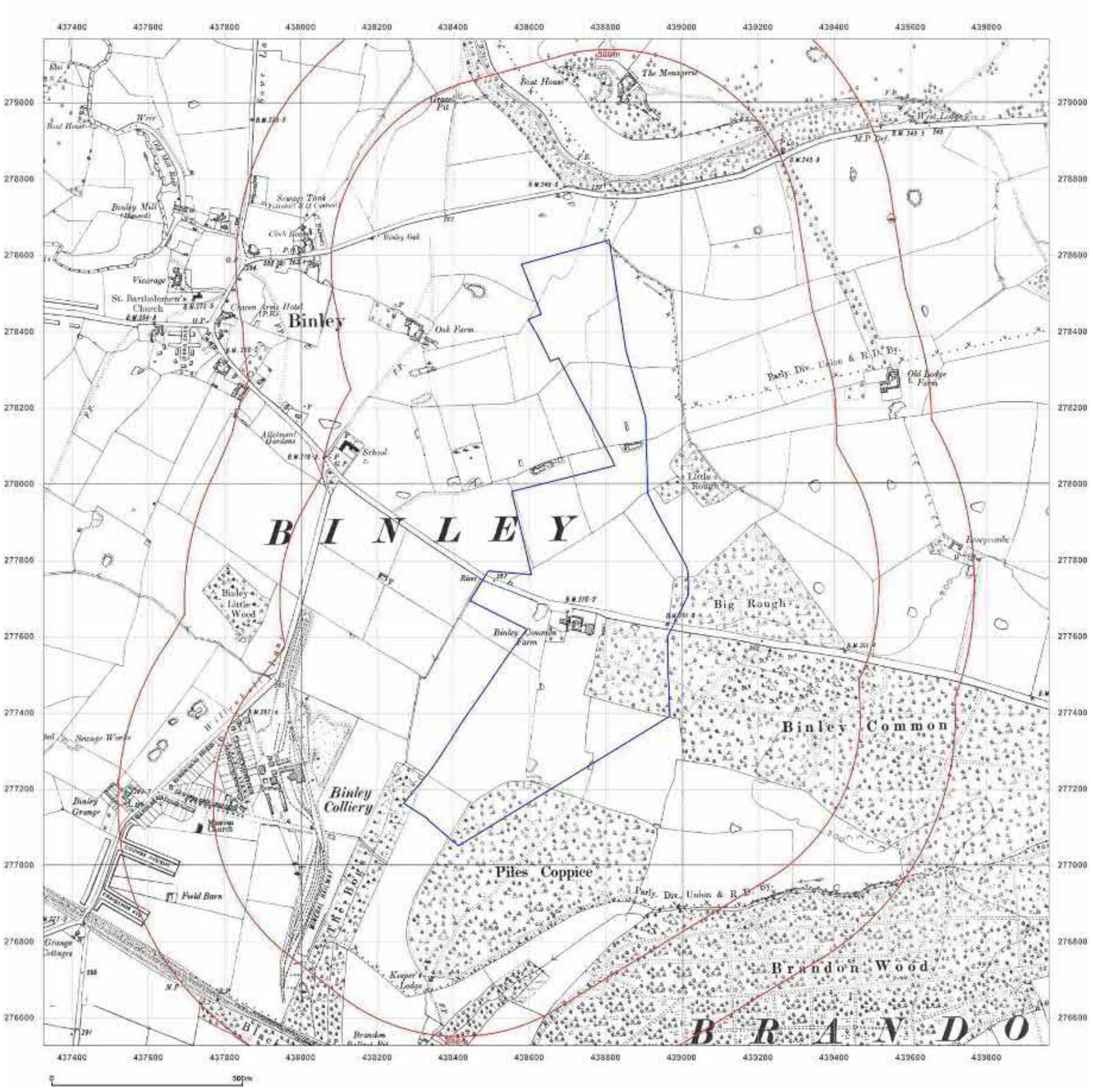
Powered by OS

Produced by
Groundsure Insights
T: 08444 159000
E: info@groundsure.com
W: www.groundsure.com

© Crown copyright and database rights 2015 Ordnance Survey 100035207

Production date: 14 November 2016

To view map legend click here *Legend*



Groundsure INSIGHTS

Site Details:

438775, 277698

Client Ref: 4500147166
Report Ref: GS-3445085
Grid Ref: 438643, 277846

Map Name: County Series

Map date: **1938**

Scale: 1:10,560

Printed at: 1:10,560

N
W E
S

Surveyed 1886
Revised 1938
Edition N/A
Copyright N/A
Levelled N/A

Surveyed 1938
Revised 1938
Edition N/A
Copyright N/A
Levelled N/A

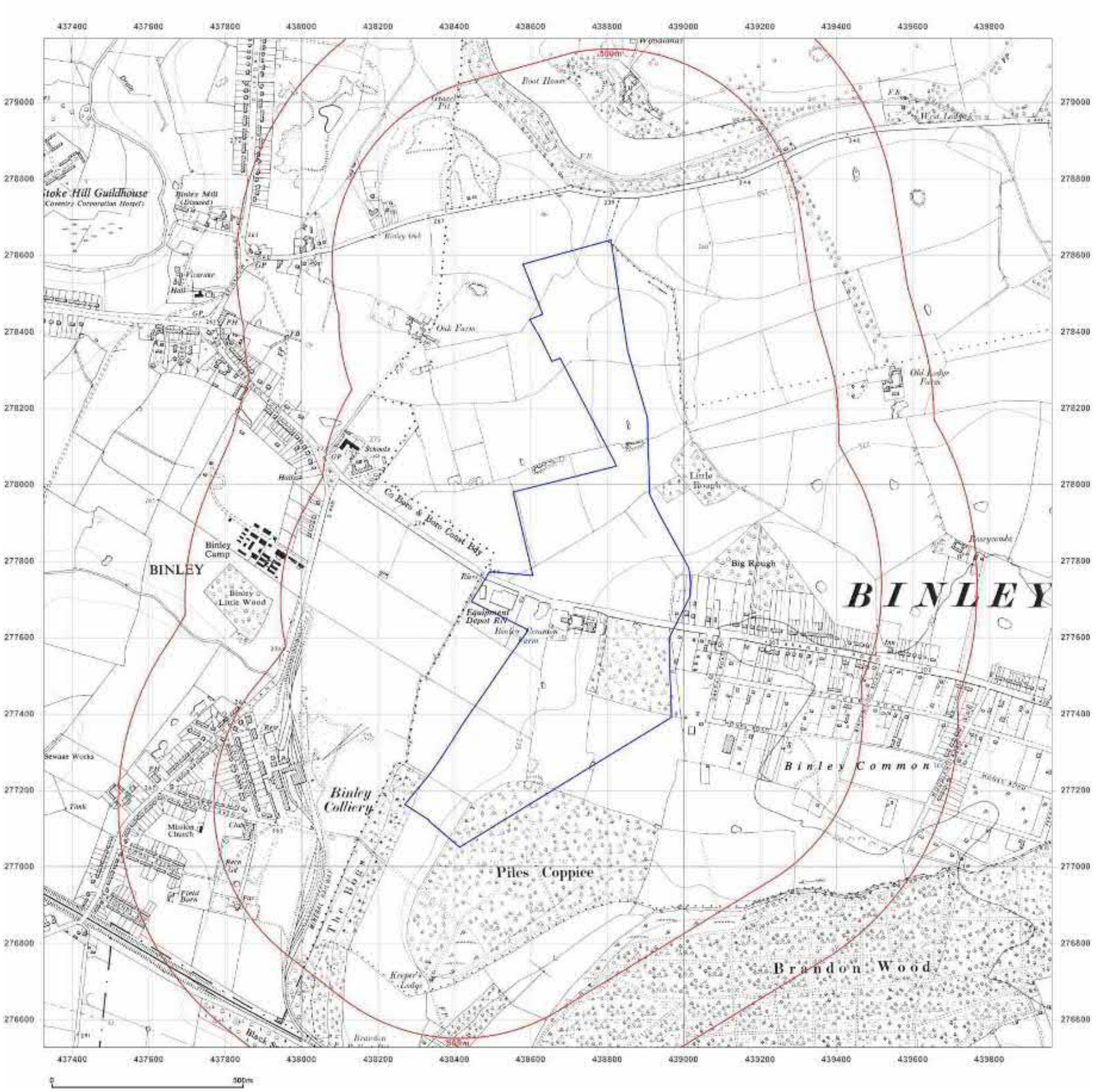
Powered by OS

Produced by
Groundsure Insights
T: 08444 159000
E: info@groundsure.com
W: www.groundsure.com

© Crown copyright and database rights 2015 Ordnance Survey 100035207

Production date: 14 November 2016

To view map legend click here *Legend*



Groundsure INSIGHTS

Site Details:

438775, 277698

Client Ref: 4500147166
Report Ref: GS-3445085
Grid Ref: 438643, 277846

Map Name: Provisional

Map date: **1955**

Scale: 1:10,560

Printed at: 1:10,560

N
W E
S

Surveyed N/A
Revised 1954
Edition 1955
Copyright N/A
Levelled N/A

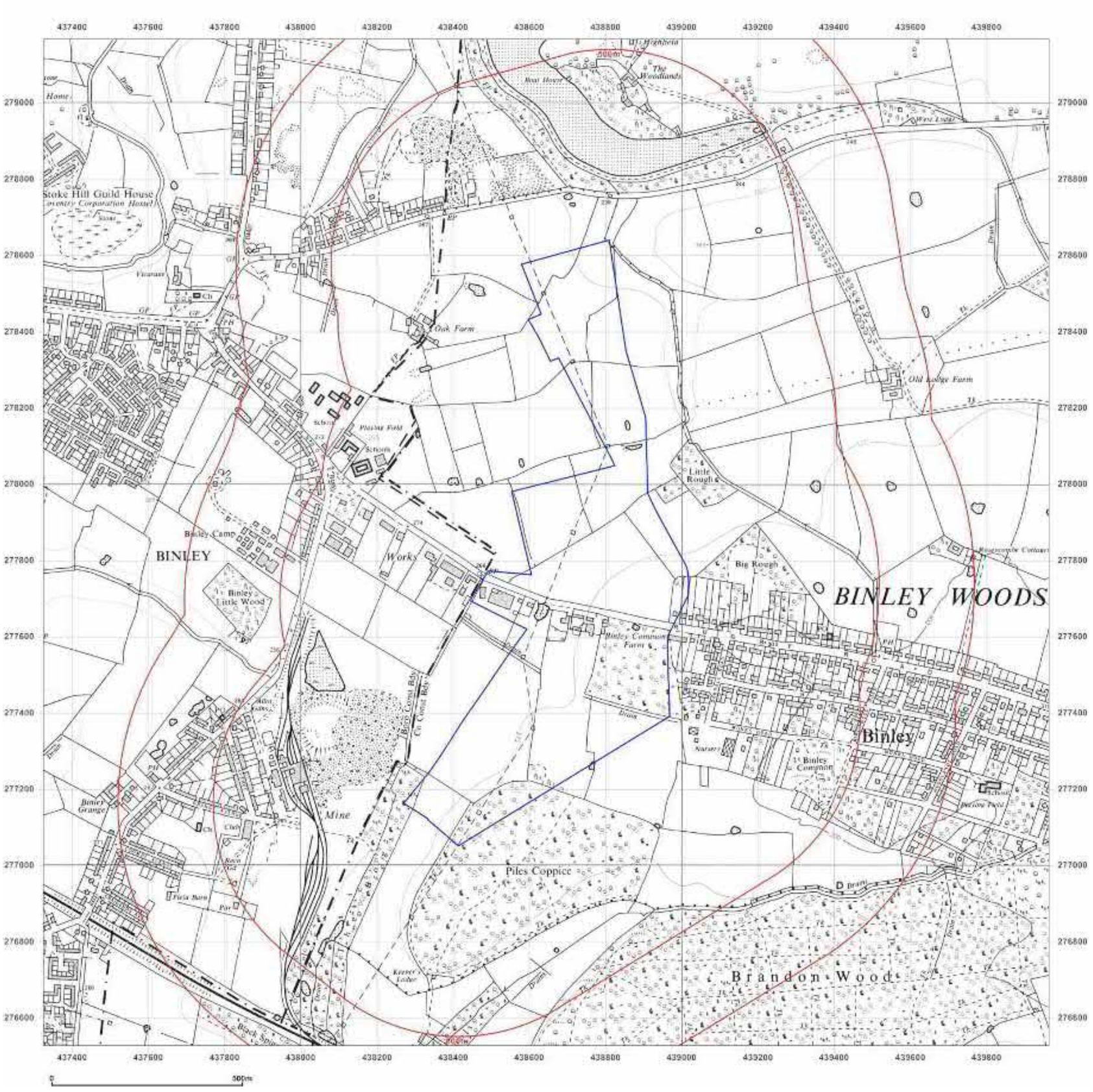
Powered by

Produced by
Groundsure Insights
T: 08444 159000
E: info@groundsure.com
W: www.groundsure.com

© Crown copyright and database rights 2015 Ordnance Survey 100035207

Production date: 14 November 2016

To view map legend click here *Legend*



Surveyed 1967
Revised 1967
Edition N/A
Copyright N/A
Levelled N/A

Site Details:

438775, 277698

Client Ref: 4500147166
Report Ref: GS-3445085
Grid Ref: 438643, 277846

Map Name: Provisional

Map date: **1967**

Scale: 1:10,560

Printed at: 1:10,560

N
W E
S

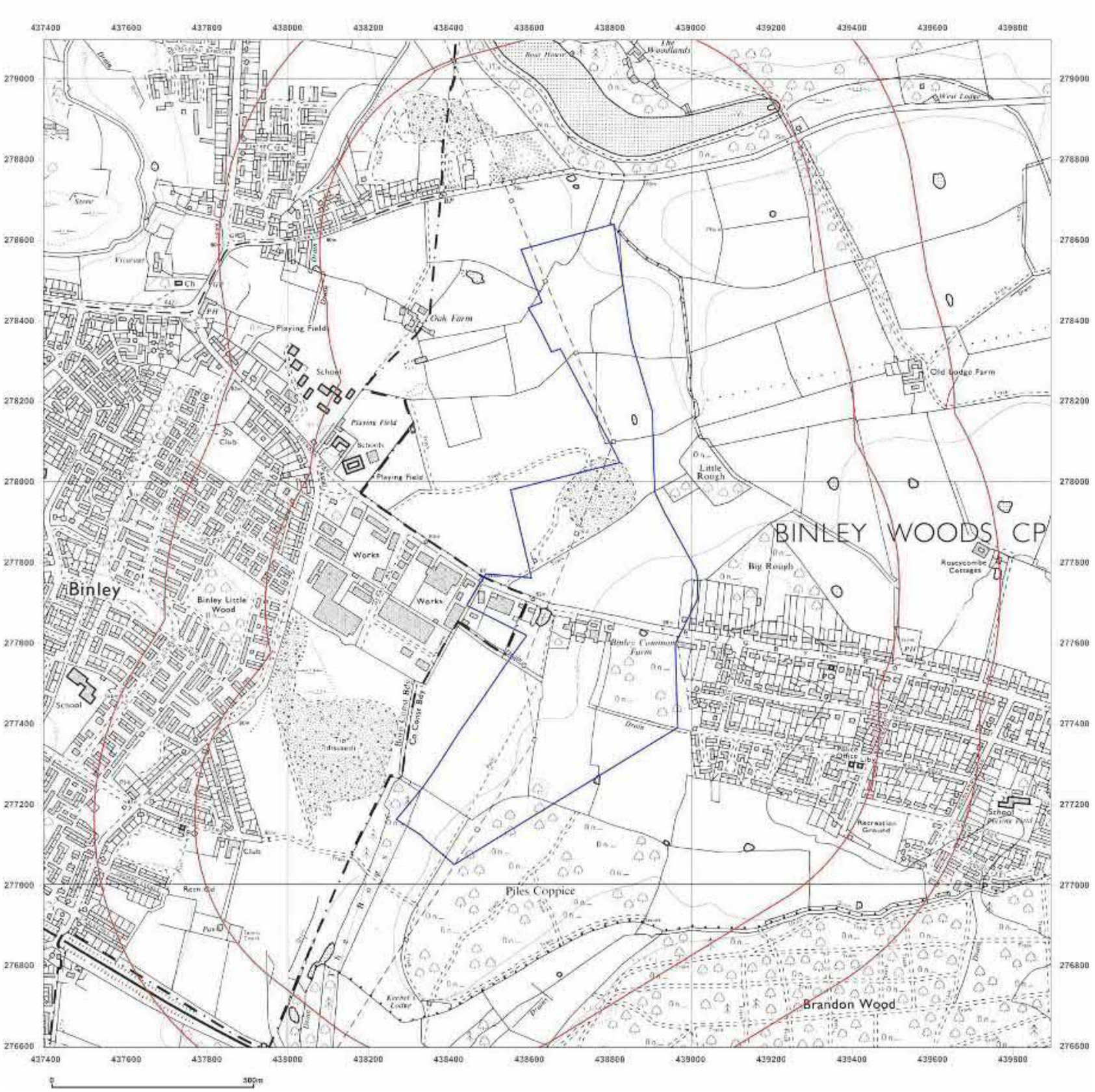
Powered by

Produced by
Groundsure Insights
T: 08444 159000
E: info@groundsure.com
W: www.groundsure.com

