HIGHWAYS AGENCY

Safe roads, reliable journeys, informed travellers

M5 Junction 4a to 6 Smart Motorway – All Lane Running (SM-ALR)

Environmental Assessment Report

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M5 Junction 4a to 6 Smart Motorway – All Lane Running (SM-ALR)

Environmental Assessment Report

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1 Introduction

1.1 Overview

This document presents the Environmental Impact Assessment (EIA) that has been prepared for the proposed M5 Junction 4a to 6 Smart Motorway All Lane Running (SM-ALR) Scheme. The EIA is presented in the form of an Environmental Assessment Report (EAR).

The proposed Scheme is being promoted by the Highways Agency. It will include the installation and/or upgrade of technology to enable the variation of speed limits along the route of the Scheme during times of high traffic flow and congestion, as well as the conversion of the hard shoulder to enable its use as a running lane to create additional capacity. The works aim to deliver benefits of reduced congestion, improved journey time reliability and improved traffic flows at a substantially lower cost than conventional motorway widening.

The Scheme comprises the installation of signal gantries, CCTV cameras, Emergency Refuge Areas (ERA's) and supporting infrastructure required to enable the four lane running managed motorway. All proposed work is to be undertaken within the existing highway boundary. A schematic of the proposed design is included within Appendix A of this EAR and a full description of the Scheme is provided in Chapter 4.

1.2 Environmental Impact Assessment

Screening

The EIA Directive (2011/92/EU) requires that EIA should be completed for certain types of development that may result in a significant impact upon the environment. The process for deciding which projects require Statutory EIA and therefore the publication of an Environmental Statement (ES) is referred to as Screening. The Screening process involves a number of steps:

- Deciding whether the project falls within Annex I or II of the EIA Directive.
- Deciding whether an Annex II project represents a 'relevant project'.

At the Screening stage, it is only possible to determine if the project is Annex I or II and if it is a 'relevant project'. Appropriate definitions of relevance to highways projects are given in Table 1.1.

Table 1.1: Annex I, Annex II and Relevant Project Definitions

Descriptor	Definition in Relation to Highways Projects
Annex I	Construction of motorways and express roads. 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 km or more in a continuous length.

Descriptor	Definition in Relation to Highways Projects
Annex II	All other improvement road projects not listed in Annex I.
Relevant project	A project for 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, materials, plant, spoil heaps or other such facilities exceeds 1 hectare or where any such area is situated in whole or in part in a sensitive area.

Statutory EIA is mandatory for all Annex I schemes. All highways projects (excluding those considered strictly maintenance) that are not listed in Annex I, fall under Annex II of the EIA Directive. For Annex II schemes that are identified as a 'relevant project, it must be determined through a formal screening process, whether the scheme is to result in a significant environmental impact. Findings of this determination process must be recorded (Record of Determination) and a notice served (Notice of Determination) within the public domain for a minimum of 6 weeks.

The proposed Scheme has been classified as a relevant Annex II Project under Part V the Highways Act 1980 since it is an improvement scheme and would have a works footprint area of greater than 1ha. As a result, a Record of Determination (RoD) will be prepared for the Scheme and a Notice of Determination (NoD) will be published, which will detail whether or not Statutory EIA and the publication of an ES is required.

The RoD and NoD will be informed by the environmental assessment that has been completed for the Scheme, which is presented within this EAR. This EAR will also determine whether or not the Scheme falls within the thresholds under the Planning Act 2008, which sets the framework for the development consent regime for Nationally Significant Infrastructure Projects (NSIPs). This framework is operated by the Planning Inspectorate (PINS), and relevant Highways Improvements schemes would be those that meet the following criteria:

- The highway is wholly in England,
- The Secretary of State is the highway authority for the highway, and,
- The improvement is likely to have a significant effect on the environment.

The M5 Junction 4a to 6 SM-ALR Scheme meets two out of the three criteria. This EAR will determine whether or not a significant effect on the environment is likely, and subsequently, whether or not the Scheme qualifies as an NSIP.

Scoping

Highways schemes are assessed in accordance with the Design Manual for Roads and Bridges (DMRB) Volume 11, Environmental Assessment, which follows a staged approach in environmental assessment. Scoping forms the second stage in the environmental assessment process, once the project has been screened to determine whether or not it is a relevant project. Scoping seeks to decide which environmental topics are to be examined in statutory EIA and non-statutory environmental impact assessments, and how much effort should be expended. If the

Scoping exercise identifies that further assessment is required, then the next stages in assessment (in accordance with DMRB Volume 11) would be either Simple or Detailed. Therefore Scoping should be considered the initial assessment level in the environmental impact assessment process.

An Environmental Scoping Report has been prepared for the M5 Junction 4a to 6 SM-ALR Scheme, and is presented within Appendix B of this EAR. The Scoping Report has identified which environmental topics included within Volume 11 of the DMRB require additional assessment to either a Simple of Detailed level for the proposed Scheme and which topics may be scoped out of the requirement for additional assessment. This is by virtue of the likely significance of environmental effects for each topic. The following topics have consequently been scoped out of the need for further assessment:

- Cultural Heritage;
- Landscape Character;
- Geology and soils;
- Effects on All Travellers;
- Community and Private Assets; and,
- Road Drainage and the Water Environment.

The Scoping Report identified the need for further assessment for the topics identified below. These assessments are presented within Chapters 3 to 7 respectively of this EAR.

- Visual Impacts – Simple Assessment;
- Materials – Simple Assessment;
- Nature Conservation – Simple Assessment;
- Air Quality – Detailed Assessment; and,
- Noise and Vibration – Detailed Assessment.

On completion of the required Simple and Detailed Assessments, a judgement as to the likely significance of environmental effects for the proposed Scheme will be made. The conclusions of this EAR will consequently inform the RoD and determine whether or not Statutory EIA is required for the Scheme. This determination will subsequently be published within the NoD.

The environmental assessment process has been undertaken alongside the development of the Scheme design. Environmental mitigation measures have been developed as part of an iterative design process in order to avoid or reduce the severity of potential environmental impacts, and have been included within this EAR to aid the determination of the overall environmental effects during both the construction and operation phases of the Scheme.

1.3 Impact Assessment Methodology

This EAR has been written in accordance with the requirements for Simple and Detailed Environmental Assessment as presented within the DMRB Volume 11, Section 3 for each of the relevant environmental topics, as well as IAN 125/09. The output of the EAR is to report the likely significance of environmental effects using established significance criteria, as presented within DMRB Volume 11 Section 2 Part 5. This requires an assessment of the receptor or resource environmental value (or sensitivity) and the magnitude of project impact (change).

DMRB states that the approach to assigning significance of effect relies on reasoned argument, professional judgement and taking on board the advice and views of appropriate organisations. For some disciplines, predicted effects may be compared with quantitative thresholds and scales in determining significance. Assigning each effect to one of the five significance categories enables different topic issues to be placed upon the same scale, in order to assist the decision making process at whatever stage the project is at within that process. These five significance categories are set out in the Table 1.2.

It is important to note that significance categories are required for positive (beneficial) as well as negative (adverse) effects. The five significance categories give rise to eight potential outcomes. Applying the formula, the greater the environmental sensitivity or value of the receptor or resource, and the greater the magnitude of impact, the more significant the effect. The consequences of a highly valued environmental resource suffering a major detrimental impact would be a significant adverse effect. The typical significance categories are presented in Table 1.3.

Table 1.2: Descriptors of the Significance of Effect Categories

Significance category	Typical descriptors of effect
Very Large	Only adverse effects are normally assigned this level of significance. They represent key factors in the decision-making process. These effects are generally, but not exclusively, associated with sites or features of international, national or regional importance that are likely to suffer a most damaging impact and loss of resource integrity. However, a major change in a site or feature of local importance may also enter this category.
Large	These beneficial or adverse effects are considered to be very important considerations and are likely to be material in the decision-making process.
Moderate	These beneficial or adverse effects may be important, but are not likely to be key decision-making factors. The cumulative effects of such factors may influence decision-making if they lead to an increase in the overall adverse effect on a particular resource or receptor.
Slight	These beneficial or adverse effects may be raised as local factors. They are unlikely to be critical in the decision-making process, but are important in enhancing the subsequent design of the project.
Neutral	No effects or those that are beneath levels of perception, within normal bounds of variation or within the margin of forecasting error.

Source: DMRB Volume 11, Section 2, Part 5, Table 2.3

The sensitivity of environmental receptors or resources are identified for each of the individual topics that have been carried forward from the Scoping exercise for further environmental assessment, along with the magnitude of change. In this way, the potential significance of environmental effects has been determined for each relevant environmental topic. An overall significance of the potential environmental effects is presented within the Conclusions of this EAR. For the purposes of this EAR, impacts that are Moderate Beneficial or Adverse or above are considered to be significant.

Table 1.3: Assessing Significance of Potential Effects

		MAGNITUDE OF POTENTIAL IMPACT (DEGREE OF CHANGE)				
ENVIRONMENTAL VALUE (SENSITIVITY)		No change	Negligible	Minor	Moderate	Major
	Very High	Neutral	Slight	Moderate or Large	Large or Very Large	Very Large
	High	Neutral	Slight	Slight or Moderate	Moderate or Large	Large or Very Large
	Medium	Neutral	Neutral or Slight	Slight	Moderate	Moderate or Large
	Low	Neutral	Neutral or Slight	Neutral or Slight	Slight	Slight or Moderate
	Negligible	Neutral	Neutral	Neutral or Slight	Neutral or Slight	Slight

Source: DMRB Volume 11, Section 2, Part 5, Table 2.4

1.4 Publication of the Environmental Assessment Report

This EAR will be published concurrently with the NoD for the Scheme and will be available to download from the Highways Agency website. The NoD will be published in the following publicly available information sources:

- The London Gazette;
- At least one local newspaper circulating in the area within which the project is situated; and,
- The HA Project website at http://www.highways.gov.uk/roads

1.5 Appropriate Assessment

The requirement for Appropriate Assessment is identified within Council Directive 92/43/EEC on the Conservation of Natural Habitats and of Wild Fauna and Flora, transcribed into UK legislation by the Conservation of Habitats and Species Regulations 2010.

Such an assessment is specifically concerned with potential impacts for sites designated in response to The EC Habitats Directive (92/43/EEC). Its purpose being to assess the implication of the proposed project in respect of the sites conservation objectives.

The Highways Agency has identified requirements for determining when Appropriate Assessment is necessary within HD 44/09. This requires for any scheme to be screened for likely significance of effects and for the findings of this screening process to be documented and agreed with the statutory nature conservation organisation and the Highways Agency.

Under HD44/09 screening is necessary for any scheme:

- Within any Special Area of Conservation (SAC), candidate SAC (cSAC), possible SAC (pSAC), Special Protection Area (SPA), possible SPA (pSPA) or Ramsar sites;
- Within 2 km of any SAC, cSAC, pSAC, SPA, pSPA or Ramsar sites;
- Within 30km of any SACs, cSACs or pSACs, where bats are one of the qualifying interests; and/ or,
- Crossing/adjacent to, upstream of, or downstream of, watercourses designated in part or wholly as SACs, cSACs, pSACs, SPAs, pSPAs or Ramsar sites.

The M5 Junction 4a to 6 ALR Scheme would not be situated within 2km of any SAC, cSAC, pSAC, SPA, pSPA or Ramsar sites. In addition, the Scheme would not be located within 30km of any SAC for which bats are one of the qualifying interests, and it would not cross or pass adjacent to any watercourses designated in part or wholly as SACs, cSACs, pSACs, SPAs, pSPAs or Ramsar sites. As a result, a screening for Appropriate Assessment is not required.

1.6 Transport Appraisal Guidance (TAG)

The appraisal of the M5 Smart Motorway has been undertaken as a separate but parallel exercise to this Environmental Assessment Reporting process. An Appraisal Specification Report (ASR) has been prepared in accordance with the requirements of Interim Advice Note 176/13. The environmental components of the ASR are summarised in the Appraisal Summary Table (AST), and are informed by the findings and conclusions of the Environmental Assessment documented in this Environmental Assessment Report (EAR).

1.7 Cumulative Effects

In addition to the above topics, cumulative effects have also been considered within this EAR. Cumulative effects have been categorised as the net result of the environmental effects from a number of schemes and activities (where these are known and can be determined), and as the result of the incremental (combined) effect of several individual effects on an environmental receptor. These Cumulative and Combined effects are considered in Chapter 8 of this EAR.

1.8 Environmental Management Plan

The overarching objective of an Environmental Management Plan (EMP) is to provide the framework for managing the environmental effects of projects, and to demonstrate compliance with environmental legislation. DMRB Volume 11, Section 2 describes the function of the Environmental EMP as primarily to highlight the project commitments to particular environmental designs, mitigation or enhancement measures and/or longer term monitoring, which have been recommended in the assessment. It provides the basis on which monitoring and auditing of the delivery of the environmental performance of the Scheme can be measured.

The key aspects and impacts of an EMP are presented within Chapter 9 of this Environmental Assessment Report, forming an Outline EMP at this stage. These will be further developed as the scheme progresses through the design process. The EMP would inform the Construction Environmental Management Plan (CEMP) to be produced by the Contractor at the construction stage and eventually the Handover Environmental Management Plan (HEMP) to be passed to the network managing agents at operation.

1.9 Consultation

The EAR will be circulated to the following Statutory Consultees for comment during February 2014, prior to the preparation of the RoD and publication of the NoD:

- Natural England;
- The Environment Agency;
- English Heritage;
- Worcestershire County Council;
- Bromsgrove District Council;
- Wychavon District council; and,
- Worcester City Council.

Statutory environmental consultation sits within an overarching Communication Strategy for the Scheme. The Strategy sets out a comprehensive, consistent and proactive approach to ensure that all key stakeholders affected by any aspect of the Scheme have been identified and are engaged with in a timely manner, both to promote more general understanding and acceptance of the Smart Motorway concept, together with more specific engagement associated with its development and design. Communication and consultation activities include proactive engagement with key stakeholders, including local authorities and the emergency services, through ongoing Scheme development. In addition, public information exhibition events will be undertaken, to provide information and engage with wider stakeholders, including residents and businesses within the region. Provisional dates for these events have been scheduled as follows:

- Worcester – 4th and 5th April 2014;
- Droitwich – 12th April 2014; and,
- Bromsgrove – 26th April 2014.

2 Scheme Description

2.1 The Project

The proposed Scheme is to install an All Lanes Running (ALR) Smart Motorway between Junction 4a to Junction 6 on the M5 motorway. The Scheme is located to the south-west of Birmingham and runs past Bromsgrove towards Worcester. The connectivity at the junctions to the local network and the tie-in with the motorway network means that this section of the M5 serves a local, regional and national function. It is directly connected to the Birmingham motorway "box", parts of which are undergoing similar improvements. The proposed Scheme falls within the Highways Agency's Area 9 maintenance area and West Midlands RCC and it comes under the Jurisdiction of Warwickshire and West Mercia Police.

2.2 Background to the Project and Project objectives

The existing M5 motorway between Birmingham and Gloucester is a 3 lane motorway with a hard shoulder. In places the verge widths are narrow, and the motorway alternates between being in cutting and on embankment. There are no motorway service areas (MSA) along the route, and the existing motorway suffers from congestion, unreliable journey times and safety issues. The objectives of the Scheme are to support and enhance the role of the M5 as a major national and inter-urban transport artery and to:

- Relieve congestion and improve flow to/ from the M42 motorway;
- Improve journey time reliability;
- Keep adverse environmental impacts to a minimum; and,
- Ensure that the Scheme is affordable and delivers high value for money in resolving the problems associated with congestion on this section of the network.

2.3 Scheme details

The proposed works would be approximately 17km in length, with the following two links:

- Junction 4a to Junction 5 - approximately 8km long.
- Junction 5 to Junction 6 - approximately 9km long.

There are 10 over-bridges on this section of the M5 and 19 under-bridges (including culverts). It is anticipated that the SM-ALR lane configuration and headroom can be accommodated under all structures with no works required at existing bridge piers. Similarly on under-bridges, the ALR provision can be accommodated by agreement of isolated relaxations and departures where needed. At under-bridges verge works will be undertaken to accommodate new communication ducting infrastructure.

All works would be undertaken within the highways boundary, with the majority being undertaken within the highways verge. For the ALR works the design philosophy is to make best use of existing infrastructure where possible, with the aim of providing additional capacity within the existing highway boundary and, where possible, within the existing paved area.

The following assumptions have been considered as part of the Scheme design and to aid the assessment of potential environmental impacts:

- Vegetation clearance would be required throughout the length of the Scheme to facilitate new infrastructure, ducting and drainage.
- Drainage would be increased to ensure sufficient attenuation prior to existing outfalls, involving drainage works in the verges.
- Cross carriageway ducts would be required.
- New ducting would be required throughout the length of the verge for new communications and power supply infrastructure.
- A total of 14 Emergency Refuge Areas (ERA's) would be constructed within the verge. Each ERA would be 250m in length and up to 8m in width comprising an area of hardstanding adjacent to the existing hard shoulder lane.
- Three existing portal gantries would be removed and replaced with super-span gantries spanning the full width of the motorway.
- Three new super-span gantries would be constructed spanning the full width of the motorway.
- Four new super-cantilever gantries would be constructed spanning one side of the motorway, two on the northbound carriageway and two on the southbound carriageway.
- Three new MS3 signs would be installed, with four removed and one retained within the Highways verge.
- Seventeen existing MS3 signs would be upgraded, to be replaced with MS4 signs in thirteen locations and CCTV in two locations. An additional eleven MS4 signs would be installed.
- Three cantilever Advanced Direction Sign (ADS) gantries would be installed, with four verge mounted ADS.
- Compound areas would be established within the verge. The final location of these is unknown at this stage.
- New pavement would be provided at ERAs, with fuel resistant treatment.
- Re-surfacing of all existing running lanes including the hard shoulder would be undertaken, using a low noise surface.

A Schematic Drawing of the proposals is included within Appendix A of this document. Environmental Constraints are identified within Appendix C.

Traffic management would be required during the construction period, which is estimated to be 2 years in total. Traffic management would comprise:

- Lane closures for the duration of the works, with narrow lanes and speed restrictions in place (50mph).
- Diversion routes may be required if full closures are used, for example during works on slip roads.
- Night works would be required.

3 Visual Impact – Simple Assessment

3.1 Introduction

This chapter identifies the baseline conditions with regards to visual amenity, and provides an assessment of the likely potential visual impacts associated with the proposed Scheme.

Generally landscape encompasses many more elements than the common association which focuses merely upon the view or appearance of the land. The notion of landscape can be applied to both rural and urban environments with the term 'townscape' frequently adopted within the urban context. From the perspective of Environmental Impact Assessment, 'landscape' apples to physical elements such as topography, drainage, land use and management and vegetation as well as ecology and historical and cultural associations. In this instance, landscape character has been scoped out of the need for further assessment (refer to the Environmental Scoping Report provided within Appendix B of this EAR), and as such the focus of this chapter is upon views and visual amenity from key receptors within the study area.

3.2 Methodology

This assessment is undertaken in accordance with DMRB Volume 11, Section 3, Part 4, as well as IAN 135/10. Consideration is also given to the guidance set out in the Guidelines for Landscape and Visual Impact Assessment (GLVIA) 3rd Edition. As landscape character has been previously scoped out, this assessment focuses purely on visual impact.

Study area

Current good practice for visual impact assessments requires that any study area should extend far enough to include all those areas within which significant visual impacts are likely to occur. DMRB recommends that all receptors within the visual envelope or Zone of Theoretical Visibility (ZTV) within flat landscapes should be assessed up to a distance of 1km from the centre line of the proposed Scheme. However, due to the undulating nature of the study area it is necessary to extend the ZTV beyond this distance to encompass any longer distance views. With this in mind the study area has been extended to 2km from the centerline of the site for the 18km length of Scheme between Junctions 4a and 6.

The site itself is within the highway corridor of the M5 motorway including both the hard and soft estate. The site is dominated by the M5 and associated infrastructure including lighting, signage and gantries. The soft estate is characterised by typical native highway planting forming linear belts of trees and shrubs alongside areas of grassland and open verge.

Baseline methodology

The visual baseline is determined through gaining an understanding of the visual amenity of the area, in addition to the identification of visual receptors and their sensitivity to change, including establishing the quality of the associated view. The initial desk study to identify likely receptors was based on a review of topographical variance, built form and existing vegetation, followed by field

surveys to confirm the extent and nature of the existing view, and the true ZTV. Receptors are identified within the Viewpoint Location Drawings presented within Appendix D of this EAR.