© Crown copyright and database rights 2015 Ordnance Survey 100035207

Production date: 14 November 2016

To view map legend click here *Legend*



Groundsure INSIGHTS

Site Details:

438775, 277698

Client Ref: 4500147166
Report Ref: GS-3445085
Grid Ref: 438643, 277846

Map Name: National Grid

Map date: **1973**

Scale: 1:10,000

Printed at: 1:10,000

N
W E
S

Surveyed 1972
Revised 1973
Edition N/A
Copyright 1973
Levelled 1972

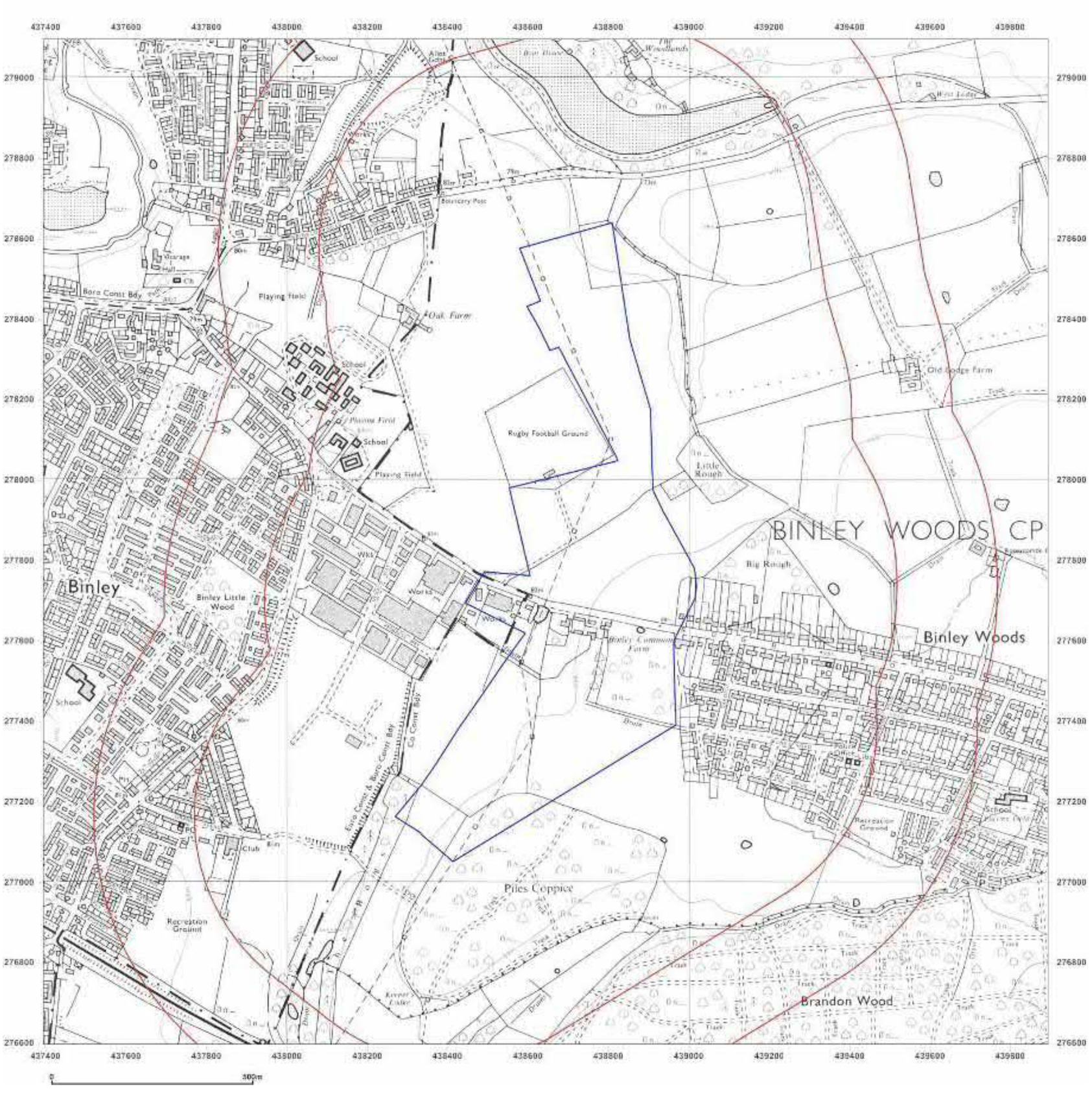
Powered by OS

Produced by
Groundsure Insights
T: 08444 159000
E: info@groundsure.com
W: www.groundsure.com

© Crown copyright and database rights 2015 Ordnance Survey 100035207

Production date: 14 November 2016

To view map legend click here *Legend*



Groundsure INSIGHTS

Site Details:

438775, 277698

Client Ref: 4500147166
Report Ref: GS-3445085
Grid Ref: 438643, 277846

Map Name: National Grid

Map date: **1980**

Scale: 1:10,000

Printed at: 1:10,000

N
W E
S

Surveyed 1979
Revised 1980
Edition N/A
Copyright N/A
Levelled N/A

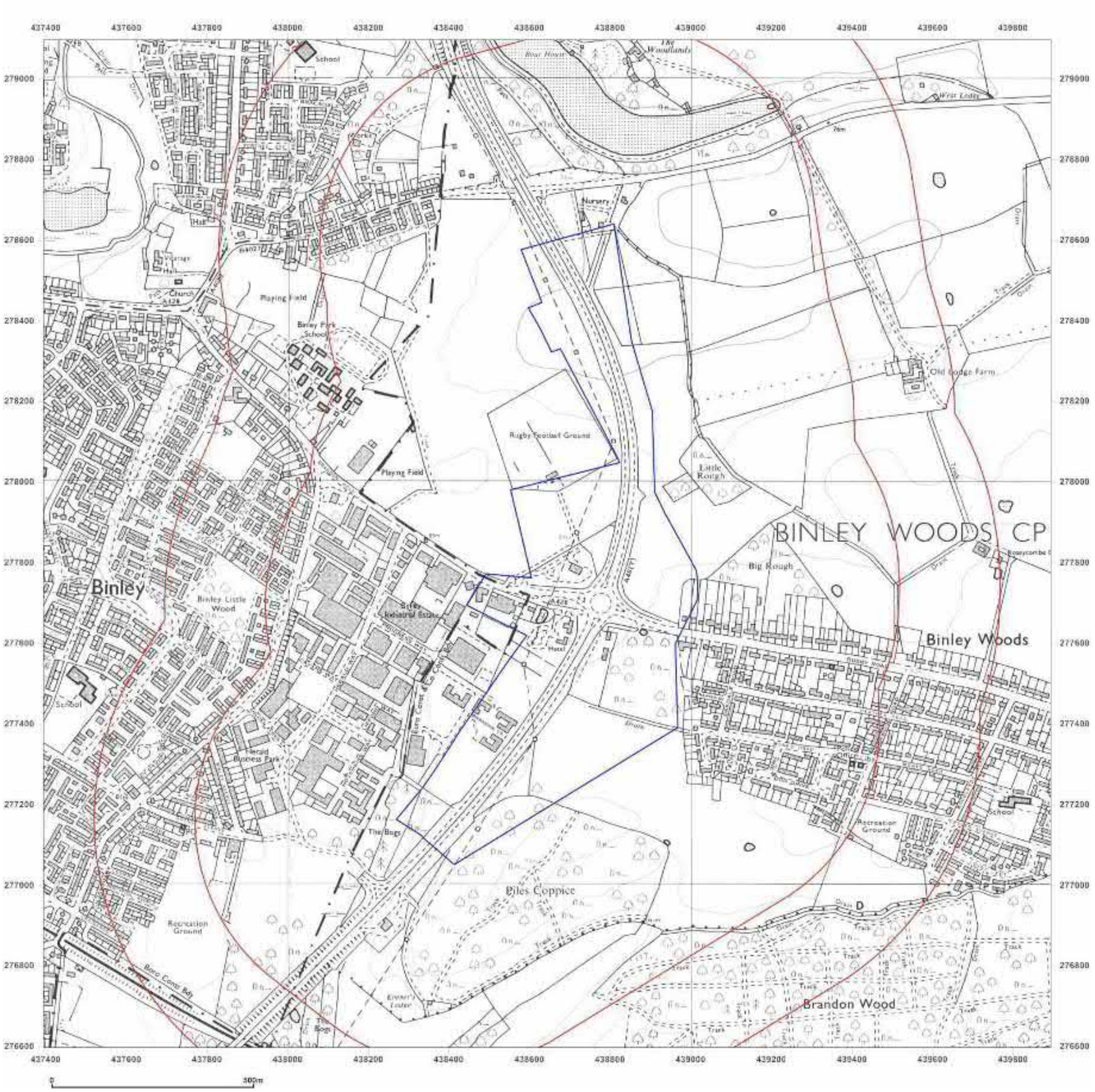
Powered by OS

Produced by
Groundsure Insights
T: 08444 159000
E: info@groundsure.com
W: www.groundsure.com

© Crown copyright and database rights 2015 Ordnance Survey 100035207

Production date: 14 November 2016

To view map legend click here *Legend*



Groundsure INSIGHTS

Site Details:

438775, 277698

Client Ref: 4500147166
Report Ref: GS-3445085
Grid Ref: 438643, 277846

Map Name: National Grid

Map date: **1991**

Scale: 1:10,000

Printed at: 1:10,000

N
W E
S

Surveyed 1983
Revised 1991
Edition N/A
Copyright N/A
Levelled N/A

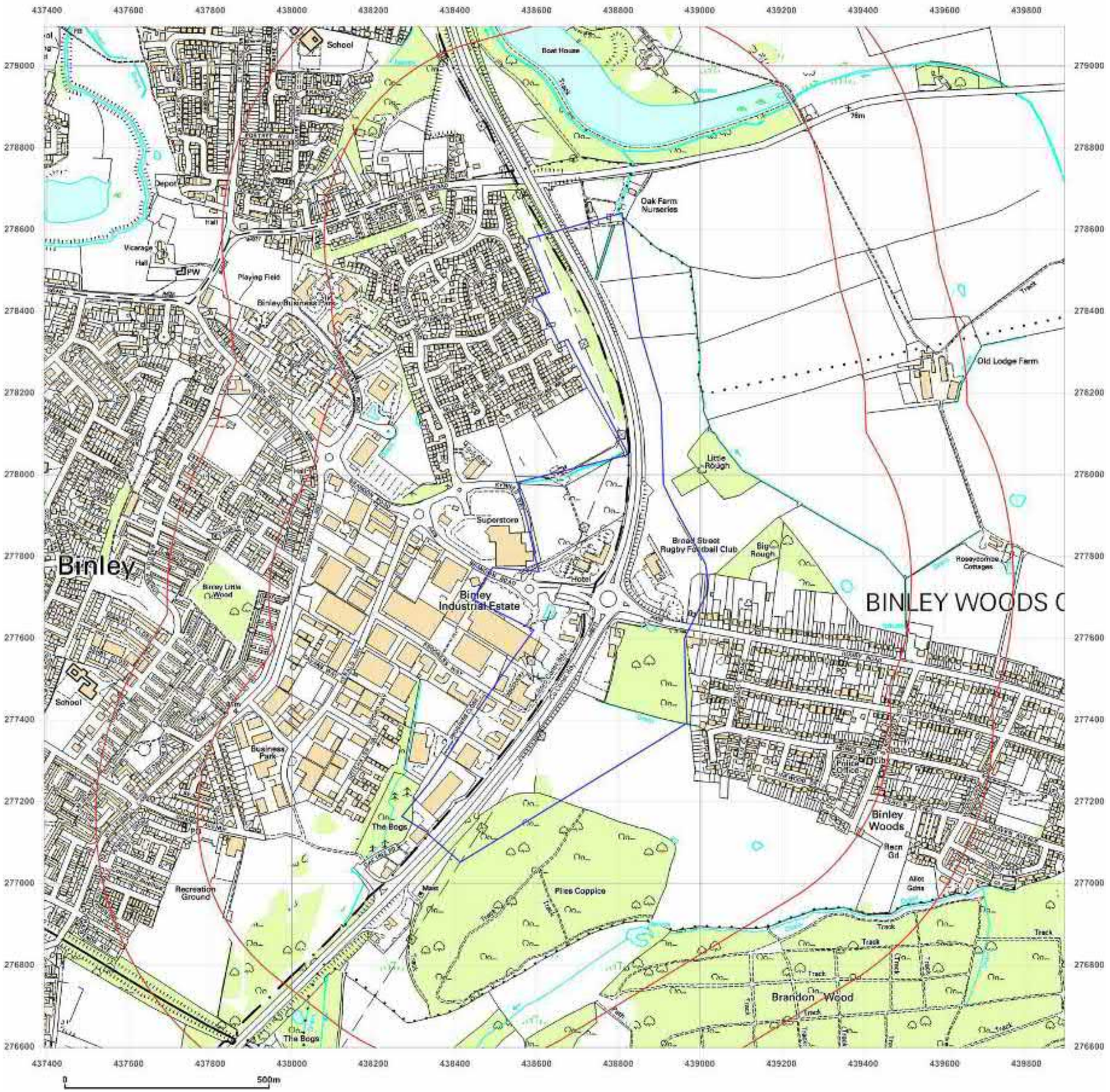
Powered by OS

Produced by
Groundsure Insights
T: 08444 159000
E: info@groundsure.com
W: www.groundsure.com

© Crown copyright and database rights 2015 Ordnance Survey 100035207

Production date: 14 November 2016

To view map legend click here *Legend*



Groundsure INSIGHTS

Site Details:

438775, 277698

Client Ref: 4500147166
Report Ref: GS-3445085
Grid Ref: 438643, 277846

Map Name: 1:10,000 Raster

Map date: **2002**

Scale: 1:10,000

Printed at: 1:10,000

N
W E
S

2002

Powered by OS

Produced by
Groundsure Insights
T: 08444 159000
E: info@groundsure.com
W: www.groundsure.com

© Crown copyright and database rights 2015 Ordnance Survey 100035207

Production date: 14 November 2016

To view map legend click here *Legend*



Groundsure INSIGHTS

Site Details:

438775, 277698

Client Ref: 4500147166
Report Ref: GS-3445085
Grid Ref: 438643, 277846

Map Name: National Grid

Map date: **2010**

Scale: 1:10,000

Printed at: 1:10,000

N
W E
S



Powered by OS

Produced by
Groundsure Insights
T: 08444 159000
E: info@groundsure.com
W: www.groundsure.com

© Crown copyright and database rights 2015 Ordnance Survey 100035207

Production date: 14 November 2016

To view map legend click here *Legend*



Groundsure INSIGHTS

Site Details:

438775, 277698

Client Ref: 4500147166
Report Ref: GS-3445085
Grid Ref: 438643, 277846

Map Name: National Grid

Map date: **2014**

Scale: 1:10,000

Printed at: 1:10,000

N
W E
S



Powered by OS

Produced by
Groundsure Insights
T: 08444 159000
E: info@groundsure.com
W: www.groundsure.com