Value (sensitivity) of resource

The sensitivity of the visual receptor varies with the type of receptor assessed. For example, within LVIA guidance, residential receptors are considered to have a high sensitivity to change, as do Public Rights of Way, where walkers will be focusing on the views within the local landscape. Places of work and recreational receptors where the focus is on the task in hand rather than the surrounding view are considered to have a lower sensitivity to change.

Table 3.1 Visual Sensitivity and Typical Examples

Sensitivity	Typical Descriptors and Examples
High	• Residential properties. • Users of Public Rights of Way or other recreational trails (e.g. National Trails, footpaths, bridleways etc.). • Users of recreational facilities where the purpose of that recreation is enjoyment of the countryside (e.g. Country Parks, National Trust or other access land etc.).
Moderate	• Outdoor workers. • Users of scenic roads, railways or waterways or users of designated tourist routes. • Schools and other institutional buildings, and their outdoor areas.
Low	• Indoor workers. • Users of main roads (e.g. trunk roads) or passengers in public transport on main arterial routes. • Users of recreational facilities where the purpose of that recreation is not related to the view (e.g. sports facilities).

Magnitude of Impact

The magnitude of impact looks at the scale and nature of a proposed scheme set within the context of the existing landscape, and in this case, the existing view. It also considers the longevity of the impact, i.e. whether it would be temporary or permanent. For example, a scheme which would sit comfortably within the existing landscape with only temporary effects during construction would have a lower magnitude of visual change compared to a scheme which introduced a change at odds with its surroundings in both scale and nature.

Table 3.2 Magnitude Criteria Descriptors

Magnitude of Visual Impact	Typical Criteria Descriptors
Major Adverse	Total loss or large scale damage to existing distinctive features and elements, and/or the addition of new but uncharacteristic conspicuous features and elements.
Moderate Adverse	Partial loss or noticeable damage to existing distinctive features and elements, and/or the addition of new but uncharacteristic noticeable features and elements.
Minor Adverse	Slight loss or damage to existing features and elements, and/or the addition of new but uncharacteristic features and elements.

Magnitude of Visual Impact	Typical Criteria Descriptors
Negligible Adverse	Barely noticeable loss or damage to existing features and elements, and/or the addition of new but uncharacteristic features and elements.
No Change	No noticeable loss, damage or alteration features or elements.
Negligible Beneficial	Barely noticeable improvement by the restoration of existing features and elements, and/or the removal of uncharacteristic features and elements, or by the addition of new characteristic elements.
Minor Beneficial	Slight improvement by the restoration of existing features and elements, and/or the removal of uncharacteristic features and elements, or by the addition of new characteristic elements.
Moderate Beneficial	Partial or noticeable improvement by the restoration of existing features and elements, and/or the removal of uncharacteristic and noticeable features and elements, or by the addition of new characteristic features.
Major Beneficial	Large scale improvement by the restoration of features and elements, and/or the removal of uncharacteristic and conspicuous features and elements, or by the addition of new distinctive features.

Significance of Effect Criteria

The assessment of the significance of visual impacts is undertaken by combining the sensitivity of visual receptors with an assessment of the magnitude of the visual impact (refer to Table 1.3). Impacts that are assessed as being either Moderate Adverse or Beneficial (or above) will be considered as significant. Although Slight Adverse or Beneficial impacts and below are not considered significant, they remain worthy of consideration throughout the decision making process. Typical descriptors for the significance of effects are given in Table 3.3 below.

Table 3.3 Typical Descriptors of Significance of Effect Categories

Significance	Typical Descriptors of Effect
Very large Beneficial	The project would create an iconic new feature that would greatly enhance the view.
Large Beneficial	The project would lead to a major improvement in a view from a highly sensitive receptor.
Moderate Beneficial	The proposals would cause obvious improvement to a view from a moderately sensitive receptor, or perceptible improvement to a view from a more sensitive receptor.
Slight Beneficial	The project would cause limited improvement to a view from a receptor of medium sensitivity, or would cause greater improvement to a view from a receptor of low sensitivity.
Neutral	No perceptible change in the view.
Slight Adverse	The project would cause limited deterioration to a view from a receptor of medium sensitivity, or cause greater deterioration to a view from a receptor of low sensitivity.
Moderate Adverse	The project would cause obvious deterioration to a view from a moderately sensitive receptor, or perceptible damage to a view from a more sensitive receptor.
Large Adverse	The project would cause major deterioration to a view from a highly sensitive receptor, and would constitute a major discordant element in the view.

Significance	Typical Descriptors of Effect
Very Large Adverse	The project would cause the loss of views from a highly sensitive receptor, and would constitute a dominant discordant feature in the view.

3.3 Limitations of assessment

The assessment was restricted to publicly accessible areas, and as such receptors have been assessed from a representative location. For example, residential properties could not be accessed from within the property boundary and consequently views were assessed from the curtilage of the property or from the adjacent road.

Areas of replacement planting have yet to be confirmed as part of the Scheme design. As a result, this assessment has considered the change in views on Scheme opening (Year 1), and has not considered the effect of any reinstatement planting that may be included as part of the Scheme for the Year 15 scenario, when planting would have matured. As a result, this assessment presents the worst case scenario, without mitigation planting.

3.4 Visual Baseline

The immediate site is dominated by the M5 motorway, associated infrastructure and vehicular traffic. The soft estate bounding the carriageway is set to grassland and linear belts of trees and shrubs, and managed hedgerows which form a notable feature within local views. Topography varies from flat plateaus/valley bottoms to more undulating landform and as such restricts views to site in many places. To the southern eastern extents of the Scheme there are areas of flat open land, which allow for views of the raised M5 corridor. However, mature intervening vegetation within the landscape and to the eastern extents of the M5 corridor screen many of these views. To the western and northern extents of the Scheme rolling hills and undulating landform interrupt direct views towards the M5 corridor in many places.

The M5 corridor is a dominant feature within the local landscape with associated existing infrastructure of gantries, signage and lighting columns within the Scheme are visible from the surrounding areas. Lighting is most visually intrusive within the rural areas between Droitwich Spa, Bromsgrove, Wychbold and Worcester where the landscape is generally dark. Existing gantries and signage attributed with the M5 corridor are also visually identifiable along the entire Scheme where there are open views across the landscape.

3.5 Mitigation

At the construction stage, mitigation would include measures to reduce visual intrusion on surrounding receptors. Initiatives such as keeping stockpiles to a minimum on site and having materials delivered on a same day basis would help to reduce the impact during construction, and these measures will be specified within the CEMP for the Scheme, to be prepared by the Contractor. If cranes are to be used during construction, visual impacts would be reduced by minimising the time cranes spent on site, thereby limiting large scale plant and the associated impacts on the sky line. Directional lighting during night works would also be used, and this would minimise effects on night time visual impact.

During operation, reinstatement planting would help to integrate the Scheme, softening the interface between the highway corridor and the surrounding landscape. Planting and seeding plans would be prepared as part of the 3000 Series within the Specification for Highways Works, and would detail areas of replacement grass seeding and any areas of planting. This would also offer further mitigation from a Nature Conservation and Biodiversity perspective. However, reinstatement planting is yet to be confirmed as part of the Scheme design, and as such, has not been considered as part of this visual impact assessment. It may be brought forward during the detailed design stage of the Scheme.

3.6 Potential Visual Impacts

Table 3.4 below summarises the potential visual impacts associated with the Scheme at both the construction and operational stage for visual receptors. This Table should be read in conjunction with the Viewpoint Location drawings presented within Appendix D of this EAR.

Construction Impacts

During construction, impacts would be associated with the removal of existing gantries, installation of proposed gantries, ERA material storage and ERA construction. These temporary impacts would only be experienced for short periods of time. Night works are planned for the duration of the construction works. However, due to the existing context of the well-lit highway, these impacts would not represent a significant increase in night time visual intrusion.

Operation Impacts

Operational impacts would be similar to those already experienced from the existing highway corridor. The proposed ERA locations would impact receptors looking directly down on the proposed Scheme, where open views are afforded and a slight increase of road surface and vegetation loss would be evident Middle and long distance views would be unlikely to be altered to such an extent as to have a significant effect on receptors, due to the lack of vertical intrusion, and the existing context of the road.

The proposed signage associated with the ERAs is the only vertical attribute related to the ERAs and, whilst it would be less intrusive than the existing lighting columns, the signage would introduce additional vertical elements within the view. Proposed gantries would represent a similar impact to those existing within the current highway corridor and in the majority of cases would be located close to existing gantries, thereby limiting the number of receptors affected by changes to views. Proposed CCTV cameras would be fixed to gantries and would not represent a significant visual impact in their own right.

Table 3.4 Significance of Impact

Receptor Number	Receptor Type	Nature of existing and Proposed View	Sensitivity to change	Magnitude of Change	Significance of effect
1	**Residential receptor**: View south east towards site from Cockshutt Lane; representative of residential properties.	The existing view from Cockshutt Lane across regularly shaped fields with managed hedgerows and fences in the short distance. Isolated collections of houses and farmsteads are visible in the middle distance. In the long distance view rolling hills can be seen with a church spore clearly visible. The view of the M5 highway corridor affords filtered views of existing lighting columns. The proposed works would be approximately 680m from the viewpoint. There would be a temporary visual impact during the construction phase with filtered views of plant associated with the construction of the proposed MS4 gantry would be visible through intervening vegetation. During operation the proposed gantry would be predominantly obscured by intervening vegetation and existing built form.	High	Construction Phase: Minor Adverse Operation Phase: No Change	Construction Phase: **Slight Adverse** Operation Phase: **Neutral**
2	**Residential receptor:** View east from Fockbury Road, representative of views from Fockbury Farm.	The existing view from Fockbury Road offers open views over existing fields and farmland with hedgerows and linear bands of vegetation in the short to middle distance. A ridge of existing houses can be seen in the middle to long distance views across the rolling landscape. Parts of the existing M5 highway corridor and associated infrastructure including signage on the existing gantry and lighting	High	Construction Phase: Minor Adverse Operation Phase: No Change	Construction Phase: **Slight Adverse** Operation Phase: **Neutral**