© Crown copyright and database rights 2015 Ordnance Survey 100035207

Production date: 14 November 2016

To view map legend click here *Legend*

Appendix 9.2 Soil and Leachage Chemistry Output

Review of Existing
Analytical Results
A46
Highways England

Location_Code	BH303/17	BH307/17	RC405/17	WS201/17	WS204/17	WS208/17	WS209/17	WS209/17	WS210/17	WS210/17	WS212/17	WS212/17	WS215/17	WS216/17	WS217/17	WS217/17	WS219/17	WS219/17
Sample_Depth_Range	0-0	7-7	0.5-0.5	0.5-0.5	0.2-0.2	0.2-0.2	0.3-0.3	1-1	0.8-0.8	2.8-2.8	0.2-0.2	0.5-0.5	0.3-0.3	0.5-0.5	0.1-0.1	0.8-0.8	0.5-0.5	1.2-1.2
Sampled_Date_Time	07/07/2017	07/07/2017	07/06/2017	21/06/2017	21/06/2017	21/06/2017	07/07/2017	13/06/2017	07/06/2017	07/07/2017	07/06/2017	07/06/2017	07/06/2017	21/06/2017	07/06/2017	07/06/2017	21/06/2017	18/07/2017

| Chem_Group | ChemName | output unit | EQL | GAC_HH_COMINDD_SLOAM_0.58-1.49%TOC | GAC_HH_ENIREN6WA_C4SL_COM_0.58-3.49%TOC | | |

Review of Existing Analytical Results A46 Highways England

Location_Code	RC405/17	WS203/17	WS207/17	WS208/17	WS212/17	WS215/17	WS217/17	WS217/17
Sample_Depth_Range	0.500-0.500	0.500-0.500	0.200-0.200	0.200-0.200	0.500-0.500	0.300-0.300	0.100-0.100	0.800-0.800
Sampled_Date_Time	07/06/2017	21/06/2017	21/06/2017	21/06/2017	07/06/2017	07/06/2017	07/06/2017	07/06/2017

Chem_Group	ChemName	output unit	EQL	GAC_WTV_EN/WA_DWS	GAC_WTV_EN/WA_EQS-Fresh								
	PAH : Total :- {Polynuclear Aromatic Hydrocarbons}	µg/L				2.5	9.9	0.19	-	-	1.2	-	3.3
	Conductivity at 20 C	µS/cm				-	-	-	109	34.8	-	113	-
Field	pH	pH_Units				6.9	7.4	7.5	7.1	7.2	7.7	7.7	7
TPH	>C5-C6 Aliphatics	µg/L		15000		<0.1	<0.1	<0.1	-	-	<0.1	-	<0.1
	>C6-C8 Aliphatics	µg/L		15000		<0.1	<0.1	<0.1	-	-	<0.1	-	<0.1
	>C8-C10 Aliphatics	µg/L		300		<0.1	<0.1	<0.1	-	-	<0.1	-	<0.1
	>C10-C12 Aliphatics	µg/L		300		<1	<1	<1	-	-	<1	-	<1
	>C12-C16 Aliphatics	µg/L		300		<1	<1	<1	-	-	<1	-	<1
	>C16-C21 Aliphatics	µg/L		300		<1	<1	<1	-	-	<1	-	<1
	>C21-C35 Aliphatics	µg/L		300		<1	20	<1	-	-	<1	-	<1
	>C5-C35 Aliphatics	µg/L				<10	20	<10	-	-	<10	-	<10
	>EC5-EC7 Aromatics	µg/L		1	*10*	<0.1	<0.1	<0.1	-	-	<0.1	-	<0.1
	>EC7-EC8 Aromatics	µg/L		700	*74*	<0.1	<0.1	<0.1	-	-	<0.1	-	<0.1
	>EC8-EC10 Aromatics	µg/L		300		<0.1	<0.1	<0.1	-	-	<0.1	-	<0.1
	>EC10-EC12 Aromatics	µg/L		90		<1	<1	<1	-	-	<1	-	<1
	>EC12-EC16 Aromatics	µg/L		90		<1	<1	<1	-	-	<1	-	<1
	>EC16-EC21 Aromatics	µg/L		90		<1	<1	<1	-	-	<1	-	<1
	>EC21-EC35 Aromatics	µg/L		90		<1	<1	<1	-	-	<1	-	<1
	>EC5-EC35 Aromatics	µg/L				<10	<10	<10	-	-	<10	-	<10
	>C5-C35 Aliphatics & Aromatics	µg/L				<10	20	<10	-	-	<10	-	<10
BTEX	Benzene	µg/L		1	*10*	<1	<1	<1	-	-	<1	-	<1
	Toluene	µg/L		700	*74*	<1	<1	<1	-	-	<1	-	<1
	Ethylbenzene	µg/L		300	*20*	<1	<1	<1	-	-	<1	-	<1
	Xylene Total	µg/L		500	*30*	<1	<1	<1	-	-	<1	-	<1
PAH	Naphthalene	µg/L		6	*2*	<0.01	0.06	0.02	-	-	<0.01	-	<0.01
	Acenaphthylene	µg/L		18		0.03	0.06	<0.01	-	-	<0.01	-	0.02
	Acenaphthene	µg/L		18		0.03	0.04	<0.01	-	-	<0.01	-	0.05
	Fluorene	µg/L		12		0.03	0.04	<0.01	-	-	<0.01	-	0.05
	Phenanthrene	µg/L		4		0.14	0.31	0.08	-	-	0.04	-	0.33
	Anthracene	µg/L		90	*0.1*	0.04	*0.11*	<0.01	-	-	0.01	-	0.07
	Fluoranthene	µg/L		4	*0.0063*	*0.34*	*0.84*	*0.06*	-	-	*0.13*	-	*0.49*
	Pyrene	µg/L		9		0.3	0.86	0.04	-	-	0.13	-	0.43
	Benz(a)anthracene	µg/L		3.5		0.16	0.51	<0.01	-	-	0.07	-	0.21
	Chrysene	µg/L		7		0.18	0.66	<0.01	-	-	0.11	-	0.23
	Benzo(a) pyrene	µg/L		0.01	*0.00017*	*0.29*	*0.91*	*<0.01*	-	-	*0.15*	-	*0.34*
	Indeno(1,2,3-c,d)pyrene	µg/L		0.1		0.22	1.4	<0.01	-	-	0.11	-	0.21
	Dibenz(a,h)anthracene	µg/L		0.07		0.04	0.21	<0.01	-	-	0.03	-	0.04
	Benzo(g,h,i)perylene	µg/L		0.1	*0.0082*	*0.26*	*2.1*	*<0.01*	-	-	*0.18*	-	*0.32*
	Benzo(b)fluoranthene	µg/L		0.1	*0.017*	*0.33*	*1.3*	<0.01	-	-	*0.2*	-	*0.39*
	Benzo(k)fluoranthene	µg/L		0.1	*0.017*	*0.13*	*0.48*	<0.01	-	-	*0.07*	-	*0.14*
Phenolics	Phenolics Total	µg/L				-	-	-	<100	<100	-	<100	-
Metals	Antimony	µg/L		5		-	-	-	0.71	0.39	-	1.6	-
	Arsenic	µg/L		10	*50*	0.41	1.2	0.72	2.9	0.93	0.66	0.9	0.56
	Barium	µg/L		1300		-	-	-	8.3	5.8	-	5.1	-
	Boron	µg/L		1000	*2000*	<100	<100	320	-	-	<100	-	<100
	Cadmium	µg/L		5	*0.08*	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03
	Chromium (III+VI)	µg/L		50		<0.25	1.2	1.1	1.5	0.34	0.41	0.5	0.4
	Copper	µg/L		2000	*1*	0.8	*12*	*2.5*	*17*	0.7	*1*	*21*	0.7
	Lead	µg/L		10	*1.2*	0.15	*2.4*	0.42	0.63	0.37	0.6	0.82	0.31
	Mercury	µg/L		1	*0.07*	<0.01	0.05	<0.01	0.03	<0.01	<0.01	0.01	<0.01
	Molybdenum	µg/L		70		-	-	-	<1.1	2.6	-	1.8	-
	Nickel	µg/L		20	*4*	<0.5	1.1	1	2.9	<0.5	<0.5	0.8	<0.5
	Selenium	µg/L		10		0.36	<0.25	<0.25	0.28	1.2	0.49	0.75	0.57
	Zinc	µg/L		6000	*10.9*	<1.3	*13*	<1.3	*21*	<1.3	1.8	*12*	1.5
Organics	Dissolved Organic Carbon	mg/L				-	-	-	2.1	<2	-	91	-
Inorganics	Fluoride	mg/L		1.5	*1*	-	-	-	0.37	0.22	-	<0.1	-
	Chloride	mg/L		250	*250*	-	-	-	4.2	2.2	-	12	-
	Sulphate (soluble)	mg/L				-	-	-	6.8	4.9	-	3.1	-
	TDS	mg/L				-	-	-	76	24	-	79	-

Review of Existing Analytical Results A46 Highways England

Location_Code	
Sample_Depth_Range	
Sampled_Date_Time	

Chem_Group	ChemName	output unit	EQL	GAC_WTV_EN/WA_DWS	*GAC_WTV_EN/WA_EQS-Fresh*	Statistical Summary										
						Number of	Number of	Minimum	Minimum	Maximum	Maximum	Average	Median	Standard	Number of	Number of
	PAH : Total :- {Polynuclear Aromatic Hydrocarbons}	µg/L				5	5	0.19	0.19	9.9	9.9	3.4	2.5	3.8	0	0
	Conductivity at 20 C	µS/cm				3	3	34.8	34.8	113	113	86	109	44	0	0
Field	pH	pH_Units				8	8	6.9	6.9	7.7	7.7	7.3	7.3	0.31	0	0
TPH	>C5-C6 Aliphatics	µg/L		15000		5	0	<0.1	ND	<0.1	ND	0.05	0.05	0	0	0
	>C6-C8 Aliphatics	µg/L		15000		5	0	<0.1	ND	<0.1	ND	0.05	0.05	0	0	0
	>C8-C10 Aliphatics	µg/L		300		5	0	<0.1	ND	<0.1	ND	0.05	0.05	0	0	0
	>C10-C12 Aliphatics	µg/L		300		5	0	<1	ND	<1	ND	0.5	0.5	0	0	0
	>C12-C16 Aliphatics	µg/L		300		5	0	<1	ND	<1	ND	0.5	0.5	0	0	0
	>C16-C21 Aliphatics	µg/L		300		5	0	<1	ND	<1	ND	0.5	0.5	0	0	0
	>C21-C35 Aliphatics	µg/L		300		5	1	<1	20	20	20	4.4	0.5	8.7	0	0
	>C5-C35 Aliphatics	µg/L				5	1	<10	20	20	20	8	5	6.7	0	0
	>EC5-EC7 Aromatics	µg/L		1	*10*	5	0	<0.1	ND	<0.1	ND	0.05	0.05	0	0	0
	>EC7-EC8 Aromatics	µg/L		700	*74*	5	0	<0.1	ND	<0.1	ND	0.05	0.05	0	0	0
	>EC8-EC10 Aromatics	µg/L		300		5	0	<0.1	ND	<0.1	ND	0.05	0.05	0	0	0
	>EC10-EC12 Aromatics	µg/L		90		5	0	<1	ND	<1	ND	0.5	0.5	0	0	0
	>EC12-EC16 Aromatics	µg/L		90		5	0	<1	ND	<1	ND	0.5	0.5	0	0	0
	>EC16-EC21 Aromatics	µg/L		90		5	0	<1	ND	<1	ND	0.5	0.5	0	0	0
	>EC21-EC35 Aromatics	µg/L		90		5	0	<1	ND	<1	ND	0.5	0.5	0	0	0
	>EC5-EC35 Aromatics	µg/L				5	0	<10	ND	<10	ND	5	5	0	0	0
	>C5-C35 Aliphatics & Aromatics	µg/L				5	1	<10	20	20	20	8	5	6.7	0	0
BTEX	Benzene	µg/L		1	*10*	5	0	<1	ND	<1	ND	0.5	0.5	0	0	0
	Toluene	µg/L		700	*74*	5	0	<1	ND	<1	ND	0.5	0.5	0	0	0
	Ethylbenzene	µg/L		300	*20*	5	0	<1	ND	<1	ND	0.5	0.5	0	0	0
	Xylene Total	µg/L		500	*30*	5	0	<1	ND	<1	ND	0.5	0.5	0	0	0
PAH	Naphthalene	µg/L		6	*2*	5	2	<0.01	0.02	0.06	0.06	0.019	0.005	0.024	0	0
	Acenaphthylene	µg/L		18		5	3	<0.01	0.02	0.06	0.06	0.024	0.02	0.023	0	0
	Acenaphthene	µg/L		18		5	3	<0.01	0.03	0.05	0.05	0.026	0.03	0.02	0	0
	Fluorene	µg/L		12		5	3	<0.01	0.03	0.05	0.05	0.026	0.03	0.02	0	0
	Phenanthrene	µg/L		4		5	5	0.04	0.04	0.33	0.33	0.18	0.14	0.13	0	0
	Anthracene	µg/L		90	*0.1*	5	4	<0.01	0.01	0.11	0.11	0.047	0.04	0.044	1	1
	Fluoranthene	µg/L		4	*0.0063*	5	5	0.06	0.06	0.84	0.84	0.37	0.34	0.31	5	5
	Pyrene	µg/L		9		5	5	0.04	0.04	0.86	0.86	0.35	0.3	0.32	0	0
	Benz(a)anthracene	µg/L		3.5		5	4	<0.01	0.07	0.51	0.51	0.19	0.16	0.2	0	0
	Chrysene	µg/L		7		5	4	<0.01	0.11	0.66	0.66	0.24	0.18	0.25	0	0
	Benzo(a) pyrene	µg/L		0.01	*0.00017*	5	4	<0.01	0.15	0.91	0.91	0.34	0.29	0.34	5	4
	Indeno(1,2,3-c,d)pyrene	µg/L		0.1		5	4	<0.01	0.11	1.4	1.4	0.39	0.21	0.57	4	4
	Dibenz(a,h)anthracene	µg/L		0.07		5	4	<0.01	0.03	0.21	0.21	0.065	0.04	0.082	1	1
	Benzo(g,h,i)perylene	µg/L		0.1	*0.0082*	5	4	<0.01	0.18	2.1	2.1	0.57	0.26	0.86	5	4
	Benzo(b)fluoranthene	µg/L		0.1	*0.017*	5	4	<0.01	0.2	1.3	1.3	0.45	0.33	0.5	4	4
	Benzo(k)fluoranthene	µg/L		0.1	*0.017*	5	4	<0.01	0.07	0.48	0.48	0.17	0.13	0.18	4	4
Phenolics	Phenolics Total	µg/L				3	0	<100	ND	<100	ND	50	50	0	0	0
Metals	Antimony	µg/L		5		3	3	0.39	0.39	1.6	1.6	0.9	0.71	0.63	0	0
	Arsenic	µg/L		10	*50*	8	8	0.41	0.41	2.9	2.9	1	0.81	0.79	0	0
	Barium	µg/L		1300		3	3	5.1	5.1	8.3	8.3	6.4	5.8	1.7	0	0
	Boron	µg/L		1000	*2000*	5	1	<100	320	320	320	104	50	121	0	0
	Cadmium	µg/L		5	*0.08*	8	0	<0.03	ND	<0.03	ND	0.015	0.015	0	0	0
	Chromium (III+VI)	µg/L		50		8	7	<0.25	0.34	1.5	1.5	0.7	0.455	0.5	0	0
	Copper	µg/L		2000	*1*	8	8	0.7	0.7	21	21	7	1.75	8.4	5	5
	Lead	µg/L		10	*1.2*	8	8	0.15	0.15	2.4	2.4	0.71	0.51	0.71	1	1
	Mercury	µg/L		1	*0.07*	8	3	<0.01	0.01	0.05	0.05	0.014	0.005	0.017	0	0
	Molybdenum	µg/L		70		3	2	<1.1	1.8	2.6	2.6	1.7	1.8	1	0	0
	Nickel	µg/L		20	*4*	8	4	<0.5	0.8	2.9	2.9	0.85	0.525	0.9	0	0
	Selenium	µg/L		10		8	6	<0.25	0.28	1.2	1.2	0.49	0.425	0.36	0	0
	Zinc	µg/L		6000	*10.9*	8	5	<1.3	1.5	21	21	6.4	1.65	7.9	3	3
Organics	Dissolved Organic Carbon	mg/L				3	2	<2	2.1	91	91	31	2.1	52	0	0
Inorganics	Fluoride	mg/L		1.5	*1*	3	2	<0.1	0.22	0.37	0.37	0.21	0.22	0.16	0	0
	Chloride	mg/L		250	*250*	3	3	2.2	2.2	12	12	6.1	4.2	5.2	0	0
	Sulphate (soluble)	mg/L				3	3	3.1	3.1	6.8	6.8	4.9	4.9	1.9	0	0
	TDS	mg/L				3	3	24	24	79	79	60	76	31	0	0

Appendix 9.3 Human Health Risk Assessment Methodology and Controlled Waters Risk Assessment Methodology

Appendix 9-4: Human Health Risk Assessment and Controlled Waters Risk Assessment

Human Health Risk Assessment

Introduction to Generic Risk Assessment Methodology

1.1.1. AECOM has a prescribed methodology for assessing risks to human health at a generic level (termed 'generic quantitative risk assessment' (GQRA) or 'Stage 2' in CLR11.