Receptor Number	Receptor Type	Nature of existing and Proposed View	Sensitivity to change	Magnitude of Change	Significance of effect
		columns can be seen in the middle to long distance views. The proposed works would be approximately 740m away from the receptor. During the construction phase open views of plant associated with the construction of the proposed MS4 would be visible for a short period of time in the middle to long distance views. During operation the proposed gantry and signage would be visible. However, this would replace the existing gantry and given the context of the current open view to highway infrastructure the proposed view would essentially remain unchanged.			
3	**Road Users:** View south along M5 Corridor from Fockbury Mill Lane over bridge.	The existing view from this over bridge over the M5 affords direct and immediate views of the highway corridor, associated traffic and infrastructure including signage and the rear façade of a gantry on the north bound carriageway which features in the immediate foreground of the view. Linear belts of mature trees and shrubs frame the highway corridor on either side, which form the foreground of distant views of rolling hills. The proposed view from this location looking south would remain unaffected by the Scheme as the proposed gantry in this location would be replacing an existing structure. However, there would be potential increase in traffic management and construction vehicles travelling to the	Low	Construction Phase: Minor Adverse Operation Phase: No Change	Construction Phase: **Neutral** Operation Phase: **Neutral**

Receptor Number	Receptor Type	Nature of existing and Proposed View	Sensitivity to change	Magnitude of Change	Significance of effect
		gantry location for a short period of time during construction. There would be no change in the view during operation.			
4	**Road and PROW Users:** View north along M5 Corridor from PROW (BM-613).	The existing view from this PROW over the M5 affords direct views of the highways corridor. Associated gantries, signage and lighting columns are also visible. Linear belts of mature trees and shrubs frame the highway corridor on either side, which form the foreground of distant views of rolling hills. The proposed works would be approximately 600m north of the viewpoint. The proposed view from this location looking north would remain unaffected by the Scheme, as the proposed gantry in this location would be replacing an existing structure. However, there would be potential increase in traffic management and construction vehicles travelling to the gantry location for a short period of time during construction. There would be no change in the view during operation.	High	Construction Phase: Minor Adverse Operation Phase: No Change	Construction Phase: **Slight Adverse** Operation Phase: **Neutral**
5	**Road and PROW Users:** View south along M5 Corridor from PROW (BM-613).	The existing view from this PROW affords direct and immediate views of the M5 highway corridor, associated traffic and infrastructure, including signage and the rear façade of a gantry on the north bound carriageway which features in the immediate foreground of the view. The proposed view from this location looking south would	High	Construction Phase: Minor Adverse Operation Phase: No Change	Construction Phase: **Slight Adverse** Operation Phase:

Receptor Number	Receptor Type	Nature of existing and Proposed View	Sensitivity to change	Magnitude of Change	Significance of effect
		remain unaffected by the Scheme, apart from a potential increase in traffic management and construction vehicles travelling to the gantry location for a short period of time during the construction phase. There would be no change in the view during operation.			**Neutral**
6	**PROW Users:** View east towards M5 from PROW (DG-606).	The existing view east from this PROW affords filtered views of the highways corridor. Rising ground in the short distance screens views south across the Scheme, while mature linear belts of mature trees filter views to the north. Tall infrastructure such as gantries and lighting columns are visible over intervening vegetation. The proposed works are approximately 750m from this receptor. During the construction phase plant associated with the erection of a new gantry would be visible above the tree line for a short period of time. During operation there would be no change to the existing view as the proposed gantry would replace the existing gantry.	High	Construction Phase: Minor Adverse Operation Phase: No Change	Construction Phase: **Slight Adverse** Operation Phase: **Neutral**
7	**Commercial/ Hotel Receptor:** View north west towards site from the Holiday Inn on Kiddeminster Road (A448).	The existing view north west from this commercial receptor affords open views across the M5 highway corridor. Gantries, lighting columns and safety barriers are visible from this location. Kidderminster Road forms the foreground of the view with the existing highway corridor running north-south in the middle ground. The view from this location looking north west would	Low	Construction Phase: Minor Adverse Operation Phase: No Change	Construction Phase: **Slight Adverse** Operation Phase: **Neutral**

Receptor Number	Receptor Type	Nature of existing and Proposed View	Sensitivity to change	Magnitude of Change	Significance of effect
		remain unaffected by the Scheme, with the exception of a potential increase in traffic management and construction vehicles travelling to the gantry location for a short period of time during the construction period. During operation there would be no change to the existing view as the proposed gantry would be the same size replacing the existing gantry.			
8	**Commercial/ Hotel Receptor:** View south west towards site from the Holiday Inn on Kiddeminster Road (A448).	The existing view south west towards the M5 corridor is filtered by existing mature vegetation, however tall infrastructure such as lighting columns and gantries remain visible over the top of vegetation. During construction of the proposed ERA, approximately 280m away from the receptor, material storage and construction plant would be temporary visible. Plant associated with the removal of the existing gantry to the south west of the view would also be visible for a short amount of time. During the operational phase the proposed ERA would not be visible due to intervening vegetation. The view would also benefit from the removal of the existing gantry.	Low	Construction Phase: Minor Adverse Operation Phase: Minor Beneficial	Construction Phase: **Slight Adverse** Operation Phase: **Slight Beneficial**
9	**Residential Receptor and PROW Users:** View east towards M5 from Monsiers Hall	The existing view looks east towards site from the top of the PROW where it meets Monsiers Hall Lane. Intervening vegetation in the foreground and middle ground of the view filters views of the existing highway, however glimpsed views of existing infrastructure including gantries and	High	Construction Phase: Minor Adverse Operation Phase: No Change	Construction Phase: **Slight Adverse**

Receptor Number	Receptor Type	Nature of existing and Proposed View	Sensitivity to change	Magnitude of Change	Significance of effect
	Lane and PROW (DG-605); representative of residential receptors on Monsiers Hall Lane.	lighting columns can be seen. The proposed replacement gantry is approximately 580m away from the receptor. During the construction phase plant associated with the removal of the existing gantry and construction of the proposed gantry would be seen. During operation the proposed view from this location looking north west would remain unaffected by the Scheme.			Operation Phase: **Neutral**
10	**PROW Users:** View east towards M5 from PROW (DG-605).	The existing view east towards site from PROW DG-605 affords partially filtered views of the highways corridor due to undulating landform and intervening vegetation. To the south of the view there are open views of the safety barriers and existing gantry (to be removed as part of the Scheme). Construction works associated with the proposed ERA would be approximately 180m away from this receptor. Material storage and construction plant would be temporarily visible. Machinery associated with the removal of the existing gantry in the south of the view would also be visible for a short period. The proposed gantry would be placed directly to the east of the existing view, approximately 270m away. Construction plant would be visible during the construction phase of works for a temporary period of time.	High	Construction Phase: Minor Adverse Operation Phase: No Change	Construction Phase: **Slight Adverse** Operation Phase: **Neutral**

Receptor Number	Receptor Type	Nature of existing and Proposed View	Sensitivity to change	Magnitude of Change	Significance of effect
		During operation the proposed view looking north west from this location would remain unaffected by the proposed Scheme.			
11	**Residential Receptor:** View west towards M5 representative of residential receptors on Sunningdale Road.	Residential properties on Sunningdale Road currently afford views of the highway corridor, which are screened by existing mature linear belts of shrubs and trees. Tall infrastructure including gantries and lighting columns are visible over the top of existing mature vegetation directly to the east in the middle distance where there is low-lying land. Rising ground in the foreground to the south of the view with existing mature vegetation screen views of the highway corridor, with rising ground in the middle distance screening views to the north. During construction of the proposed ERA, material storage and plant may be visible on a temporary basis. Plant associated with the removal of the existing gantry to the north of the view would also be visible temporarily. The proposed gantry would be placed in the centre of the existing view, approximately 440m away from the viewpoint. During operation the proposed view looking north west from this location would remain unaffected by the Scheme.	High	Construction Phase: Minor Adverse Operation Phase: Neutral	Construction Phase: **Slight Adverse** Operation Phase: **Neutral**
12	**Residential Receptor:** View	The existing view east towards site has distant views of the highway corridor, partially screened by existing mature	High	Construction Phase: Negligible Adverse	Construction Phase:

Receptor Number	Receptor Type	Nature of existing and Proposed View	Sensitivity to change	Magnitude of Change	Significance of effect
	east towards the M5 from Timberhonger Lane.	vegetation. The flat low-lying land affords distant views across arable fields bordered by existing mature trees with managed hedgerows. Existing tall infrastructure associated with the highway is visible including lighting columns. An existing gantry is visible directly to the east in the long distance. The proposed works would be approximately 1450m away from the residential receptors on Timberhonger Lane. During the construction phase plant associated with the construction of the proposed ERA, gantry and material storage may be visible for a short period of time. During operation the proposed view from this location looking south east would remain unaffected by the Scheme.		Operation Phase: Neutral	**Slight Adverse** Operation Phase: **Neutral**
13	**PROW Users:** View south west from PROW (DG-582) on Grafton Lane.	The existing view south west towards site is partially obscured by rising ground in the foreground and filtered by existing mature vegetation. Electricity pylons which traverse the view act as visual detractors from the lighting columns and infrastructure associated with the highway corridor. Rising ground within the foreground screens the view of the highways corridor to the north east with large flat areas of fields in the middle and long distance. The viewpoint would be approximately 800m away from the proposed ERA and 1400m away from proposed gantry. During the construction phase plant associated with the	High	Construction Phase: Negligible Adverse Operation Phase: Neutral	Construction Phase: **Slight Adverse** Operation Phase: **Neutral**

Receptor Number	Receptor Type	Nature of existing and Proposed View	Sensitivity to change	Magnitude of Change	Significance of effect
		construction of the proposed ERA and gantry and material store may be visible for a short period of time over existing vegetation and falling ground. The proposed gantry would not be visible due to intervening vegetation and built form. During operation the proposed view looking south west from this location would remain unaffected by the Scheme.			
14	**Road Users:** View south along M5 from Swan Lane over bridge.	The existing view south from this over-bridge affords direct views of the M5 highways corridor. Associated gantries, signage and lighting columns are clearly visible. The proposed ERAs would be approximately 380m south from the viewpoint. During the construction phase plant associated with the construction of the proposed ERA may be temporarily visible. Material storage would also be evident. During operation the proposed view from this location looking south would include minor vegetation loss and additional signage and hard surfacing within the ERAs.	Low	Construction Phase: Minor Adverse Operation Phase: Minor Adverse	Construction Phase: **Slight Adverse** Operation Phase: **Slight Adverse**
15	**Residential Receptor:** View west towards M5 from Paper Mill Lane.	Mature managed hedgerows either side of the access road screen views north and south in the foreground. Directly west the view from Paper Mill Lane affords only glimpsed views of existing lighting columns associated with the M5 highway corridor. The proposed works would be approximately 360m from the viewpoint. During the construction phase, glimpsed		Construction Phase: Minor Adverse Operation Phase: Minor Adverse	Construction Phase: **Slight Adverse** Operation Phase: **Slight Adverse**