1.1.2. Where one or more complete contaminant linkage to human health it is often necessary to clarify the risk posed by that contaminant linkage by comparison of reported concentrations with guideline values that represent acceptable concentrations.

1.1.3. The procedures outlined in Environment Agency Science Reports SC050021/SR2 , SR3 , SR4 and SR7 have been adopted in conjunction with the amendments to generic land-use exposure models published in Defra research report SP1010 detailing the derivation of Category 4 Screening Levels (C4SL) to select and develop generic assessment criteria (GAC) for soil. This approach has also been adapted to develop assessment criteria for ground water and soil vapour.

Selection and Derivation of Stage 2 GAC

Hierarchy of Published Sources

1.1.4. AECOM utilises a hierarchy of published sources for Stage 2 generic assessment criteria for soil.

1.1.5. The hierarchy of published sources are:

- Defra Category 4 Screening Levels (C4SL)
- Land Quality Management (LQM) / Chartered Institute of Environmental Health (CIEH) Suitable for Use Levels (S4UL) for Sandy loam soil
- Environmental Industries Commission (EIC) GAC
- AECOM GAC
- Dutch Intervention Values (IV) and Serious Risk Concentrations (SRC)
- United States Environmental Protection Agency (USEPA) Regional Screening Levels (RSL)

1.1.6. No LQM or EIC values are available for lead, and therefore the published C4SLs for lead are the default soil GAC. Further consideration of Defra SP1010 C4SLs for other substances is made where appropriate, subject to the current limited availability to six substances.

1.1.7. There are no published sources of relevant GAC for non-potable groundwater and soil vapour.

Application of GAC to Site Data

1.1.8. A typical first step is to compare individual soil, groundwater, and/or soil vapour concentrations to the GAC in order to establish whether further more detailed assessment and/or potentially remediation is required. This comparison can be expressed numerically as a Hazard Quotient (HQ):

HQ = (Sample Concentration)/GAC

1.1.9. Dependent on the assessment assumptions and uncertainties, a HQ< 1 indicates an acceptable level of risk from the substance being evaluated. The assessment of cumulative risk from multiple substances is not required at a GQRA level with the exception of TPH. In accordance with Environment Agency science report P5-080/TR3 , a hazard index (HI) is calculated for each individual sample based on the summation of the HQ for each TPH fraction .

1.1.10. Statistical analysis may be warranted, if justified by the available data, to support initial GAC comparisons to individual reported concentrations. For ground investigations of contaminated land sites where judgemental sampling is often employed and representative datasets are small statistical analysis is not viable.

1.1.11. In accordance with Environment Agency guidance co-authored by AECOM, GAC can be used as a starting point for evaluating long-term risks to human health from substances in soil. They address one specific consideration – long-term adverse effects on human health – and are designed to indicate where long-term (chronic) human health soil exposure risks are considered to be tolerable or minimal. They do not represent the "trigger" for an unacceptable risk under Part 2A of EPA 1990, and they do not address risk related to construction workers, acute exposure, ecology, controlled waters or building materials, they do not inform on the geotechnical suitability of the soil, and they do not inform on the aesthetic quality of the soil – both visual and olfactory. Therefore the GAC have not been explicitly derived to define remediation standards and are just one component in the assessment of whether soil is suitable for use.

1.1.12. It is good practice to use multiple lines of evidence to support GQRA conclusions.

Proposed Land Use Scenario

1.1.13. The proposed scheme is to comprise the construction of a new raised junction between the A46 and the A428 with additional upgrading of the A46 carriageway to accommodate the new junction. The site is currently occupied almost in its entirety by the existing A46 and associated landscaping and infrastructure and the A428 outside of the A46 the remaining area is open, undeveloped agricultural land. The investigation indicates potential made ground onsite associated with the development of the A46 c1991 and a number of infilled ponds and 'landfill' areas associated with former industry which may encroach on the site. However it is likely made ground associated with these features including a former farm house to the south of the junction shall have been to some degree addressed during the construction of the A46 and its junction as it is currently.

1.1.14. As noted the proposed scheme is to comprise the upgrading of the A46 within the site alignment with the addition of raised on and off slip roads leading to a new raised junction with the A428. The A428 shall also involve some upgrades around the immediate area of the roundabout to realign with the new junction. It is anticipated that imported clean fill material shall be utilised for the raising of the junction and areas outside of the alignment shall be landscaped with a suitable clean topsoil growing medium. The anticipated site users shall include road maintenance workers onsite, and the public utilising the road and any pedestrian routes within the development. Both uses are likely to be for limited hours per week. Although very conservative for road developments, as there is no infrastructure end use scenario, an end use of 'commercial / industrial' for human health exposure is considered the closest to the development based upon potential exposure. This will be conservatively protective of all future end-uses (based on default modelling scenarios) and uncertainty in the final design

Exposure Scenario Modelling Parameters

1.1.15. For the Public Open Space end use scenario the following default exposure pathways have been modelled to derive GAC against which to screen site data:

Exposure Pathway	Land-Use
	Commercial / Industrial
Soil and outdoor dust ingestion	✓
Soil and outdoor dust dermal contact	✓
Dust inhalation (outdoor)	✓
Soil vapour inhalation (outdoor)	✓
Groundwater vapour inhalation (outdoor)	✓

1.1.16. The chemical data obtained from laboratory analysis identified that the soil samples had an average soil organic matter (SOM) percentage of 0.95%. The calculated total organic content (TOC) content is 0.55%. The GAC have therefore been calculated for the most conservative default TOC content of 0.58-1.45%. An appropriate typical soil type of 'sandy loam' was used to calculate the GAC based on the shallow geology found on site.

1.1.17. Stage 2 assessments tend to be relatively conservative by nature and therefore suitable for screening the potential risks at the site. The application of the parkland public open space end use scenario adds further conservatism with regards to dermal contact and ingestion of soils and dusts, as the majority of the site shall be covered with artificial sports pitches. Full details of the physical and chemical parameters used in the derivation of these numbers can be made available upon request.

1.1.18. The soil samples have been chosen based upon limited earthworks on site in relation to the levelling and installation of the artificial pitches and potential for disposal or re-use on site or elsewhere of the topsoil. The assessment assumes no significant intrusive earth works or excavation works e.g. soil inversion where works may move contaminants from depth to shallow or surface levels potentially impacting the validity of this risk assessment.

CONTROLLED WATERS RISK ASSESSMENT

Groundwater and Surface Water Generic risk assessment methodology

1.1.19. AECOM has a prescribed methodology for assessing risks to controlled waters at a generic level, termed 'generic quantitative risk assessment' (GQRA) or 'Stage 2' in CLR11.

1.1.20. For sites in England and Wales where the conceptual site model has identified a potentially complete contaminant linkage to controlled waters, the first step is to define a suitable water target value (WTV) for the identified point of compliance upon which the risk assessment can be based. For groundwater compliance points the drinking water standard (DWS) is used in England and Wales while for surface water compliance points an environmental quality standard (EQS) is adopted.

1.1.21. For England and Wales, Stage 2 WTV have been selected following the Level 1 assessment methodology detailed in the Environment Agency's Remedial Target Methodology (RTM).

Selection of Stage 2 WTVSelection of DWS Criteria for England and Wales

1.1.22. The selection process used to determine the DWS is presented below in order of preference:

- United Kingdom drinking water standards.
- European Union (EU) drinking water standards.
- World Health Organisation (WHO) drinking water standards.

1.1.23. In addition for some compounds other criteria have been considered, although these are also not published standards, such as

- published taste or odour data which are relevant for aquifers used for potable supply have been selected for oxygenates such as MTBE which are known to have taste and odour thresholds which are significantly lower than toxicity based criteria.
- WHO (2008) proposals for drinking water guidelines which are based on the TPHCWG approach for TPH fractions.

Selection of EQS Criteria for England, Scotland and Wales

1.1.24. The selection process used to determine the freshwater and coastal EQS is presented below in order of preference:

- United Kingdom environmental quality standards including SEPA WAT-SG-53.
- PNEC derived for EU REACH registration dossiers/chemical safety reports (via the Fuel Ether REACH Consortium FERC).

1.1.25. When an EQS or PNEC is not available, a GAC will not be set. However, for a number of sites where groundwater has the potential to provide baseflow to surface water, the groundwater may also have resource potential and therefore also be screened against DWS based standards.

Stage 2 Assessment for Groundwater Data

1.1.26. The Stage 2 assessment involves the comparison of measured groundwater concentrations against the WTV. If the concentrations are below the water target concentrations, then the risks are considered insignificant. If the concentrations in the source are above the WTV, there is a potentially unacceptable risk to groundwater or surface water which requires further qualitative or quantitative assessment.

1.1.27. Whilst the hierarchies detailed above are appropriate for most sites there may be site specific conditions which require review of alternative criteria to be adopted, i.e. where an aquifer is located in an area of low environmental sensitivity and/or is considered unlikely to be utilised for potable supply or to provide baseflow to surface water. Where alternative criteria have been considered this will be highlighted.

Selection of Appropriate Controlled Waters Criteria Values

Consideration of Hydrology and Hydrogeology

1.1.28. With regards the risk to surface water: the nearest surface water feature is identified to be an unnamed 'secondary river' extending north east from the northern end of the site from the A46 alignment to the southern end of Coombe Pool through a nursery. This 'secondary river' was constructed between 1980 and 1991 at the same time as the A46 and is presumed to be associated with drainage for the current scheme. The river appears to be culverted in some sections.

1.1.29. The ground water strikes from the ground investigation were all noted within the superficial deposits at depths between 2.1mbgl and 7.9mbgl and showed a general downward gradient towards the north end of site. The ground investigation data onsite identifies glacial sands with interbedded clays overlying relatively shallow bedrock. The superficial deposits are described in the Groundsure Geo-Insight Report to have 'low' to 'very high' the permeability with 'very high' permeability made ground. The mudstone bedrock had no ground water strikes and although described as a Secondary 'A' aquifer is overlain typically by weathered mudstones described as clay which may potentially act as an aquiclude. This would limit any downward migration but may present the potential for a base flow to the river and lake to the north propagating along the stratums upper boundary.

1.1.30. The date of the development and inclusion of drainage culverts at the time of the original A46 development suggests it is most likely that the drainage of the existing site is managed, however no detailed information is currently available regarding the drainage and as such it is conservatively assumed that there is potential connectivity of surface and shallow ground water with the river and lake to the north.

1.1.31. Based upon the potential pathways to surface water the data has been screened against appropriate Environmental Quality Standard Values for freshwater.

1.1.32. With regards the risk to underlying aquifers: The superficial deposits of the Baginton Sand and Gravel Formation and Sand and Gravel River Terrace Deposits which occupy the majority of the site are described as a Secondary 'A' aquifer and the Thrussington Member and Bosworth Clay member to the east of the junction towards Binley Woods are designated as 'Unproductive'

1.1.33. There are no source protection zones registered on or within 1km of site and no groundwater protection or vulnerability zone is identified nearby. The Groundsure Enviro-Insight Report identified one surface water abstraction with 1km of the site lying 865m east of the site.

1.1.34. There are no potable ground water extraction zones in the areas of the site. The underlying superficial deposits are considered in majority a Secondary A aquifer, and typically granular in nature and as such are potentially in hydraulic connectivity with the granular made ground onsite. This connectivity, coupled with the superficial limited thickness, means it is unlikely to be used as potable water supply.

1.1.35. The ground investigation data identified the depth of the Mercia Mudstone bedrock onsite, noted as a Secondary A aquifer, to be between 0.6mbgl and 16.7mbgl, or when adjusted for topography, between 88.55mAOD and 68.68mAOD. The logs onsite identified significant thicknesses of extensively weathered mudstone bedrock identified as clays. It is likely that these weathered strata would effectively provide an aquiclude to the less weathered bedrock below, limiting significant contaminant migration. Although it is unlikely that the bedrock is utilised for potable water, the potential for migration exists and as such the leachate samples taken from the site are conservatively screened against Drinking Water Standard Values for consideration of risk.

Screening criteria available data and assumptions

1.1.36. On the basis of the information noted in Sections 1.1.28 through to 1.1.35 of this appendix, the analytical data for the leachate samples has been compared to both the Environmental Quality Standards (EQS) for freshwater as a means of assessing the significance of the results in relation to impact on groundwater and surface water migration to the River Irwell; and to the UK Drinking Water Standards (DWS) in order to assess any potential impact upon the underlying Principal Aquifer.

1.1.37. The selection of appropriate controlled waters criteria values have been based upon the following available data and assumptions:

- A conservative hardness of 50mg/l $CaCO_3$ (Calcium Carbonate) has been used to assist in the derivation of calculated values which are affected by water hardness as a function of $CaCO_3$;
- The surrounding area is 'lightly urbanised' with the nearest down gradient unbuilt area being adjacent to the site; and,
- The risk to both game and coarse fish is considered as a conservative assessment of receiving surface waters.
- The risk to fresh waters is considered in the assessment of receiving surface waters

1.1.38. For pollutants with no published EQS or DWS values, AECOM has selected the next most appropriate assessment criteria hierarchy; as follows:

- Water Framework directive Groundwater Target Value (GWTV);
- Scottish Environmental Protection Agency Resource Protection Value (RPV);

1.1.39. Where none of these are applicable the assessment criteria for EEC MAC 1980 are used although these criteria are now no longer used as part of the EU and UK regulations they are used as conservative screening criteria.

1.1.40. The results are interpreted to assess potential risks to controlled waters. It should be noted that for a risk to be present then a relevant contaminant linkage must be present.

Appendix 13-1

A46 Coventry Junctions Upgrade

Flood Risk Assessment

September 2019

A46 Coventry Junctions Upgrade

Flood Risk Assessment

Report No: S0

September 2019

Revision	Current Status	Date	Prepared By	Reviewed By	Approved By
P01	S0	February 2018	S Johnson L Irvine	A Prabhuswamy	S Edwards
P02	S0	September 2019	A Prabhuswamy	J Gunn	K Pearson

Highways England
Temple Quay House
2 The Square Temple Quay
Bristol
BS1 6HA

AECOM Infrastructure & Environment
Portwall Place
Portwall Lane
Bristol
BS1 6NA

© 2017 AECOM Infrastructure & Environment UK Limited. All Rights Reserved.

This document has been prepared by AECOM Infrastructure & Environment UK Limited ("AECOM") for sole use of our client Highways England (the "Client") in accordance with generally accepted consultancy principles, the budget for fees and the terms of reference agreed between AECOM and the Client. Any information provided by third parties and referred to herein has not been checked or verified by AECOM, unless otherwise expressly stated in the document. No third party may rely upon this document without the prior and express written agreement of AECOM.

Copyright

© This Report is the copyright of AECOM Infrastructure & Environment UK Limited. Any unauthorised reproduction or usage by any person other than the addressee is strictly prohibited.

SCHEDULE OF REVISIONS

Revisions Issued Since Publication

Report Revision Number	Revision Date	Paragraphs amended

Standard codes for suitability models and documents See BS1192:2007 Table 5 for further details					
Revision	Status	Description	Revision	Status	Description
P01.01 etc. to Pnn.nn etc.	S0	Initial status or WIP	P01.1 etc. to Pnn.nn etc.	D1	Costing
P01.01 to Pnn.nn	S1	Co-ordination	P01.1 etc. to Pnn.nn etc.	D2	Tender
P01 to Pnn	S2	Information	P01.1 etc. to Pnn.nn etc.	D3	Contractor Design
P01 to Pnn	S3	Review & Comment	P01.1 etc. to Pnn.nn etc.	D4	Manufacture/ Procurement
P01 to Pnn	S4	Stage Approval	C01 to Cnn	A1, A2 etc.	Approved and accepted as stage complete
P01 to Pnn	S5	Manufacture	P01.01 etc. to Pnn.nn etc.	B1, B2 etc.	Partially signed-off:
P01 to Pnn	S6	PIM Authorization	C01 to Cnn	CR	As Construction Record
P01 to Pnn	S7	AIM Authorization			

Contents

1 INTRODUCTION 2
1.2 Description of the Proposed Site 2
1.3 Description of the Proposed Works 2
2 EVALUATION OF FLOOD POLICY 4
2.1 National Planning Policy 4
2.2 Regional and Local Planning Policy 5
2.3 Other Relevant Studies and Reports 9
3 FLOOD RISK TO THE SITE 10
3.2 Flood Risk from Fluvial Sources 10
3.3 Flood Risk from Surface Water 11
3.4 Flood Risk from Sewers 12
3.5 Flood Risk from Groundwater 12
3.6 Flood Risk from Artificial Sources 13
4 CLIMATE CHANGE 14
4.1 Context 14
4.2 Peak River Flow Allowances by River Basin District 14
4.3 Peak River Flow Allowances for Different Assessments 15
4.4 Peak River Flow Allowances for the Proposed Development 16
4.5 Peak Rainfall Intensity Allowance 16
4.6 Impact of Climate Change on the Development 16
5 FLOOD RISK FROM THE SITE AND MITIGATION MEASURES 19
5.1 Flood Risk from Surface Water and Mitigation 19
5.2 Flood Risk from Groundwater and Mitigation 22
5.3 Residual Flood Risk 22
6 SUMMARY AND CONCLUSION 23
6.1 Summary of Flood Risk 23
6.2 Drainage Strategy 23
6.3 Conclusion 24

Appendices

Appendix A Proposed Scheme Site Boundary

Appendix B Environment Agency Historic Flood Map

Appendix C Environment Agency Flood Map for Planning

Appendix D Ground Investigation Report

Appendix E Environment Agency Consultation Response regarding Climate Change

Appendix F Drainage Strategy Report

1 INTRODUCTION

1.1.1 This Level 2 Flood Risk Assessment has been prepared on behalf of Highways England (HE) in support of a licence application for the proposed A46 Coventry Junctions Upgrade. The proposed scheme site is located on the south-eastern side of Coventry.

1.1.2 The proposed scheme site boundary is provided in Appendix A.

1.1.3 A Level 2 Flood Risk Assessment is a screening study of the flood risks posed to a site and the potential impacts which development could have on flood risk elsewhere, providing recommendations of possible measures to reduce the level of flood risk, where necessary. This Level 2 Flood Risk Assessment report has been prepared in accordance with the National Planning Policy Framework (NPPF) and the associated Planning Practice Guidance (PPG).

1.1.4 This Flood Risk Assessment is based on the best available flood risk information available at the time of writing. Data has been provided by the Environment Agency and other external sources.

1.2 Description of the Proposed Site

1.2.1 The A46 Coventry Junctions Upgrade is located in the surrounds of Binley, Coventry, and Warwickshire.

1.2.2 Land use in the area to the east is predominantly green fields or woodland except for the rugby club and garden centre next to Binley roundabout. The west is much more built-up with restaurants and commercial units along most of the site, although these are mostly separated from the A46 by trees.

1.2.3 The nearest Environment Agency *main river* to the proposed scheme area is the River Sowe which is approximately 0.62 miles (1km) away from the site boundary. Smite Brook which is a tributary of River Sowe is the nearest ordinary water course located approximately 700m to the north of the site boundary.

1.2.4 Figure 1 shows the topography of the site, as demonstrated by LiDAR Mapping (data available at www.data.gov.uk). A review of the ground elevation levels of the proposed scheme area shows that the ground levels are highest in the centre in the vicinity of the Binley Road roundabout and to the area southeast of the roundabout. The ground slopes from the roundabout towards the northern edge of the proposed scheme site boundary and also towards the southwest.

1.3 Description of the Proposed Works

1.3.1 The proposed scheme includes improving the Binley roundabout on the A46 near Coventry and includes upgrading a trunk road section of the A46 between the M6 and M40, a total distance of approximately 0.93 miles (1.5km), to full expressway standard. The central part of the site is the Binley Junction, linking the A46 to the A428 which runs east to west.

1.3.2 The proposed scheme involves the grade separation of Binley junction by raising the A46 over the A428 Rugby Road maintaining National Speed Limit, with entry and exit slip roads to an at-grade circulatory signalised junction.

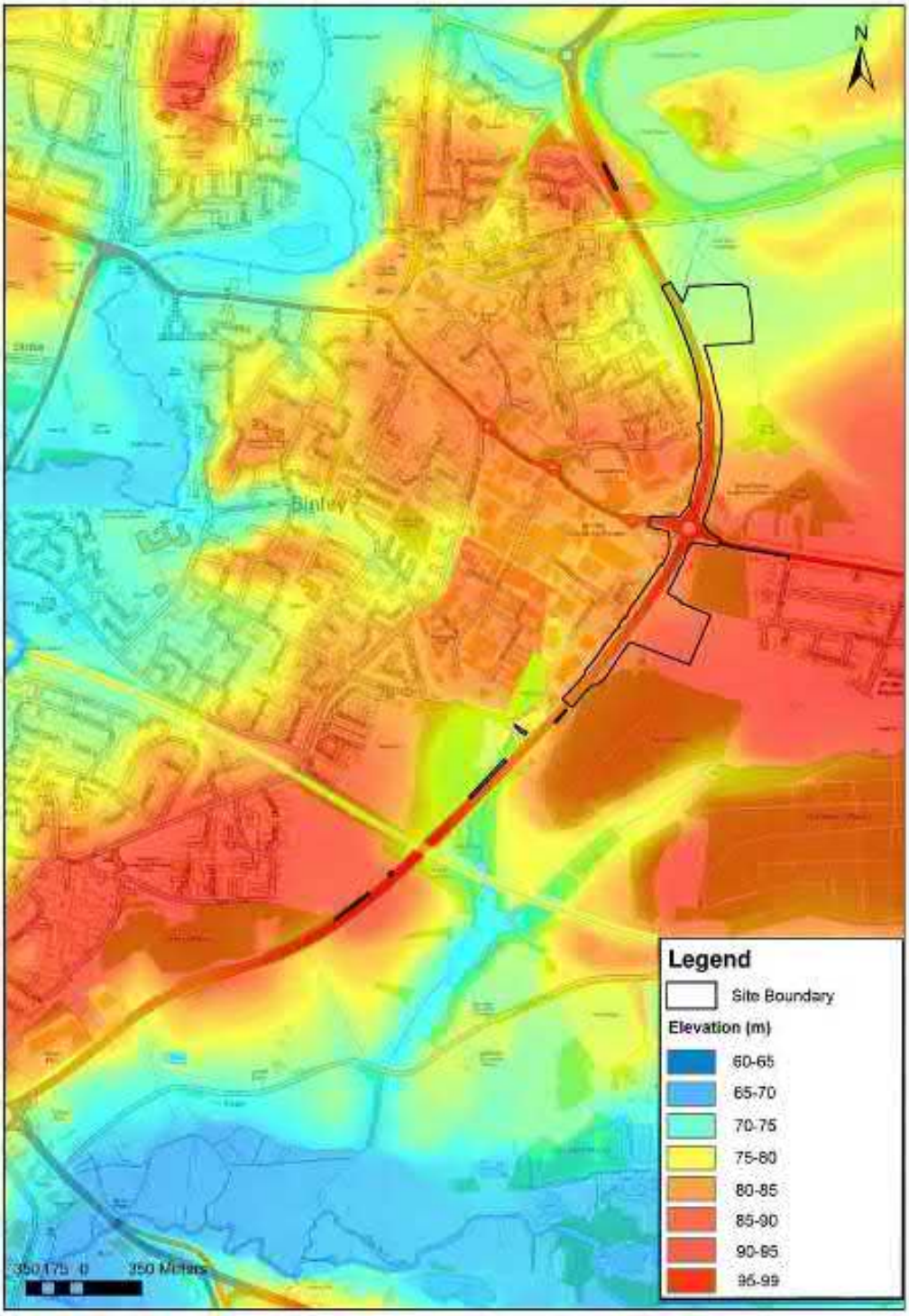


Figure 1 Ground Elevation of the Proposed Scheme Area (LiDAR)

2 EVALUATION OF FLOOD POLICY

2.1 National Planning Policy

2.1.1 Section 10 of the National Planning Policy Framework (NPPF) gives guidance on how to take account of the risks associated with flooding when planning developments. Table 2 of the PPG categorises different types of land use and development in accordance with their vulnerability to flooding. The development of the A46 would be considered *essential infrastructure*.

2.1.2 Figure 2 below provides a matrix (used in the NPPF PPG) of development suitability, based on the development's classification and the flood zone it lays within. The proposed site boundaries for this development sit within Flood Risk Zone 1, where development of *essential infrastructure* is acceptable.

Figure 2 – Flood Risk Vulnerability and Flood Zone 'Compatibility' Table[1]

Flood Zones	Flood Risk Vulnerability Classification				
	Essential infrastructure	Highly vulnerable	More vulnerable	Less vulnerable	Water compatible
Zone 1	✓	✓	✓	✓	✓
Zone 2	✓	Exception Test required	✓	✓	✓
Zone 3a †	Exception Test required †	✗	Exception Test required	✓	✓
Zone 3b *	Exception Test required *	✗	✗	✗	✓*

Key:

✓ Development is appropriate

✗ Development should not be permitted.

2.1.3 As part of this Flood Risk Assessment, the NPPF requires that the developer considers both the flood risk to the development and the impact the development might have on flood risk elsewhere. It is also necessary to consider flood risk from other possible sources, such as: surface water, groundwater, ordinary watercourses, artificial drainage systems and infrastructure failure.

[1] NPPF PPG Table 3, Online, Available at: https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/575184/Table_3_-_Flood_risk_vulnerability_and_flood_zone__compatibility_.pdf

2.2 Regional and Local Planning Policy

2.2.1 Coventry City Council are acting as the Lead Local Flood Authority (LLFA) and have produced the *Coventry Local Plan 2016*[2] which sets out policies for Flood Risk Management aimed at directing development away from areas of high risk. Excerpts of the relevant policies are provided below:

2.2.1.1 Policy EM4 Flood Risk Management

1. All major developments must be assessed in respect of the level of flood risk from all sources. If development in areas at risk of flooding is the only option following the application of the sequential test, it will only be permitted where all of the following criteria are met:

a) the type of development is appropriate to the level of flood risk associated with its location with reference to Coventry's Strategic Flood Risk Assessment (SFRA) flood zone maps and advice on appropriate uses within these zones from the Environment Agency and/or Lead Local Flood Authority;

b) it can be demonstrated that no suitable alternative sites are available in an area of lower risk;

c) it is provided with the appropriate minimum standard of flood defence and resilience to aid recovery (including suitable warning and evacuation procedures) which can be maintained for the lifetime of the development;

d) it does not impede flood flows, does not increase the flood risk on site or elsewhere or result in a loss of floodplain storage capacity;

e) it would not be subject to regular flooding;

f) in the case of dwellings, it is evident that as a minimum, safe, dry pedestrian access would be available to land not at high risk, and;

g) in the case of essential infrastructure, access must be guaranteed and must be capable of remaining operational during all flooding events.

2. A sequential, risk-based approach to the location of suitable development will be undertaken by the Council based on the Environment Agency's latest flood maps, Strategic Flood Risk Assessment flood zones and Vulnerability Classification to steer new development to areas with the lowest probability of flooding avoiding, where possible, flood risk to people and property and managing any residual risk.

3. The Exception Test (for use when there are large areas in Flood Zones 2 and 3, where the Sequential Test alone cannot deliver acceptable sites, but where some continuing development is necessary) will apply where development will provide wider sustainability benefits that outweigh flood risk, fully informed by an appropriately scaled Flood Risk Assessment (FRA) which indicates that development will be safe for its lifetime taking account of the vulnerability of its users, without increasing flood risk elsewhere, and, where possible reducing flood risk overall.

[2] Coventry Local Plan (2016), Online, Available at: http://www.coventry.gov.uk/downloads/file/19583/lp1_coventry_local_plan_publication_draft_2016

4. Land that is required for current and future flood management will be safeguarded from development. Where development is supported as an exception to this policy within high risk areas, applicants will need to demonstrate that they strictly comply with all of the above criteria.

5. A Flood Risk Assessment is required, appropriate to the scale and nature of the development proposed, where the development is:

a) within a river floodplain, as defined by the Coventry Strategic Flood Risk Assessment indicative flood zone maps;
b) within 20 metres of any watercourse;
c) adjacent to, or including, any flood bank or other flood control structure;
d) within an area where there may be surface water issues and drainage problems;
e) likely to involve the culverting or diverting of any watercourse, or
f) of such size and nature relative to the receiving watercourse/drainage system that there could be an increase in rate or volume of surface water run-off from the area.

2.2.1.2 Policy EM5 Sustainable Drainage Systems (SuDS)

Outlines how sustainable urban drainage systems should be implemented to mimic natural drainage systems and reduce flood risk.

1. All development must apply SuDS unless it can be clearly demonstrated there are practical reasons for not doing so and should ensure that surface water runoff is managed as close to its source as possible.

2. SuDS are the preferred way of managing and conveying surface water. All developments will consider and demonstrate how the following hierarchy for the discharge of surface water from a site will be applied:

a) Discharge by infiltration and water reuse technologies
b) Discharge to a watercourse allied with water reuse technologies
c) Discharge to surface water sewer allied with water reuse technologies.

3. All development should carry out infiltration tests and a ground water risk assessment, including seasonal groundwater monitoring, to demonstrate whether infiltration is possible, and that ground water would not be polluted to Environment Agency and Lead Local Flood Authority requirements. Where it is proven that infiltration is not possible, allied with water reuse technologies, surface water should be discharged into a watercourse (in agreement with the Environment Agency and Lead Local Flood Authority) at a rate no greater than Qbar greenfield runoff, or an appropriate minimum rate for small sites, agreed by the Lead Local Flood Authority. If there is no watercourse available then, allied with water reuse technologies, surface water should be discharged to a surface water sewer at a rate no greater than Qbar greenfield runoff.

4. In exceptional circumstances, where a sustainable drainage system cannot be provided, it must be demonstrated that it is not possible to incorporate sustainable drainage systems, and an acceptable means of surface water disposal is provided at source which does not increase the risk of flooding or give rise to environmental problems and improves on the current situation with a reduction in peak and total discharge.

5. The long-term maintenance arrangements for all SuDS must be agreed with the relevant risk management authority. A separate SPD will be produced to detail how SuDS schemes will be designed in accordance with the technical standards set out by the Coventry Lead Local Flood Authority and by the Department for Environment, Food and Rural Affairs.

2.2.2 Preliminary Flood Risk Assessment

2.2.2.1 A Preliminary Flood Risk Assessment has been completed by Coventry City Council in 2011. This was done to fulfil their duties as LLFA, as required in the Flood Risk Regulations (2009), by providing a high-level summary of any significant flood risks identified in readily available information. The Preliminary Flood Risk Assessment describes both the probability and consequences of past and future flooding. This assessment looked at flood risk from local sources such as surface water, groundwater and ordinary watercourses. The Preliminary Flood Risk Assessment shows this proposed scheme is not at risk from flooding.

2.2.3 Strategic Flood Risk Assessment

2.2.3.1 A Strategic Flood Risk Assessment was completed by Coventry City Council in 2015, which replaced the Level 1 Strategic Flood Risk Assessment completed in 2008, while including a Level 2 Strategic Flood Risk Assessment. This shows the possible development locations that might be allocated within the Local Plan. This Strategic Flood Risk Assessment provides supporting evidence for the emerging Local Plan, and partially covers the area for this proposed scheme.

2.2.3.2 In addition to this, a Level 1 Strategic Flood Risk Assessment has been produced by the Stratford-on-Avon District Council (SD), Warwickshire County Council (WCC), North Warwickshire Borough Council (NWBC), and Rugby Borough Council (RBC). This was carried out to present the most up to date flood risk information for the relevant Local Planning Authorities, the WCC Surface Water Management Plans, and WCC Minerals and Waste Development Documents. This Strategic Flood Risk Assessment also covered part of the area identified for this proposed scheme. The table below (Table 1) shows the summary of information collated by both Strategic Flood Risk Assessments.