Receptor Number	Receptor Type	Nature of existing and Proposed View	Sensitivity to change	Magnitude of Change	Significance of effect
		views of plant associated with the construction of the proposed MS4 gantry may be visible through intervening vegetation temporarily. During operation the proposed gantry would be predominantly obscured by intervening vegetation.			
16	**Residential Receptor:** View south east towards site from residential properties on Hanbury Road.	Rising ground to the south east, from Hanbury Road towards site, affords partially screened views of the highway corridor. Existing mature trees and managed hedgerows filter views of much of the road. However, signs and lighting columns are visible over the top of existing mature vegetation. The proposed gantries would be approximately 180m and 270m from the viewpoint to the south east. During the construction phase plant associated with the construction of the proposed gantries would be visible for a short period of time. During operation the proposed view looking south from this location would include partially filtered views of the proposed gantries.	High	Construction Phase: Minor Adverse Operation Phase: Minor Adverse	Construction Phase: **Slight Adverse** Operation Phase: **Slight Adverse**
17	**Residential Receptors:** View west towards M5 from Stoke Road, representative of residential receptors.	A managed hedge in the foreground screens views west. To the north residential and industrial roofs can be seen with existing radio masts and power lines in the short and middle distance being visibly dominant. The existing view west towards site affords distant filtered views of highway infrastructure. Only the tops of lighting columns can currently be seen due to intervening vegetation, landform	High	Construction Phase: Negligible Adverse Operation Phase: No Change	Construction Phase: **Slight Adverse** Operation Phase:

Receptor Number	Receptor Type	Nature of existing and Proposed View	Sensitivity to change	Magnitude of Change	Significance of effect
		and built form. The proposed gantries would be approximately 1000m from this viewpoint. During the construction phase plant associated with the construction of the proposed gantries may be visible from glimpsed views for a short period of time. During operation the proposed view looking north west from this location would remain unaffected by the Scheme.			**Neutral**
18	**Residential Receptors:** View south east towards site from Impney Way, representative of residential receptors.	The existing view south is representative of residential receptors on Impney Way and Impney Green. Existing fencing, mature vegetation and buildings screen views of much of the highways infrastructure. However, lighting columns remain visible over the top of existing vegetation and buildings. The distance from the receptor to the proposed ERA would be approximately 90m and during operation no direct views would be afforded. Despite the close proximity of the proposed cantilever gantry to residences on Impney Way, mature screening vegetation would screen direct views of the proposed gantry. However, there may be temporary glimpsed views of plant, material storage and construction of the proposed gantry and ERAs. During operation, the proposed view looking south and east from this location may experience filtered of glimpsed views of the proposed	High	Construction Phase: Minor Adverse Operation Phase: No Change	Construction Phase: **Slight Adverse** Operation Phase: **Slight Adverse**

Receptor Number	Receptor Type	Nature of existing and Proposed View	Sensitivity to change	Magnitude of Change	Significance of effect
		gantries in winter. To mitigate any potential visual impact it is recommended that any vegetation removed is replaced.			
19	**Residential Receptor:** View east towards site from Newlands Road, representative of Newland Manor residences.	The existing view east towards site is representative of residential receptors of Newlands Manor. A managed hedge to the north is visible in the foreground, bounding a field and a managed hedgerow to the south bordering residences, frame the view. An existing mature belt of trees to the west partially screen views of the highway corridor and glimpsed views of lighting columns can be seen from this location. The proposed gantry would be approximately 280m from this receptor and the ERA approximately 200m away. During construction, glimpsed views of material stores and plant associated with construction of the proposed gantries and ERAs may be temporarily visible from this location. During operation the proposed view looking east from this location would remain unaffected by the Scheme, due to a lack of a direct view of the works and the distance to the proposed gantry.	High	Construction Phase: Minor Adverse Operation Phase: No Change	Construction Phase: **Slight Adverse** Operation Phase: **Neutral**
20	**Residential Receptor:** View west towards M5 from Trench Lane; representative of residential	The existing view north west towards site is representative of residential receptors on Trench Lane. The view affords no clear views of the existing highways infrastructure due to intervening built structures and rising ground.	High	Construction Phase: Negligible Adverse Operation Phase: No Change	Construction Phase: **Slight Adverse** Operation

Receptor Number	Receptor Type	Nature of existing and Proposed View	Sensitivity to change	Magnitude of Change	Significance of effect
	receptors.	The proposed ERA would be approximately 900m from the viewpoint. The proposed view from this location looking north west would remain unaffected by the Scheme, apart from a potential increase in traffic management and construction vehicles travelling to the gantry location during the construction period. During operation the proposed view looking west from this location would remain unaffected by the Scheme, due to a lack of a direct view of the works.			Phase: **Neutral**
21	**Residential Receptor:** View north west towards M5 from Park Farm Barns, representative of residential receptors.	The existing view north west towards site is representative of residential receptors of Park Fields. In the foreground an existing managed hedgerow bounds a linear field which rises west towards the highway corridor. The view affords filtered views of the highway corridor, through an existing belt of mature shrubs and trees. Existing highway infrastructure such as signs, gantries and lighting columns are visible over the top of the existing vegetation. The proposed gantries would be approximately 400m from the receptor. During the construction phase plant associated with the construction of the proposed gantries may be visible from glimpsed views for a short period of time. During operation the proposed view looking north west from this location would remain unaffected due to the existing infrastructure being currently visible.	High	Construction Phase: Minor Adverse Operation Phase: No Change	Construction Phase: **Slight Adverse** Operation Phase: **Neutral**

Receptor Number	Receptor Type	Nature of existing and Proposed View	Sensitivity to change	Magnitude of Change	Significance of effect
22	**Leisure/Recreation Users:** View south west towards M5	The existing view south west towards site affords filtered views of the highway corridor through existing mature vegetation along the field boundary. However, where vegetation is sparse vehicles can be seen travelling along the M5. Lighting columns can also be seen above existing mature vegetation. The proposed gantry would be approximately 250m from the receptor. During construction, plant associated with the construction of the proposed gantry may be temporarily visible via glimpsed views. During operation there may be views of the proposed gantry over the top of vegetation.	Low	Construction Phase: Minor Adverse Operation Phase: Minor Adverse	Construction Phase: **Slight Adverse** Operation Phase: **Neutral**
23	**Residential Receptor:** View north east towards M5 from Green Lane representative of residential receptor.	The existing view north east towards site affords open middle and long distance views across the highway corridor. Existing gantries and lighting columns can be seen across the entire view. Within the foreground a mature unmanaged hedgerow with intermittent trees screens views of the M5 corridor to the south. To the north of the view a managed hedgerow forms the foreground with a pastoral field forming the middle and long distance view. The proposed view looking north east from this location would remain unaffected by the Scheme, apart from a potential increase in traffic management and construction vehicles travelling to the gantry location during the	High	Construction Phase: Minor Adverse Operation Phase: No Change	Construction Phase: **Slight Adverse** Operation Phase: **Neutral**

Receptor Number	Receptor Type	Nature of existing and Proposed View	Sensitivity to change	Magnitude of Change	Significance of effect
		construction period. The existing view would remain unchanged during operation.			
24	**Commercial/ Hotel Receptor:** View north east towards site from Smite Lane representative of Pear Tree Country Hotel and Public House.	The southern aspect of the view is screened by a mature unmanaged hedgerow with scattered trees. The view north is restricted by built form and rising landform. Views north east towards site affords a narrow view of the highway corridor over rising ground. An existing gantry and lighting columns can be seen. The proposed view from this location looking north east would remain unaffected by the Scheme, apart from a potential increase in traffic management and construction vehicles travelling to the gantry location temporarily.	Low	Construction Phase: Minor Adverse Operation Phase: No Change	Construction Phase: **Slight Adverse** Operation Phase: **Neutral**
25	**Commercial and Educational Receptor:** View south east towards site from Offerton Lane representative of educational and commercial receptors (Offerton Farm Day Nursery AWS Electrical and Lowton Construction).	The existing view east affords intermittent filtered and open views towards the site. An existing mature managed hedge lies to the north. Existing lighting columns associated with the M5 are visible over existing vegetation. The proposed gantry would be approximately 150m from the viewpoint location. During the construction phase plant associated with the construction of the proposed gantry may be visible from filtered views for a short period of time. During operation there may be a filtered view of the proposed gantry through and over the top of existing vegetation.	High	Construction Phase: Minor Adverse Operation Phase: Minor Adverse	Construction Phase: **Slight Adverse** Operation Phase: **Slight Adverse**

Receptor Number	Receptor Type	Nature of existing and Proposed View	Sensitivity to change	Magnitude of Change	Significance of effect
26	**Residential Receptor:** View south east towards site from Pershore Lane, representative of residential properties.	Flat open land affords open views across pastoral fields with scattered mature trees in the short, middle and long distance views. The existing view south east towards site from this location affords distant intermittent filtered and open views of the site. Existing lighting columns from the M5 are visible over existing vegetation. The proposed gantry would be approximately 700m from the viewpoint. During the construction phase filtered views of works and associated plant may be temporarily visible. During operation the proposed view from this location looking south east would remain unchanged by the Scheme, due to the distance to the gantry.	High	Construction Phase: Minor Adverse Operation Phase: No Change	Construction Phase: **Slight Adverse** Operation Phase: **Neutral**
27	**Commercial Receptor:** View south east towards site from Warriors Way, representative of commercial receptors.	The existing view north east affords filtered views towards the site, although existing built form lies in the foreground. Existing electricity pylons are dominant features in the view, stretching north-south across the view point. Existing lighting columns from the M5 are visible through intermittent vegetation and existing built form in the foreground. The proposed view from this location looking north east would remain unaffected by the Scheme, apart from a potential increase in traffic management and construction vehicles travelling to the gantry location for a short period of time.	Low	Construction Phase: No Change Operation Phase: No Change	Construction Phase: **Neutral** Operation Phase: **Neutral**

3.6 Conclusions

During the construction phase of the proposed works, material storage and the presence of construction plant would only be present for a temporary period. In the majority of cases, these features would only be visible in locations where existing vegetation is sparse. Given the existing context of the M5 highway corridor and the already visible associated infrastructure, such as lighting columns, gantries, signage and over bridges, receptors along the entire Scheme would therefore experience up to a minor magnitude of change from construction activities. Mitigation such as ensuring that stockpiles are kept to a minimum, and that materials are delivered on a same day basis, as well as directional night-time lighting would ensure that impacts during the construction stage are minimised, resulting in an overall **Slight Adverse** and not significant effect.