Table 1 Summary of Strategic Flood Risk Assessments for Area of Proposed Scheme

Council	Source of Flood Risk	Summary for the proposed scheme	Risk
Coventry City Council	Rivers and the Sea	Scheme located in Flood Zone 1.	Low
	Surface water runoff from the land	Most of the scheme is within an area with a <0.1 Annual Exceedance Probability (AEP) risk of flooding from surface water. Two minor areas are within areas with a high 3.33% AEP risk of flooding from surface water.	Medium
	Sewers	No records of sewer flooding.	Low
	Groundwater	Parts of the proposed scheme are shown to be in an area considered prone to groundwater flooding (≥75%).	High
	Artificial sources	The proposed scheme is located outside of the maximum extent of flooding from reservoirs.	Low
SD, WCC, NWBC & RBC	Rivers and the Sea	Scheme located in Flood Zone 1.	Low
	Surface water runoff from the land	Several areas within the proposed scheme are at risk of deeper surface water flooding (>0.3m).	Medium
	Sewers	No records of sewer flooding.	Low
	Groundwater	Parts of the proposed scheme are shown to be in an area considered prone to groundwater flooding (≥75%).	High
	Artificial sources	The proposed scheme is located outside of the maximum extent of flooding from reservoirs.	Low

2.2.4 Local Flood Risk Management Strategy

2.2.4.1 As the LLFA statutory consultee, Coventry City Council has been required by the Flood and Water Management Act 2010 to produce a Local Flood Risk Management Strategy[3] and action plan to provide an overview and assessment of flood risk in Coventry. A draft has been published, which provides a clear vision for dealing with flood risk within the district. It aims to develop a greater understanding and use a more sustainable approach to flood defence, through engaging with the local community. It sets out how partners are to work together to reduce flood risks through a Duty to Cooperate (DtC) arrangement which was created in the Localism Act 2011. One of the objectives set out in the Local Flood Risk Management Strategy is to enhance planning policy to not only reduce flood risk from new developments, but to enhance where possible though smarter design and planning.

2.2.4.2 WCC has also published a draft Local Flood Risk Management Strategy[4], giving a clear vision of how flood risks will be dealt with in Warwickshire. It stresses that any new development planning should take into full account the local flood risk and seeks to reduce local flood risks through the development.

[3] CCC LFRMS, Online, Available at: http://www.coventry.gov.uk/downloads/file/19379/coventry_local_flood_risk_management_strategy
[4] WCC LFRMS, Online, Available at: https://apps.warwickshire.gov.uk/api/documents/WCCC-1039-47

2.3 Other Relevant Studies and Reports

2.3.1 No records of historic flood events have been identified as affecting this proposed scheme site during the data review for this Flood Risk Assessment. However, flooding has occurred less than 0.62 miles (1km) from the site boundaries on 1 April 1998. For a map showing the historic flood event extents provided by the Environment Agency, refer to Appendix B.

3 FLOOD RISK TO THE SITE

3.1.1 This section of the report considers the potential risks that the proposed development might be under, from all sources of flooding. If flood risk is considered moderate or high, then mitigation measures may be required.

3.2 Flood Risk from Fluvial Sources

3.2.1 In accordance with the Flood Map for Planning (FMfP)[5] provided by the Environment Agency reproduced as Figure 1 below (also provided in Appendix C), the majority of the proposed development site is located within Flood Zone 1. Land identified as being within Flood Zone 1 is classified as being at low risk (less than 0.1% Annual Exceedance Probability (AEP)) of flooding from rivers and the sea. A small area at the northern edge of the site boundary is at high (greater than 3.3% AEP) and medium risk of flooding (between 1% to 3.3% AEP). The proposed scheme plans indicate that this area which is at higher risk of flooding is a part of the site compound that will be used as a laydown yard temporarily during the construction phase. The proposed works will not involve changing existing ground levels within the flood zone.

3.2.2 The River Sowe and its tributary Smite Brook are the nearest watercourses to the proposed scheme site boundary. As the FMfP in Appendix C shows, River Sowe is about 0.62 miles (1km) and Smite Brook is approximately 750m away from the site boundary, and the risk of flooding from them does not extend into the proposed site. Thus, the site is at a low risk of flooding from fluvial sources.

[5] https://flood-warning-information.service.gov.uk/long-term-flood-risk/map?map=Reservoirs



Figure 2 Environment Agency Fluvial Flood Map for Planning

3.3 Flood Risk from Surface Water

3.3.1 The Risk of Flooding from Surface Water Map[6] (Figure 3) shows that majority of the site is at very low risk of flooding but there are two small areas shown to be at high risk of surface water flooding in the 3.33% AEP event. One such area is located towards the north of the proposed scheme site boundary in the vicinity of a ditch located in Oak Farm nurseries. The other area at high risk of flooding is located to the south east of the Binley Road junction roundabout adjacent to the highway.

3.3.2 The overall flood risk from surface water runoff from land is considered to be medium.

[6] https://flood-warning-information.service.gov.uk/long-term-flood-risk/map



Figure 3 Environment Agency Surface Water Flood Risk Map

3.4 Flood Risk from Sewers

3.4.1 Based on the data provided in the Strategic Flood Risk Assessment (Coventry County Council, 2015), there is no known risk of flooding from sewers to the proposed scheme area.

3.5 Flood Risk from Groundwater

3.5.1 Groundwater flooding occurs when the natural level of water stored within the ground rises above local ground level. This can result in deep and long-lasting flooding of low lying or below ground areas such as underpasses and basements.

3.5.2 According to the British Geological Survey (BGS) online mapping, the bedrock geology of the site comprises of Mercia Mudstone Group - Mudstone. The Mercia Mudstone Group is classified as a Secondary B aquifer. These are predominantly lower permeability layers which may store and yield limited amounts of groundwater due to localised features such as fissures, thin permeable horizons and weathering. The superficial deposits are classified as Secondary A (undifferentiated) aquifers.

3.5.3 According to the Environment Agency's Risk of Flooding from Groundwater mapping[7], this site is located outside Groundwater source protection zones. However, the majority of the proposed scheme is also situated within the Environment Agency's 'Minor Aquifer High' Groundwater Vulnerability Zone. High vulnerability indicates areas able to easily transmit pollution to groundwater. They are characterised by high leaching soils and the absence of low permeability drift deposits.

3.5.4 According to the Strategic Flood Risk Assessments, parts of the proposed scheme are shown to be in an area considered prone to groundwater flooding (≥75%). Therefore, the proposed scheme area is considered to be at a high risk of groundwater flooding.

3.5.5 Thus, during construction in order to mitigate groundwater flooding risk, adequate drainage and dewatering facilities should be provided.

3.5.6 Further information about ground conditions at the site and details regarding soakaway testing undertaken can be found in the Geotechnical Interpretive Report (HE551486-ACM-VGT-XX-RP-GE-00001, AECOM 2017) provided in Appendix D.

3.6 Flood Risk from Artificial Sources

Flood Risk from Reservoirs

3.6.1.1 Based on Environment Agency mapping, the proposed scheme is not located within the maximum extent of flooding from reservoirs and is therefore not considered to be at risk of flooding from reservoirs.

Flood Risk from other Artificial Sources

3.6.1.2 The proposed scheme is not near to any other artificial sources of flood risk such as canals or wetland areas. As such, the proposed scheme is considered not to be at risk from any other artificial sources of flood risk.

[7] http://maps.environment-agency.gov.uk/wiyby/wiybyController?x=437500.0&y=277500.0&topic=groundwater&ep=map&scale=9&location=Binley,%20Coventry&lang=_e&layerGroups=default&distance=&textonly=off#x=438347&y=277691&lg=1,10,&scale=8

4 CLIMATE CHANGE

4.1 Context

4.1.1.1 The NPPF requires site specific FRAs accompanying planning applications to assess the risk of all sources of flooding to and from the development and to demonstrate how these flood risks will be managed so that the development remains safe throughout its lifetime, taking climate change into account.

4.1.1.2 The EA published updated climate change guidance[8] in 2016. The guidance indicates that climate change is likely to increase river flows, sea levels, rainfall intensity, wave height and wind speed. The Environment Agency websites states that this guidance is currently being revised in line with UK Climate Projections 2018 and recommends that the Environment Agency be contacted for interim guidance while preparing any site-specific flood risk assessment.

4.1.1.3 The EA were consulted to obtain updated guidance regarding climate change allowances to be considered within this flood risk assessment in August 2019. The response received from the Environment Agency did not provide any updated guidance in line with UK Climate Change Projections 2018. Instead the Environment Agency's response (see Appendix E) recommended referring to the standard guidance available on their website which was last updated in 2016.

4.1.1.4 Thus, this assessment uses the standard Flood risk assessments: Climate change guidance[8].

4.2 Peak River Flow Allowances by River Basin District

4.2.1.1 The peak river flow allowances show the anticipated changes to peak flow by river basin district. The range of climate change allowances is based on percentiles. A percentile is a measure used in statistics to describe the proportion of possible scenarios that fall below an allowance level. The 50th percentile is the point at which half of the possible scenarios for peak flows fall below it and half fall above it.

- central allowance is based on the 50th percentile;
- higher central is based on the 70th percentile;
- upper end is based on the 90th percentile.

4.2.1.2 The guidance states that "If the central allowance is a 30% increase in flows, scientific evidence suggests that it is just as likely that the increase in peak river flow will be more than 30% as less than 30%". At the higher central allowance, 70% of the possible scenarios fall below this value. So, if the higher allowance is a 40% increase in flows, then current scientific evidence suggests that there is a 70% chance that peak flows will increase by less than this value, but there remains a 30% chance that peak flows will increase by more.

4.2.1.3 The proposed development lies within the Severn River Basin District. Table 2 shows the climate change allowances for the Severn River Basin District.

[8] Available at: https://www.gov.uk/guidance/flood-risk-assessments-climate-change-allowances

Table 2 Peak River Flow Allowance for the Severn River Basin District

Allowance Category	Total potential change anticipated for '2020s' (2015 to 2039)	Total potential change anticipated for '2050s' (2040 to 2069)	Total potential change anticipated for '2080s' (2070 to 2115)
Upper End	25%	40%	70%
Higher Central	15%	25%	35%
Central	10%	20%	25%

4.3 Peak River Flow Allowances for Different Assessments

4.3.1.1 For FRAs, the "Flood Risk Vulnerability Classification" must be used to categorise the development in order to determine its compatibility with the Flood Zone. The proposed development is a highway improvements scheme which is classed as 'Essential Infrastructure'.

4.3.1.2 The vulnerability classification and Flood Zone designation should be used to decide which peak river flow allowances (allowance category) to use based on the design life of the development. Table 3 shows the peak river flow allowances for the different flood risk vulnerability classifications for each zone.

Table 3 Peak river flow allowances based on flood risk vulnerability classification and flood zone

Flood Zone 2
• Essential infrastructure – use the higher central and upper end to assess a range of allowances • Highly vulnerable – use the higher central and upper end to assess a range of allowances • More vulnerable – use the central and higher central to assess a range of allowances • Less vulnerable – use the central allowance • Water compatible – use none of the allowances
Flood Zone 3a
• Essential infrastructure – use the upper end allowance • Highly vulnerable – development should not be permitted • More vulnerable – use the higher central and upper end to assess a range of allowances • Less vulnerable – use the central and higher central to assess a range of allowances • Water compatible – use the central allowance
Flood Zone 3b
• Essential infrastructure – use the upper end allowance • Highly vulnerable – development should not be permitted • More vulnerable – development should not be permitted • Less vulnerable – development should not be permitted • Water compatible – use the central allowance
In flood zone 1 use the central allowance for essential infrastructure, highly vulnerable, more vulnerable and less vulnerable developments. For water compatible developments use none of the allowances.
If (exceptionally) development is considered appropriate when not in accordance with flood zone vulnerability categories, then it would be appropriate to use the upper end allowance.

4.4 Peak River Flow Allowances for the Proposed Development

4.4.1.1 It is assumed that the operational lifetime of the proposed development is up to 100 years. Therefore, the peak river flow climate change allowances for the lifetime of the proposed development should be assessed as shown in Table 4.

Table 4 Peak River Flow Allowances for the Proposed Development

Proposed Development Details	
River Basin District	Severn
Flood Zone	The proposed development will be entirely Flood Zone 1 except a small area on the northern edge of the redline boundary located in Flood Zones 2&3 which is to be used as a laydown yard temporarily during the construction phase only.
Flood Risk Vulnerability Classification	Essential Infrastructure
Lifetime of Development	100 years
Climate Change Allowance to be Assessed	25% (Central for '2080s' (2070 to 2115))

4.5 Peak Rainfall Intensity Allowance

4.5.1.1 Increased rainfall intensity affects river levels and land and urban drainage systems. Table 5 shows anticipated changes in extreme rainfall intensity in small and urban catchments. For flood risk assessments and strategic flood risk assessments, both the central and upper end allowances need to be assessed to understand the range of impact.

Table 5 Peak Rainfall Intensity Allowance in small and urban catchments

Applies across all of England	Total potential change anticipated for 2010 to 2039	Total potential change anticipated for 2040 to 2059	Total potential change anticipated for 2060 to 2115
Upper End	10%	20%	40%
Central	5%	10%	20%

4.6 Impact of Climate Change on the Development

4.6.1 Tidal Flooding

4.6.1.1 The proposed development is not at risk of tidal flooding given its location and distance from the sea.

4.6.2 Fluvial Flooding

4.6.2.1 As the proposed development is located in Flood Zone 1 the guidance suggests that the Central allowance must be assessed for essential infrastructure, indicating that peak flows could increase by 25%. Climate change has the potential to increase peak flows, and therefore flood extents, for the watercourses located in the vicinity of the Site.

4.6.2.2 The majority of the proposed development over its lifetime is likely to remain at very low risk of fluvial flooding since it is located in Flood Zone 1.

4.6.2.3 A small area of the redline boundary at the northern edge of the site boundary is in flood zones 2 & 3. The proposed scheme plans indicate that this area which is at higher risk of flooding is a part of the site compound that will be used as a laydown yard temporarily during the construction phase. The proposed works will not involve changing existing ground levels within the flood zone. Therefore, even though climate change is likely to increase flood risk to this area, the consequence of flooding will remain low if the site is returned back to greenfield conditions post-construction by complete removal of the temporary site compound. Also, since the Site falls within the River Severn Catchment Flood Management Plan (CFMP), it is likely that the Environment Agency and the local council will work to deliver sustainable flood risk management for the long term to keep pace with climate change as per Policy 4 of the CFMP. Policy 4 states that for areas of low, moderate or high flood risk where flood risk is being managed effectively but where further actions may be required to keep pace with climate change, future action to reduce flood risk will be taken if further appraisal shows that socially and environmentally sustainable, technically viable and economically justifiable options exist.

4.6.3 Groundwater Flooding

4.6.3.1 The predicted increase in the wetness of winters and the intensity of storm events could impact groundwater level fluctuations across the site, and possibly increase the level of the water table. As the likelihood of groundwater emergence under the climate change scenario is likely to increase, the potential for groundwater flooding to impact infrastructure will also increase.

4.6.3.2 Post-development the Site will be largely covered by hardstanding ground, which reduces the infiltration and the likelihood of localised groundwater reaching the surface and causing flooding.

4.6.3.3 Therefore, it is not anticipated that the risk from groundwater sources, which is currently considered to be high, would increase significantly to the point that it would increase the risk to the proposed development.

4.6.4 Surface Water Runoff Generation and Overland Flow

4.6.4.1 Climate change must be considered when considering surface water runoff generated by development sites. This is usually represented by increasing the peak rainfall intensities. An increase in rainfall intensity will increase runoff rates and volumes. Therefore, the design of the drainage system associated with the proposed development has taken this into account in accordance with the guidance of the NPPF, the EA and the SFRA.

Peak runoff from the proposed development will be attenuated up to the 1% AEP (1 in 100 year) rainfall event plus a minimum of 40% climate change. Surface water runoff generated by higher return period storms (up to and including the 1% AEP + 40% allowance for climate change) will be retained within the site boundary, in accordance with the NPPF and EA guidance as described in Section 5. Thus, if the drainage strategy, as described in Section 5, is properly implemented the risk of flooding from surface water shall remain low throughout the lifetime of the development.

4.6.5 Flooding from Drainage Infrastructure

4.6.5.1 It is difficult to predict precisely the impact of climate change on sewer flooding; however, the anticipated increase in rainfall intensity may cause greater volumes of rainfall to enter the surface water sewer network during storm events. This may require the upgrading of existing infrastructure to maintain the same level of service and for new infrastructure to be designed with greater capacities.

4.6.5.2 The drainage infrastructure on the Site would be extensively remodelled in support of the proposed development as described in detail in Section 5. The proposed drainage network, excluding attenuation features, has been designed including a 20% increase in rainfall to consider the effects of climate change. Attenuation storage features have been designed to accommodate 1%AEP + 40% climate change allowance flows. Thus, risk of flooding from drainage infrastructure is considered to be low if the proposed drainage strategy is properly implemented.

5 FLOOD RISK FROM THE SITE AND MITIGATION MEASURES

5.1.1 Based on the review of flood risk to the site in the preceding section, the sections of the site are at risk of flooding from surface water and the site is at the high risk of flooding from groundwater. A small portion of the north eastern part of the site is at medium and high risk of flooding. This section summarises the mitigation measures to address these risks along with flood risk arising from the site to adjoining areas.

5.1.2 A separate Drainage Strategy Report has been developed, provided in Appendix F that needs to be read in conjunction with this section of the Flood Risk Assessment.

5.1 Flood Risk from Surface Water and Mitigation

5.1.1 The existing A46 drainage on the southern approach to the Binley roundabout drains to a ditch along nearby Oak Tree access road (Outfall A). 100m south of the roundabout, a culvert collects overland flows and flow from existing land drains and discharges this to Outfall B. The section of the A46 north of the Binley roundabout is super-elevated and slopes towards the west. The road discharges directly to ditches parallel to the road through outfalls C, D, and E. All existing outfalls are located as shown in Figure 4 and Figure 5.

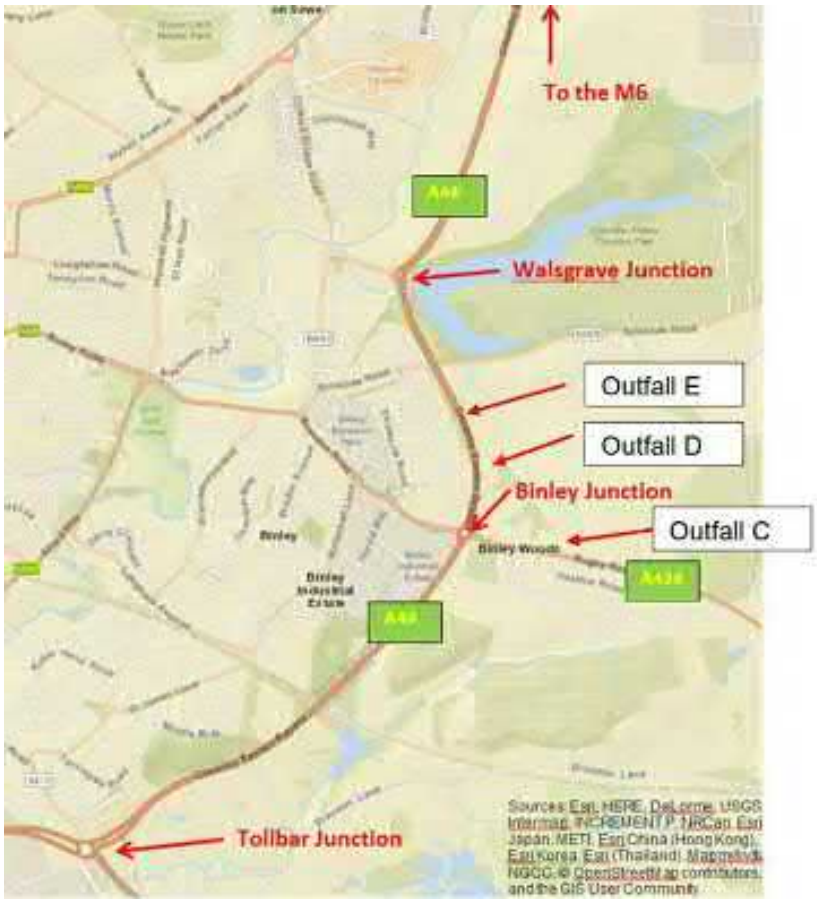


Figure 4 Locations of Outfalls C, D, and E



Figure 5 Locations of Outfalls A and B

5.1.2 The proposed drainage strategy, as detailed in the report, includes restricting the runoff rate from the proposed development to greenfield run-off rate, and the construction of two attenuation areas (Ponds A and B) to provide storage to excess storm water. The location of the proposed attenuation ponds are provided in Figure 6 below.



Figure 6 Locations of attenuation ponds A and B

5.1.3 The proposed ponds A and B will mitigate the increased impermeable area for the catchments of Outfall B and Outfall E, respectively. Pond A is designed to have a volume of 1000m^3 and Pond B to have a volume of 1600m^3. These are preliminary estimates of volume calculated using MicroDrainage to attenuate 1 in 100 year return period storm event plus allowance for climate change (40%) at the greenfield discharge rates of 4.7 litres per second (l/s) for pond A, and 8.7 litres per second for Pond B.

5.1.4 The highway drainage system has been designed in accordance with HD33/16, ensuring no surcharge for a 1 in 1 year return period and no flooding for a 1 in 5 year return period. The network, excluding SuDs, has been designed including a 20% increase in rainfall to consider the effects of climate change.

5.1.5 No attenuation works are required for Outfall A, Outfall C, or Outfall D due to a reduction in impermeable area for these catchments (see Table 6).

5.1.6 In addition, upsizing of the existing culvert at Outfall B is proposed to alleviate the known flooding issues in the area. Outfall B discharges into a culvert which consists of a 750mm pipe underneath the A46 and a 600mm pipe collecting overland flow from the east. Surface water flooding has been observed at this location and the drainage strategy includes upsizing this culvert from 600mm to 750mm diameter.

Table 6 Changes in impermeable areas for each outfall due to the development

Catchment	Existing impervious area (ha)	Proposed impervious area (ha)	Area=Proposed-Existing
Outfall A	3.005	2.867	-0.138
Outfall B	4.599	4.604	0.005
Outfall C	0.092	0.081	-0.012
Outfall D	1.073	0.993	-0.080
Outfall E	1.854	1.428	-0.426

5.2 Flood Risk from Groundwater and Mitigation

5.2.1 Since the proposed works are located in an area where the risk of flooding from groundwater is considered to be high, the highway design should consider the potential impact of likely presence of elevated groundwater levels on the structural stability of the highway.

5.3 Residual Flood Risk

5.3.1 There is risk associated with failure of the drainage system through blockage and/or build-up of sediment, both of which may cause the capacity of the drainage system to be reduced. This residual risk of flooding will be alleviated by the new proposed drainage system where impermeable areas are -reduced and by ensuring regular maintenance is undertaken during the lifespan of the proposed scheme.

6 SUMMARY AND CONCLUSION

6.1 Summary of Flood Risk

6.1.1 A review of the NPPF and local planning policies suggests the development of the A46 would be considered *essential infrastructure*. In accordance with Table 3, *Essential Infrastructure* developments are permitted in Flood Zone 1

6.1.2 The majority of the proposed development site is located within Flood Zone 1. Land identified as being within Flood Zone 1 is classified as being at low risk (less than 0.1% Annual Exceedance Probability (AEP)) of flooding from rivers and the sea. A small area at the northern edge of the site boundary is at high (greater than 3.3% AEP) and medium risk of flooding (between 1% to 3.3% AEP). The proposed development plans indicate that this area which is at higher risk of flooding is a part of the site compound that will be used as a laydown yard temporarily during the construction phase. The proposed works will not involve changing existing ground levels within the flood zone.

6.1.3 As the proposed development is located in Flood Zone 1 the Environment Agency's climate change guidance suggests that the Central allowance must be assessed for essential infrastructure, indicating that peak flows could increase by 25%. Climate change has the potential to increase peak flows, and therefore flood extents, for the watercourses located in the vicinity of the Site. However, since the majority of the proposed development over its design life is likely to remain at very low risk of fluvial flooding since it is located in Flood Zone 1.

6.1.4 The majority of the proposed scheme is identified as being at very low risk (each year this area has a chance of flooding of less than 0.1%) of surface water flooding. However, there are two small areas identified as being at high risk (each year this area has a chance of flooding of greater than 3.3%) of surface water flooding. The overall flood risk from surface water runoff from land is considered to be medium.

6.1.5 According to the Strategic Flood Risk Assessments, parts of the proposed scheme are shown to be in an area considered prone to groundwater flooding (≥75%). Therefore, the proposed scheme area is considered to be at a high risk of groundwater flooding.

6.1.6 The risk to the proposed development from flooding due to canal and reservoirs, sewer and water supply infrastructure and artificial drainage systems and flood risk management infrastructure is considered to be low.

6.2 Drainage Strategy

6.2.1 The proposed drainage strategy is to discharge directly to ditches parallel to the road via the existing drainage outfalls A, B, C, D and E. No attenuation works are required for Outfall A, Outfall C, or Outfall D due to a reduction in impermeable area for these catchments due to the proposed works.

6.2.2 For discharge via outfalls B and D, the proposed drainage strategy includes restricting the runoff rate from the proposed development to greenfield run-off rate, and the construction of two attenuation areas (Ponds A and B) to provide storage to excess storm water.

6.2.3 The proposed drainage network, excluding attenuation features, has been designed including a 20% increase in rainfall to consider the effects of climate change. Attenuation storage features have been designed to accommodate 1%AEP + 40% climate change allowance flows. Thus, risk of flooding from drainage infrastructure is considered to be low if the proposed drainage strategy is properly implemented.

6.3 Conclusion

6.3.1 This study has demonstrated that it will be possible to manage flood risks to and from the proposed scheme in compliance with the NPPF and PPG, and a strategy has been developed to control and discharge surface water runoff in an acceptable, conventional and sustainable manner.

Appendix A Proposed Scheme Site Boundary

Appendix B Environment Agency Historic Flood Map

Appendix C Environment Agency Flood Map for Planning

Appendix D Ground Investigation Report

Appendix E Environment Agency Consultation Response regarding Climate Change

Appendix F Drainage Strategy Report

Appendix contents to range below (as appropriate)

Appendix 13.2

West Midlands Autumn Statement 2014 (AS14)

Drainage Strategy Report

A46 Coventry Junctions Upgrade

Ref: HE551486-ACM-HDG-A46_SW_000_Z-RP-CD-0001

January 2018

This page is left intentionally blank

Document Control

Document Title	A46 Coventry Junctions Upgrade Scheme Drainage Strategy Report
Author	Luisa Nunes
Owner	Grant Paxton
Distribution	
Document Status	Issued for Stage Approval

Record of Issue

Version	Status	Author	Date	Checked	Date	Authoriser	Date
P01	S4	Oluwatobi Owoiya	05/12/2017	Luisa Nunes	05/12/2017	Grant Paxton	21/03/2018

Reviewer List-

Name	Role

Approvals

Name	Signature	Title	Date of Issue	Version

The original format of this document is copyright to Highways England

Table of Contents

Document Control **3**
1 Introduction **5**
1.1 Scheme Overview 5
2 Existing Drainage **6**
2.1 Existing drainage survey 6
2.2 Existing surface water drainage 6
3 Proposed Drainage **9**
3.1 Design Standards 9
3.2 Coventry City Council (CCC) requirements 9
3.3 Key design criteria and assumptions 9
3.4 Major Design Constraints 10
3.5 General Description 10
4 Conclusions ..... Error! Bookmark not defined.
Appendices **16**

1 Introduction

1.1 Scheme Overview

AECOM has been commissioned by Highways England (HE) to prepare a drainage strategy as part of the A46 Binley Junction Improvement. Binley Junction is located on the south-eastern side of Coventry.

The proposed scheme involves the grade separation of Binley junction by raising the A46 over the A428 Rugby Road maintaining National Speed Limit, with entry and exit slip roads to an at-grade circulatory signalised junction.

AECOM has developed a scheme proposal which maintains the existing roundabout with a bridge overpassing the junction. The existing roundabout has an internal diameter of 50m and 15m carriageway width, can house the bridge piers for the flyover, and the A46 will have four arms of slip roads tying into the existing circulatory. East–West directions and related approach/departure arms, on A428 and Rugby road, are not affected by the proposed scheme.

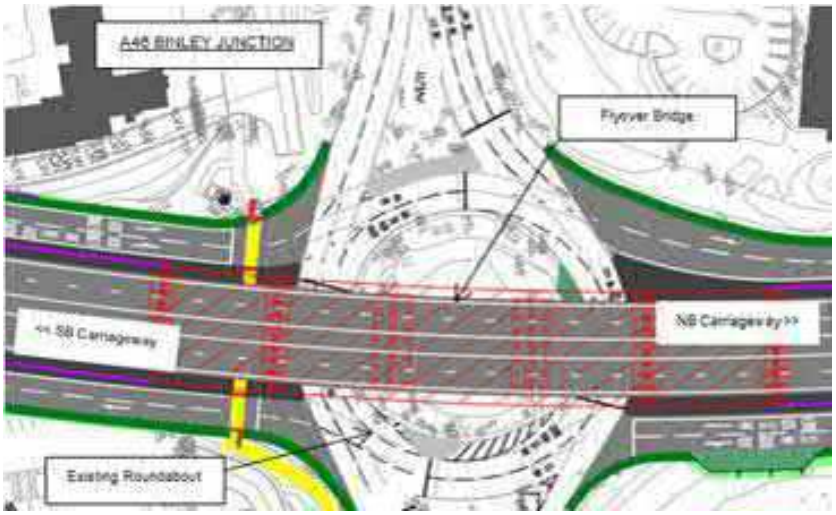


Figure 8-1: A46 Binley Junction- South Catchment **(Copyright 2008, Google Inc. All rights reserved)**

The drainage strategy for the above scheme is presented in the following chapters.

2 Existing Drainage

2.1 Existing drainage survey

As built information has been made available through the Carnell's Asset Inventory Survey drawings. (Drawing ref.11286_AI_001 to 11286_AI_008)

2.2 Existing surface water drainage

The existing A46 road at Binley junction area can be divided into two major catchments: south and north of Binley roundabout.

South Catchment

The existing A46 drains towards south from the existing Binley roundabout to an outfall that discharges to a ditch located nearby to Oak Tree access road (Outfall A). Survey drawings show that surface water is currently collected in a kerb and gully and filter drain systems at the verges and surface water channel and pipe systems along the central reserve

Approximately 100m south of the roundabout a culvert collects overland flows from adjacent fields and car park and existing land drains (filter drains) located on the toe of the A46 embankments (Outfall B). All known outfalls for the road drainage on the A46 south catchment, as recorded by Carnell's survey, are shown in Figure 2-1.

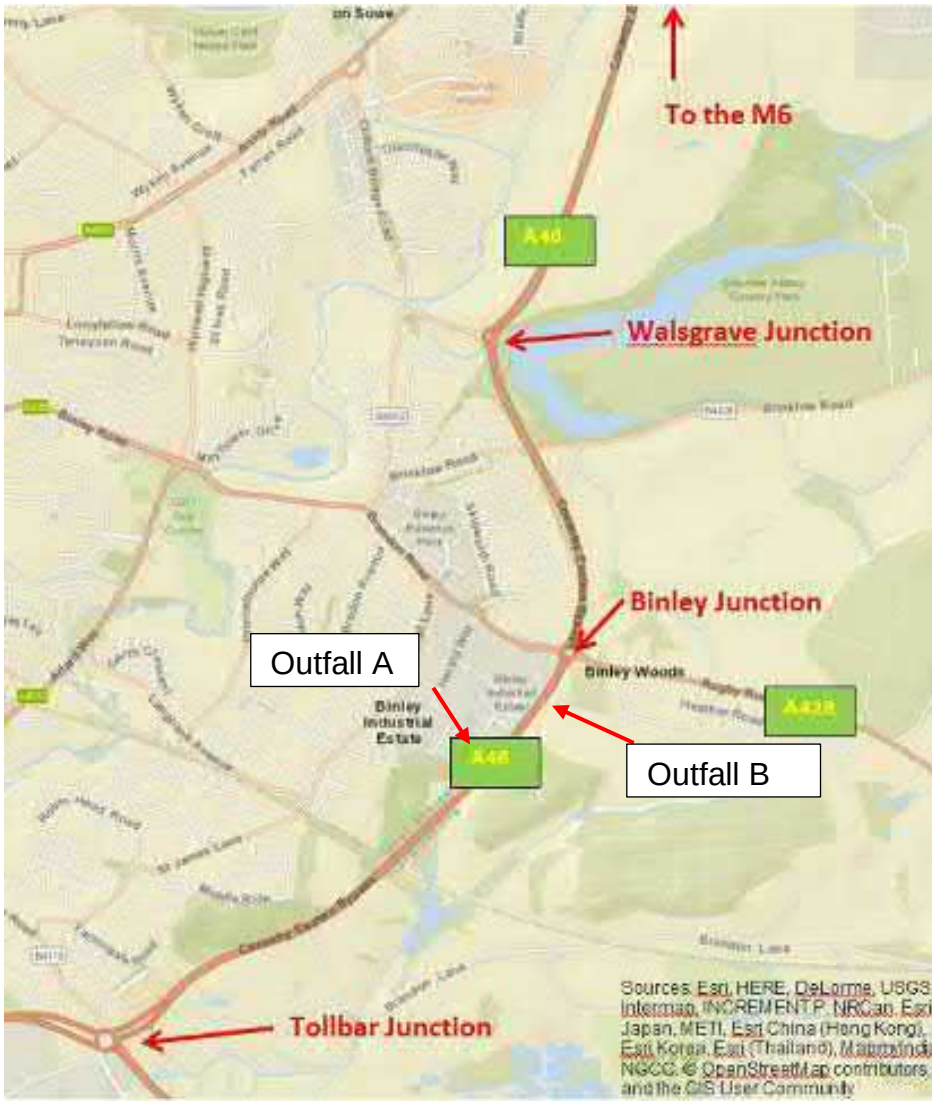


Figure 2-1: A46 Binley Junction- South Catchment **(Copyright 2008, Google Inc. All rights reserved)**

See existing catchment drawings HE551486-ACM-HDG-A46_SW_000_Z-DR-CD-0521 to 525 and summary areas table in Section 4 for existing drainage catchments to outfalls A and B.