During operation, the proposed Scheme would result in an overall **Neutral** impact. This is because in the majority of cases the proposed infrastructure is in keeping with the existing features and context of the landscape and the highway corridor, resulting in no change in the magnitude of impacts. Middle and long distance views would be unlikely to be altered to such an extent as to have a significant effect on receptors, due to the lack of vertical intrusion, and the existing context of the road. On balance, the effect of the Scheme is not considered to be significant.

4 Materials - Simple Assessment

4.1 Introduction

This chapter assesses the potential impact on material resources of the M5 Junction 4a to 6 SM-ALR Scheme. The assessment is undertaken in accordance with the guidance provided by the Highways Agency in the Interim Advice Note (IAN) 153/11 guidance on the Environmental Assessment of Materials Resources, and aims to help meet the following priority, which is established within the Highways Agency Environmental Strategy contained within the Highways Agency Strategic Plan (2010-15):

'To seek out new ways to use materials efficiently through reuse, recycling and designing out waste and adopt initiatives'

4.2 Study Area

The study area for this Simple Assessment is the land within the highway boundary of the M5 motorway between Junctions 4a to 6, where it is planned to install SM-ALR. The proposed works would be approximately 17km in length, which would include the following:

- Junction 4a to Junction 5 - approximately 8km long; and,
- Junction 5 to Junction 6 - approximately 9km long.

In addition, waste disposal is considered more generally in Worcestershire and Herefordshire taking into account the proximity of waste management facilities and their ability to accept and manage such waste types.

4.3 Limitations of Assessment

The DMRB Material Resources guidance states that it is not possible to provide detailed guidance on some aspects of the assessment process, namely significance of effect, that the DMRB, Volume 11 guidance would normally be expected to be addressed. It recognises that permanent impacts are likely to be significant in terms of their effect and so projects should, as a minimum, aim to identify these. Similarly, estimates of quantities of materials to be used and waste forecast to be produced can be made and provides the basis for assessment of magnitude of change.

Cut and fill volumes have been estimated based on the design information available at the time of writing (January 2014), and are therefore likely to change as detailed design evolves. The estimated volumes are intended only for the purpose of the current assessment and should be reviewed on completion of the detailed design. A Site Waste Management Plan (SWMP) would be produced by the Principal Contractor as a working document, and would therefore take account of changes in scheme design and be based on construction operations as they occur. As of 1st December 2013, the production of a SWMP is no longer mandatory with the revocation of the Waste (England and Wales) Regulations (2011). However, the principles behind the regulations

remain as best practice. A SWMP should include details of the amount and types of waste that will be produced on site and how it will then be reduced, re-used and disposed of, by whom and where.

4.4 Baseline Conditions

The Environmental Scoping Assessment (Appendix B of this EAR) identified the materials to be used and wastes generated by the Scheme that have the potential to generate significant environmental effects. This assessment expands on the findings of that report in accordance with the Design Manual for Roads and Bridges (DMRB) Materials Resource guidance provided in IAN153/11. Significant environmental effects are likely to arise from those materials or waste which:

- Arise in the largest quantities;
- Have hazardous properties; or,
- Comprise a large proportion of the value of the Scheme.

The following waste-generating activities have been considered:

- Excavation of material (including vegetation clearance and soil removal);
- Demolition;
- Construction;
- Treatment of contaminated materials; and,
- On-site (or off- site) reuse and recycling/ recovery where appropriate.

Sources of contamination are identified in the Scoping Assessment. Therefore, consideration is given to the disposal of hazardous waste and quantities of contaminated material in this assessment.

Potential sources of contamination include historic landfill sites. Sites that are within 500m of the Scheme are listed below:

- Conybury Wood, adjacent to Junction 6;
- Primsland Swan Lane, approximately 450m west of M5 between Junction 5 to 6;
- Mayflower Road, Cockshute Hill, Droitwich, between Junction 5 to 6, approximately 100m west of the Scheme;
- Droitwich Rugby Club landfill site, between junction 5 to 6, 100m west of M5;
- Former Droitwich Rugby Club landfill site, between Junction 5-6, approximately 400m west M5;
- Hill top Quarry, between Junction 4a to 5, approximately 500m east of the M5;
- M5 Land, Rashwood Junction, Wychbold, adjacent to Junction 5;
- Tickeridge Farm, Landfill Site, between Junction 4a to 5, adjacent to the M5;

- Monsiurs Hall Farm, between Junction 4a to 5, adjacent to the M5; and,
- Fockbury Farm, between Junction 4a to 5, adjacent to the M5.

In addition to this, there would be contamination associated with the existing highway itself, which would be confined to the existing highway boundary and are considered to result in minimal quantities of hazardous waste. Potential sources of contamination that are greater than 500m in distance away from the study area have not been taken into account, as these are considered not to likely to affect the Scheme.

There are no active landfill sites specifically between Junctions 4a to 6. However Table 4.1 lists the nearest active landfill sites to the Scheme.

Table 4.1: Nearest landfill sites to the Scheme

Landfill Site	Address	Distance from Scheme
Mill Farm Sandpit Landfill (Pinches 2)/ Mill Farm Sandpit (Pinches 2)	Wildmoor Lane, Wildmoor, Bromsgrove, Worcestershire, B61 0RF	Adjacent to Junction 4 of the M5, approximately 3km north of the Scheme
Pinches 3 Landfill/ Pinches 3 Quarry	Wildmoor Lane, Wildmoor, Bromsgrove, Worcestershire, B61 0RF	Adjacent to Junction 4 of the M5, approximately 3km north of the Scheme
Chadwich Lane Quarry	Chadwich Lane, Bellbroughton, Stourbridge, West Midlands, DY9 9UX	Just after Junction 4 of the M5 approximately 4.5km north of the Scheme
Shepley Quarry Landfill	Brookhouse Road, Barnt Green, Shepley, West Midlands, B60 1QP	Just after Junction 1 of the M42, approximately 3km east of the Scheme

The Joint Municipal Waste Management Strategy (JMWMS) for Herefordshire and Worcestershire (2004-2034) outlines the two County's stances towards waste management and the Waste Core Local Strategy Plan (2012- 2027) sets out the plan for waste management facilities in Worcestershire until 2027. There are no permitted recycling or treatment facilities that accept hazardous waste in Worcestershire. The closest site capable of accepting hazardous waste is:

- Wingmoor Farm Landfill, Stoke Orchard road, Bishops Cleeve, Cheltenham, Gloucestershire, GL52 4DG - 30km South of Junction 6 and likely accessible via the A435.

However, sites able to accept inert waste locally are listed in Table 4.2:

Table 4.2: Nearest sites able to accept inert waste local to the Scheme

Inert Waste Site	Address	Comments	Distance from Scheme
A-Z Skips Ltd. NCCSKI009/1	B60 4JZ	Accepts inert waste	2.1km east of the Scheme and

Inert Waste Site	Address	Comments	Distance from Scheme
			accessible via A38 and the B4091
Mercia Waste Management Ltd (46183).	Aston Road, Aston Fields Industrial Estate, Bromsgrove, B60 3EX	Accepts inert waste	2km east of the Scheme and accessible via the A38
Blackpole Recycling BA2BLA004/0	Blackpole trading estate, West Hindlip, Worcester, WR3 8TJ	Accepts Inert Waste	3km west of the Scheme and accessible via the A449

If landfill sites or hazardous and inert waste sites are to be used, waste haulage routes would have to be agreed between the landfill operator and the Contractor.

4.5 Methodology

All Lanes Running Smart Motorways are contained within the existing highway boundary as it makes use of the hard shoulder. In addition, the design emphasises the reduction and reuse of materials, and estimated quantities are given in Table 4.4 and 4.5 below.

The Scoping Assessment concluded that a Simple Assessment would be sufficient to ascertain the potential effects of material generation. A Simple Assessment, in accordance with IAN153/11 takes into account the following:

- The materials required for the project and, where information is available, the quantities;
- The anticipated waste arisings from the project, and where information is available, the quantities and type (e.g. hazardous);
- The impacts that will arise from the issues identified in the Scoping exercise in relation to materials and waste;
- The results of any consultation; and,
- A conclusion about whether this level of assessment is sufficient to understand the effects of the project or whether Detailed Assessment is necessary.

4.6 Regulatory/Policy Framework

National Legislation and Policy

A wide range of legislation, policies and guidance that regulate the control and management of waste have been considered. The key legislation and policies relevant to the project include the following:

- The Waste (England and Wales) Regulations 2011;
- Environmental Permitting Regulations 2010 as amended;
- Environmental Protection Act 1990;
- Waste Strategy for England 2007;
- Clean Neighbourhoods and Environment Act 2005;
- Hazardous Waste (England and Wales) Regulations 2005 as amended;
- List of Waste Regulations 2005;
- Site Waste Management Plans; and,
- Waste Framework Directive 2008/98/EC.

The Landfill (England and Wales) Regulations 2002 (as amended) requires that disposal sites are classified into one of three categories, dependent on the chemical composition of the material. These are hazardous, non-hazardous and inert. Prior to disposal, if material is deemed hazardous it must be pre-treated to meet the Waste Acceptance Criteria (WAC).

If the excavated materials are in accordance with the Waste Acceptance Criteria (WAC) testing and Soil Guideline Values (SGVs), then a number of re-use and recycling opportunities will exist.