North Catchment

The existing roundabout slopes to the north and from the roundabout to the junction with the B4428 the A46 mainline carriageway is super-elevated, falling towards the West. All known outfalls for the road drainage on the A46 north catchment, as recorded by Carnell's survey, are shown in Figure 2-2.

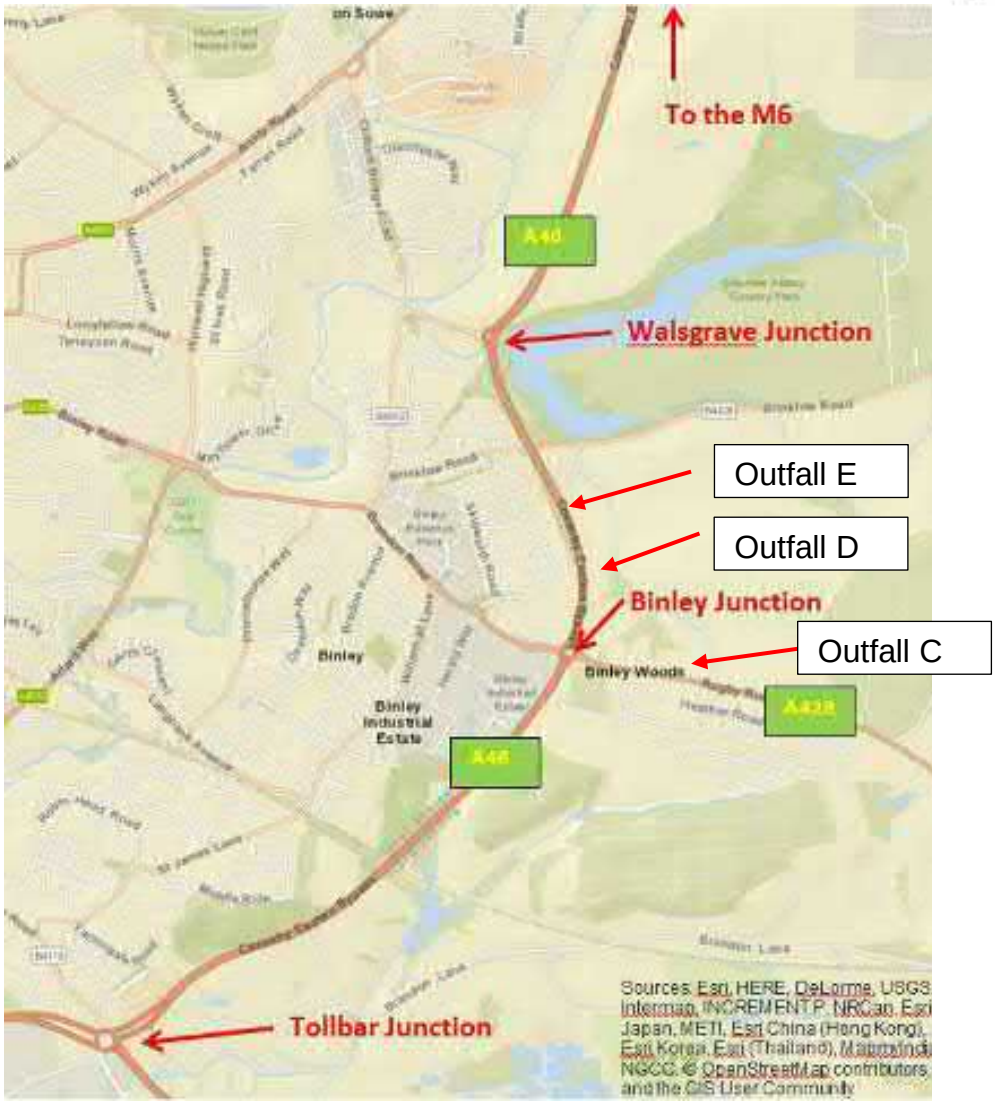


Figure 2-2: A46 Binley Junction- North Catchment

There are no existing sustainable drainage systems known in this scheme, and the road drainage discharges directly to the ditches/watercourse.

See existing catchment drawings HE551486-ACM-HDG-A46_SW_000_Z-DR-CD-0521 to 525 and summary areas table in Section 4 for existing drainage catchments to outfalls C, D and E.

3 Proposed Drainage

3.1 Design Standards

Including, not limited to:

HD50/16 – Certification of Drainage Design

HD49/16 – Highway Drainage Design Principal Requirements

HD33/16 – Design of Highway Drainage Systems

HD45/09 – Road Drainage and the Water Environment

HA37/17 – Hydraulic Design of Road Edge Surface Water Channels

HA39/98 – Edge of Pavement Details

HA40/01 – Determination of Pipe Bedding Combinations for Drainage

HA 106/04 – Drainage of Runoff from Natural Catchments

HA 83/99 – Safety Aspects of Road Edge Drainage Features

IAN 117/08 rev 2 – Certification of Combined Kerb and Drainage products

3.2 Coventry City Council (CCC) requirements

A meeting with the Coventry City Council was conducted to include site specific requirements, and it was advised to:

- Any greenfield runoff is to be in line with Qbar rates and DMRB standard should suffice;
- SuDs should be employed with oversized pipes to restrict flows and drainage channelled to open water bodies. However, open water features such as Ponds would be preferable.
- Climate change allowance for attenuation features to be 40%.
- Strategy which may include the use of culverts to alleviate flooding at A46 south east area, which is known to have flooding issues.

3.3 Key design criteria and assumptions

WinDES Microdrainge software was used to calculate Greenfield runoff rates for each catchment using the ICP SuDS method and rainfall and soil parameters for Region 6 of SAAR = 700 and soil = 0.450.

Flow attenuation measures in the form of two ponds are proposed to be used for the Scheme, upstream outfall B - Pond A and upstream outfall D – Pond B. The proposed attenuation ponds were based on a discharge rate equal to Qbar and were designed to attenuate the 1 in 100 year return period storm event plus allowance for climate change (40%).

The highway drainage system has been designed in accordance with HD33/16, ensuring no surcharge for a 1 in 1 year return period and no flooding for a 1 in 5 year return period. The network, excluding SuDs, has been designed including a 20% increase in rainfall to consider the effects of climate change.

A concrete v channel system is proposed to collect the surface water runoff within the central reserve. Concrete design channels were based on HA37/17 and designed for a 1 in 5 year return period plus 20% allowance for climate change. Combined kerb drainage systems were chosen as the collection system along verges (at embankments) and were designed for a 1 in 5 year return period.

The equivalent impermeable area for permeable catchment areas has been calculated using a 30% runoff coefficient and accounts for the varying permeability of the surface. Permeable catchment areas were determined from areas between the carriageway and filter collectors, however; overland drainage catchments from all adjacent lands have not been included in the catchment tables.

3.4 Major Design Constraints

The proposed drainage scheme is to tie in into existing drainage system and therefore it is constrained by the existing drainage system in terms of levels and location.

A significant constraint is the legislative requirement to not increase flood risk. In order to achieve this it will be necessary to ensure that surface water discharges to existing outfalls are not increased and as required by CCC, any Greenfield runoff is to be in line with Qbar rates.

3.5 General Description

The proposed drainage layouts are shown on drawing numbers HE551486-ACM-HDG-A46_SW_000_Z-DR-CD-0511 to 514 in Appendix A.

The proposed scheme was divided into two major catchments, South and North of the new proposed bridge.

3.5.1 South Catchment

The south catchment of the proposed road includes the mainline (from south of the the overfly bridge to approximately Road Tree access road) and north bound merge and south bound diverge. The proposed layout also includes new proposed impermeable areas mainly in diverge and merge areas.
Surface water run-off will be collected by surface water channels; kerb drains or filters drains and discharge to existing outfall A or outfall B.
In the proposed scenario, permeable and impermeable areas are summarized in the following tables.

Table 3-1: A46 Binley Junction- South Catchment Impermeable areas

	Proposed Impermeable area (ha)	Proposed Permeable area (ha)	Proposed Cumulative Impermeable area (ha)
Outfall A	1.733	3.779	2.867
Outfall B	0.709	12.984	4.604

Upstream of outfall B, a flow attenuation measure, in the form of pond A, will be required to ensure discharge rates and volumes at existing outfall is not worsened (i.e. increased) relative to the existing situation.
Pond A was designed to attenuate a 1 in 100 year return period storm event plus allowance for climate change (40%).

Table 3-2: A46 Binley Junction- Pond A

	Proposed Impermeable area (ha)	Proposed Permeable area (ha)	Proposed Cumulative Impermeable area (ha)	Qbar (l/s)	Pond Volume provided (m3)
Pond A	0.853	0.222	0.920	4.1	1000 m3

Discharge rates will be restricted to 4.7l/s using a hydrobrake or orifice at the outlet of pond A.

The outfall B is located at an existing culvert comprising two pipes, a 750 mm diameter pipe crossing the A46 carriageway and a 600mm pipe upstream which collects the overland flow.

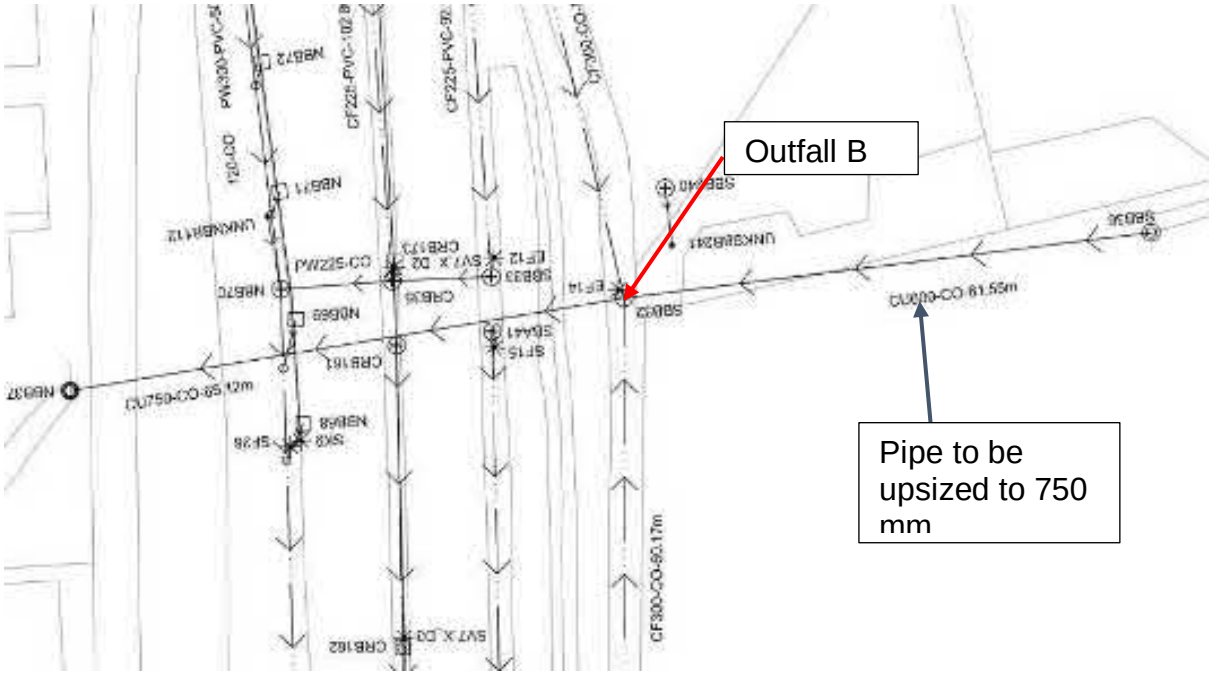


Figure 3-2: A46 Binley Junction- Existing Culvert – Outfall 2 (Extracted from Carnell's survey) **(Contains Ordnance survey Data@Crown copyright and database rights)**

Surface water flooding records indicate flooding, upstream the culvert; this appears to be due to the undersized diameter pipe. It is, therefore, proposed to upsize the upstream pipe of the culvert to 750mm to create a more resilient area to surface water flooding.

3.5.2 North Catchment

The north catchment comprises the area from north of the proposed bridge to the crossing with the B4428, northbound diverge and southbound merge. The proposed road falls mainly towards the north and the new layout includes new impermeable areas, mainly on the merge and diverges.

Surface water run-off will be collected by surface water channels, kerb drains and conveyed by pipe systems and discharge to the existing outfalls.
The existing and proposed equivalent impermeable areas are summarized in the following table.

Table 3-3:A46 Binley Junction- North Catchment Impermeable areas

	Proposed Impermeable area (ha)	Proposed Permeable area (ha)	Proposed Cumulative Impermeable area (ha)
Outfall C	0.068	0.042	0.081
Outfall D	0.804	0.629	0.933
Outfall E	0.885	1.911	1.428

Upstream of outfall E, a flow attenuation measure, in the form of pond B, will be required to ensure discharge rates and volumes at existing outfall is not worsened (i.e. increased) relative to the existing situation.
Pond B was designed to attenuate a 1 in 100 year return period storm event plus allowance for climate change (40%).

Table 3-4 A46 Binley Junction - Pond B

	Proposed Impermeable area (ha)	Proposed Permeable area (ha)	Proposed Cumulative Impermeable area (ha)	Qbar (l/s)	Pond Volume provided (m3)
Pond B	1.944	0.52	2.1	9.3	1600 m3

The discharge rates will be restricted using a hydrobrakes or orifices at the pond outlets.

Ponds are to be located in the construction compounds areas as indicated in the figure below and on drainage drawings HE551486-ACM-HDG-A46_SW_000_Z-DR-CD-0511 to 514 in Appendix A.



Figure 3-3: A46 Binley Junction- P

3.5.3 Existing and Proposed Overall Catchments

The summary table below of outfall catchments and associated discharge changes, following development of the scheme, demonstrates that flood risk is not increased as the proposed scheme's total unrestricted road drainage outfall flow rates decrease with flow restrictions at SUDS outfalls for Pond A and B.

Table 3.5 Drainage Catchments

	Proposed Impermeable Area (ha)	Proposed Permeable area (ha)	Proposed Cumulative Impermeable area (ha)	Existing Impermeable Area (ha)	Existing Permeable Area (ha)	Existing Cumulative Impermeable area (ha)	Proposed vs Existing Cumulative Imperemable Area (ha)	Comments
Outfall A	1.733	3.779	2.867	1.764	4.137	3.005	**-0.138**	**Reduction in total catchment area**
Outfall B	0.709	12.984	4.604	0.562	13.458	4.599	**-0.005**	**Negligible increase (50m2) in total catchment area**
Outfall C	0.068	0.042	0.081	0.081	0.038	0.092	**-0.012**	**Reduction in total catchment area**
Pond A	0.855	0.222	0.920	See Note	See Note	See Note	See Note	**Pond A discharges into Outfall B at a restricted Qbar rate (4.1 l/s)**
Outfall D	0.804	0.629	0.993	0.750	0.750	1.073	**-0.080**	**Reduction in total catchment area**
Pond B	1.944	0.52	2.100	See Note	See Note	See Note	See Note	**Pond B discharges into Outfall B at a restricted Qbar rate (9.2 l/s)**
Outfall E	0.855	1.911	1.428	1.703	0.502	1.854	**-0.426**	**Significant reduction in unrestricted road discharge catchment area**

Appendices

Appendix A - Existing Drainage Drawings

Appendix B - Proposed Drainage Drawings

Appendix C - Existing Catchment Drawings

Appendix D - Proposed Catchment Drawings

Appendix E – Drainage Schedules