The Waste (England and Wales) Regulations (2011) states that a Site Waste Management Plan (SWMP) must be produced for a project on any one construction site with an estimated cost greater than £300,000 excluding VAT. However, as of 1st December 2013 SWMPs are no longer mandatory for projects commencing after this date. They are, however, recommended, and the principles behind the regulations remain best practice. A SWMP should include details of the amount and types of waste that will be produced on site and how it will then be reduced, re-used and disposed of, by whom and where. To accord with best practice, for the M5 Junction 4a to 6 SM-ALR Scheme, the Contractor will prepare a SWMP alongside the CEMP prior to construction, and will adopt the waste hierarchy for the management of waste.

The Waste Strategy for England (2007) states that there is a good potential to increase resource efficiency in construction and reduce waste. In relation to Construction, Demolition, and Excavation (CD&E) waste there is evidence to suggest that contractors have a tendency to underestimate the true cost of waste. There has been an increase in the recycling of CD&E waste suitable for reprocessing into aggregates, particularly in relation to demolition and earthworks. To stimulate diversion from landfill the government proposed a target of halving the amount of CD&E waste going to landfill by 2012 as a result of waste reduction, re-use and recycling.

The Environmental Protection Act (1990) requires that all producers of controlled waste ensure that they only transfer wastes that are produced to authorised carriers or to operators with suitable permits for the management of these wastes. Part IIA of the Act requires a risk-based approach to the identification and remediation of land where contamination poses an unacceptable risk to human health or the environment.

The principles of sustainable development in line with the National Planning Policy Framework (NPPF) (2012) would be an inherent consideration throughout the design phase of the proposed

Scheme. Paragraph 120 advises that where a site is affected by contamination or stability issues, it is the responsibility of the developer or landowner to secure a safe development. In addition to this, paragraph 121 advises that planning policies and decisions should ensure that:

'*the site is suitable for its new use taking account of ground conditions and land instability, including from natural hazards or former activities such as mining, pollution arising from previous uses and any proposals for mitigation including land remediation or impacts on the natural environment arising from that remediation; after remediation, as a minimum, land should not be capable of being determined as contaminated land under Part IIA of the Environmental Protection Act 1990; and adequate site investigation, prepared by a competent person is presented*.'

The Environmental Permitting (England and Wales) Regulations 2010 (as amended) standardises environmental permitting and compliance to protect human health and the environment.

The Waste (England and Wales) Regulations 2011 implement the revisions to the Waste Framework Directive (2008/98/EC), which is the primary European legislation for the management of waste. This places a greater emphasis on the waste hierarchy to ensure that waste is dealt with in the following order of priority:

- Prevention;
- Preparing for re-use;
- Recycling;
- Other recovery, for example energy recovery; and,
- Disposal, only as a last resort.

The waste hierarchy is also partly implemented through amended Duty of Care requirements and businesses need to confirm that the waste hierarchy has been applied prior to transferring waste.

Local Policies

The Joint Municipal Waste Management Strategy (JMWMS) for Herefordshire and Worcestershire (2004-2034) outlines the County's stances towards waste management and Policy 1 states that:

'*Local Authorities in Herefordshire and Worcestershire will adopt the Waste Hierarchy as a template for their approach to Waste Management, ensuring that waste is prevented wherever possible first before considering other options.'*

The primary aim of the JMWMS is to decrease waste production and consider waste as a resource through recycling, composting, re-using etc., whilst ensuring continued and improved cooperation between key players in waste management within Worcestershire and Hertfordshire. Sustainability is important to the JMWMS agenda and as part of this aims to provide value for money for local communities, taxpayers and fee payers. Ten principles have been outlined to change the way in which municipal waste is managed in Worcesertshire and Hertfordshire, and in order to meet municipal waste targets over the next twenty years. On top of this, there are 24 policies for general waste climate change, waste prevention, re-use, recycling/ composting, recovery, disposal,

awareness raising, partnerships and planning, economic opportunities, transport and other waste streams.

The Waste Core Local Strategy Plan (WCLSP) (2012- 2027) sets out the plan for waste management facilities in Worcestershire until 2027 and supersedes previous waste planning policies. The purpose of the WCLSP is to stimulate development in Worcestershire by encouraging the re-use and recycling of waste. The strategy provides for the following types of waste:

- Commercial and Industrial (C&I) waste;
- Construction and Demolition (C&D) waste;
- Municipal Solid Waste (MSW);
- Hazardous Waste; and,
- Waste Water.

In addition, Worcester City Council has a Minerals Local Plan (MLP), that sets out policies to guide the extraction and restoration of mineral sites to safeguard aggregate sources and a Minerals and Waste Local Development Scheme (2012), that sets out the timescale for the Council's waste core strategy and for the preparation of the Minerals Local Plan.

Wychavon District Council has the Wychavon District Local Plan 2006, which follows the JMWMS for Hertfordshire and Worcestershire (2004-2034).

Bromsgrove District Council has the Bromsgrove District Local plan (2011- 2030) and expects all developments to comply with the Waste Core Strategy for Worcestershire.

4.7 Mitigation and Detailed Scheme Development

The Scheme would have a construction cost of greater than £300,000 and subsequently there is potential for adverse effects for materials and wastes. The following information with regards to materials use for the Scheme is currently known:

- All vegetation removed from the verge would be recycled;
- All uncontaminated soil arisings from excavations for the ERA's would be re-used onsite;
- No specific requirement has been made for locally sourced materials, but it is likely that asphalt for the ERA's would be sourced locally from recycled material; and,
- Existing MS3 bases would be re-used.

A consistent potential impact associated with the disposal of the materials identified, is the contribution to landfill and subsequent risk of damage to local hydrological systems and emissions associated with its transportation. When considering the requirement for material usage onsite, sources and suppliers will be identified within close proximity to the site of proposed works to reduce fuel requirements and cost. Where material must be taken to a recycling/disposal site, licensed sites within as close proximity to the works as possible will be identified and used. This

information will be included within the Specification for Highways Works, and the appointed Contractor will use this information to inform the CEMP, to reduce impacts associated with the construction phase of the proposed Scheme.

Although no longer mandatory, in line with best practice, the requirement for a SWMP will be included within the Specification for Highways Works, to be produced by the appointed Contractor. The preparation of the SWMP and a CEMP will ensure that adverse impacts associated with material use and the transport of materials and waste are minimised. In addition, since potential impacts may arise from incorrect disposal of contaminated soils and vegetation arisings, a site investigation of any contaminated land, to establish the contaminants present and identify the appropriate method of treatment would be undertaken if necessary.

All potential impacts identified can be adequately mitigated for through the use of measures identified in Table 4.3.

Table 4.3: Mitigation Measures Reporting Matrix

Project Activity	Potential impacts associated with material resource use/waste management	Description of mitigation measures	How the measures will be implemented, measured and monitored
Site remediation/ preparation/ earthworks	Impacts associated with the transportation of materials and unnecessary imports of primary aggregates and/or fill material.	Primary materials would be sourced locally wherever possible. Excavated material would be re-used on site where possible. Materials and waste would be transported by road, using the existing highway network and/ or agreed landfill transportation routes.	Mitigation measures would be implemented by a site specific CEMP and SWMP. Opportunities for reduction reuse and recycling would be identified.
Demolition and construction	Impacts associated with the transportation of construction material and the disposal of waste associated with the removal of existing material.	Primary materials would be sourced locally where possible. Excavated material would be re-used on site where possible. Materials and waste would be transported by road, using the existing highway network and/ or agreed landfill transportation routes.	Mitigation measures would be implemented by a site specific CEMP and SWMP. Opportunities for reduction reuse and recycling would be identified.

Project Activity	Potential impacts associated with material resource use/waste management	Description of mitigation measures	How the measures will be implemented, measured and monitored
Installation of new MS4 signs	Primary materials may be required for the new MS4 signs. Where design constraints, allow screwpile bases will be used, removing the need for concrete. Where possible metal with a high recycled content will be used for the sign post and faces.	Where design standards allow, metals with a high recycled content would be specified. Reuse of existing MS3 bases where possible.	Detailed design of this element of the works would ensure that the use of recycled materials is made a priority. A SWMP would be implemented across the site. This would ensure that material re-use is promoted, monitored and recorded and would result in the reduction of material wastage.
Installation of communications infrastructure including cross carriageway ducts	Metal for above ground infrastructure, wires and cabling would be required. Rigid plastics would be used for new ducts and traffic sign components. Concrete foundations are required for new chambers and cross carriageway ducts.	Where design standards allow, infrastructure with a high recycled content would be specified.	A SWMP would be implemented ensuring that material reuse is promoted, monitored and recorded and would result in the reduction of material wastage.
Operation and maintenance	Impacts associated with the annual maintenance regime.	Maintenance carried out in accordance with a planned annual schedule (likely to involve overnight closure of the motorway). This would reduce the impact by limiting ad-hoc visits by maintenance contractors.	Scheduled maintenance regimes would form part of the contract for ongoing maintenance and would ensure efficient use of resources.

4.8 Potential Impacts

For the ALR works the design assumptions are as detailed within Chapter 2 of this EAR. The anticipated materials and waste streams associated with the Scheme are summarised in Table 4.4 below.

Table 4.4: Material Resources

Project Activity	Material resources required for the project	Quantities of materials resources required	Additional information on material resources
Site remediation / preparation / earthworks	Primary aggregate for ground stabilisation during ERA construction and sign/ gantry foundations.	There would be a net deficit of suitable site-won material - cutting material is unlikely to be geotechnically suitable and as such aggregate would need to be sourced off-site. Consideration should be given to the use of locally sourced recycled materials or the potential coordination of materials available from other nearby schemes to provide any required fill. 14 ERAs would be constructed (299m^2 each). Foundations for 12 new bases for cantilever mounted MS4s (15 existing MS3 bases would be reutilised). Additional bases for 15 portal and cantilever gantries would be required.	Primary materials would be sourced locally where possible. Materials would be transported by road, using the existing highway network. Excavated material would be re-used on site wherever possible.
Demolition and construction	Material use is not expected to be significant during demolition (minor works only). The installation of new technology and infrastructure would require material use including: • Piling: Steel reinforcement and concrete; • Narrowing central reserve at	• 10095m new Reinforced Concrete Barrier. • 23625m new steel safety barrier. • 17304m new surface drainage systems. • 23307m new sub-surface drainage systems. • 16440m^2 new hard strip. • 464655m^2 new paving.	Primary materials would be sourced locally where possible. Materials would be transported by road, using the existing highway network.

Project Activity	Material resources required for the project	Quantities of materials resources required	Additional information on material resources
	underbridges and central pier protection at overbridges; • Bituminous strip widening of carriageway; • Concrete base for barrier; • Concrete in Reinforced Concrete Barrier; and, • Existing gantries are to be re-used where possible.	• 400 new lights and 298 new lanterns. • 6 underbridges would require parapet strengthening. • 1100m retaining wall in cut. • 600m retaining wall in fill.	
Installation of new MS4 signs	Primary materials are usually required for constructing new MS4 signs including metals, metal fixings and electronic equipment. Concrete foundations are likely to be required for all new MS4 signs.	• 11 new MS4 signs • 17 existing MS3 signs to be upgraded and replaced with MS4s	Where possible the use of screwpiles would remove the need for concrete bases.
Installation of communications infrastructure including cross carriageway ducts	Metal for above ground infrastructure, wires and cabling would be required. Rigid plastics.	• 19000m of conduit for service provisions.	Metal with a high recycled content can be used for new and replacement cabinets. Plastic piping for new ducts can be from recycled sources.
Operation and Maintenance	Routine maintenance of infrastructure and technology including surfacing asphalt and servicing of electronic equipment.	Insignificant quantities (not estimated).	Primary materials would be sourced locally where possible. Materials would be transported by road, using the existing highway network.

Table 4.3: Waste Arisings

Project Activity	Waste arisings from the project	Quantities of waste arisings	Additional information on waste arisings
Site remediation / preparation / earthworks	Only 27 existing gantries would be removed as part of the clearance works, including disconnection of electrical equipment and foundation to be demolished to below ground level and covered with topsoil. Communications cables would be recovered and recycled, although it is understood that cable troughs would remain in situ. Technology would be returned to the operator of the equipment/infrastructure. Individual highways infrastructure components (such as signs, barriers etc.) would be retained by the Contractor and reused elsewhere. Minimal waste arisings are anticipated which would be managed by the Contractor as part of a SWMP with waste disposed of in accordance with statutory requirements.	There would very little material requiring disposal off site (only a small amount of cut material that is unable to be reused on site).	Waste would be minimised as far as possible through re-use on site. However Warwickshire County Council have indicated that there should be no difficulty in finding suitable disposal facilities for inert wastes in close proximity to the M5, and that a supply of inert waste would be welcomed by a number of quarries which are currently undergoing restoration. In addition a number of Recycling Facilities have been identified as capable of accepting inert waste material locally (refer Table 4.2).

Project Activity	Waste arisings from the project	Quantities of waste arisings	Additional information on waste arisings
Demolition and construction	Existing infrastructure (e.g. existing communications cables) may be re-aligned, including: • Carriageway planings from resurfacing of the existing carriageway. • Replacement of trenched cables with ducting. • New construction: Small quantities of spoil from piling, timber shuttering. Existing steel safety barriers; and central reserve fill material (to be replaced with concrete barriers). The installation of new technology and infrastructure would result in waste arisings including: - Spoil from piling, timber shuttering. - Packaging material related to new infrastructure.	Although all the specific quantities of waste have not been finally quantified this stage, it is not anticipated that significant amount of waste would be generated by the Scheme. Estimated quantities are: • 36650m steel safety barrier (it will be reused where possible); • 16319m of kerbs and gulleys; • 6815m of subsurface drainage; • 14 gantries; and • 584 lights.	The removal and disposal of any small quantities of asbestos would be managed through the SWMP and in line with best practice. Due to the relatively small amounts of asbestos expected to be present (if any) and the implementation of the SWMP. The Scheme would require the removal and disposal of some materials (such as that excavated for foundations) that are considered to be Construction and Demolition (C & D) waste, and therefore require disposal to inert landfill. Materials would be transported by road, using the existing highway network. Proposed work within the existing highways boundary may result in a small amount of hazardous arisings. Contaminated materials would be subject to Waste

Project Activity	Waste arisings from the project	Quantities of waste arisings	Additional information on waste arisings
	- Material excavated for gantry foundations and cutting.		Acceptance Criteria testing and would require disposal of at an appropriately licensed facility. Such contaminated material would be transported by road, using the existing highway network.
Operation and Maintenance	Waste arisings during operation and maintenance are expected to be minimal.	Insignificant quantities (not estimated)	Any waste arisings would be during periodic maintenance and are not expected to be significant.

4.9 Significance of Effects

The likely material resources and waste arising from the Scheme have been identified within this Simple Assessment. SM-ALR is an inherently resource efficient method for increasing capacity on a motorway, and as such, only relatively small quantities of materials and waste would be used and produced. Mitigation to minimise the use of raw materials and ensure the efficient re-use of existing materials and recycling where possible has been proposed, and would be finalised in the detailed design. This would include a SWMP, which would be produced in advance of the construction stage, in line with best practice, where the specific waste streams and construction impacts will be considered. These measures would help to reduce the amount of waste materials going to final disposal, thus minimising the permanent effects of the Scheme.

With the inclusion of these measures to manage material and waste streams, and thus to minimise the permanent effects of the Scheme, it is considered that the magnitude of change for material resources would be minor. As a result, the effect of the Scheme upon material resources is not considered to be significant.

4.10 Summary of Key Effects

Through re-using and recycling all soil materials onsite there would be a reduction in materials required and wastes produced. In addition, all concrete and metal to be used onsite would, where design constraints and specifications allow, contain high proportions of recycled content. Existing infrastructure such as ducts and cabinets would be re-used where possible, reducing the need for new construction. All un-reusable concrete, metal and plastics will be sent for recycling off site, therefore minimising waste sent to landfill. .

Given the above mitigation, the effect of the Scheme upon material resources is not considered to be significant. A detailed assessment is therefore not required as no significant impacts are anticipated with regard to materials, based on the current Scheme details.

5 Nature Conservation – Simple Assessment

5.1 Introduction

This chapter assesses the potential nature conservation impacts associated with the M5 Junction 4a to 5 SM-ALR Scheme. The assessment is undertaken in accordance with the DMRB Volume 11, Section 3, Part 4 "Ecology and Nature Conservation", Interim Advice Note 130/10 and the guidelines for Ecological Impact Assessment (EcIA) produced by the Institute of Ecology and Environmental Management (IEEM).

Details of the proposed Scheme are provided within Chapter 2 of this EAR. The activities associated with the Scheme would require vegetation clearance and excavation within the verge. Therefore, in the absence of mitigation, the proposed works would be likely to result in the permanent loss of some habitat where ERAs would be constructed. Temporary loss of habitat is also anticipated in association with the drainage attenuation works required to facilitate the Scheme.

All mitigation recommended in this report is detailed in the Ecological Mitigation Strategy Report - 326073-30-0000-ST-001-P01 (Mott MacDonald, 2014).

5.2 Methodology

The assessment presented below aims to identify ecological features and resources of nature conservation value and determine the value (sensitivity) of these resources. Following this, the characterisation of each ecological impact and the magnitude of change as a result of the proposed Scheme would be determined, which enables the assessment of the overall significance of each effect to be undertaken.

Value (sensitivity)

Table 5.1 below details the resource values and their level of importance.

Table 5.1: Criteria for Determining the Conservation Value

Conservation value	Criteria	Level of importance	Criteria
Very high	High importance and rarity and limited potential for substitution.	International	Internationally designated sites (SPAs, SACs, Ramsar Sites). Significant populations of species and habitats of international importance, notably qualifying interest features of designated sites. Habitat and species listed in EC Habitats Directive.
High	High importance & rarity, or with limited potential for substitution	National	Nationally designated sites (SSSIs, NNR). Nationally important habitats of good condition and/or significant species population of national importance. Regionally important habitats and/or

Conservation value	Criteria	Level of importance	Criteria
			species with limited potential for substitution. Significant species population.
Medium	High or medium importance and rarity, and limited potential for substitution	Regional	Locally designated sites (LNR, SINCs). Regionally important habitats and/or species with potential for substitution. BAP priority habitats and species other than those of national importance.
Low	Low or medium importance and rarity.	Local	Undesignated sites of some local biodiversity and earth heritage interest. Local species of importance (often listed in BAPs).
Negligible	Very low importance and rarity.	-	Other habitats or species populations with little biodiversity value and earth heritage interest

Magnitude

Once the value of each resource was identified using the criteria shown above, the magnitude of impact was assessed as described in Table 5.2.

Table 5.2: Criteria for Determining the Magnitude of Impact

Magnitude	Criteria
Major negative/positive	The proposal would affect the integrity of the site, habitat or species population, in terms of the coherence of its ecological structure and function, across its whole area, which enables it to sustain the habitat, the complex of habitats and/or the population levels of species of interest.
Moderate negative/positive	The site's integrity will not be affected, but the effect on the site is likely to be significant in terms of its ecological objectives. However if, in the light of full information, it cannot be clearly demonstrated that the proposal will not have an effect on integrity, then the impact should be assessed as major.
Minor negative/positive	Some minor impact is evident with changes in the habitat or species population, but the changes are not deemed as being significant.
Negligible	The habitats or species on the site is being affected or changed, but there is no observable impact in either direction.
No impact (neutral)	The site, habitat or species is either outside the zone of influence, or if inside the zone of influence is not in any way altered by the development. Ecological resources with no impact are unlikely to be reported in an ECIA.

Significance

The significance of effect upon each resource was then ascertained using the criteria set out in Table 5.3. For the purposes of this assessment, effects of Moderate Adverse or Beneficial and above are considered to be significant.

Table 5.3: Overall Appraisal Category

	Conservation importance				
Magnitude of impacts	**Very High**	**High**	**Medium**	**Low**	**Negligible**
Major Negative	Very Large Adverse	Very Large to Large Adverse	Moderate Adverse	Moderate to Slight Adverse	Negligible
Intermediate Negative	Large Adverse	Moderate to Large Adverse	Moderate Adverse	Slight Adverse	Negligible
Minor Negative	Moderate to Slight Adverse	Slight Adverse	Slight Adverse	Slight Adverse	Negligible
Neutral	Negligible	Negligible	Negligible	Negligible	Neutral

5.3 Study Area

The study area includes all potential habitats within the Zone of Influence (ZoI) of the Scheme. For the proposed works, the influential range has been taken to include:

- The immediate site of proposed works; and,
- Riverine habitats immediately downstream of the site of proposed works.

For the assessment of implications on European sites, undertaken in accordance with HD44/09, the study area includes all Natura 2000 sites within 2km of the site and all Special Areas of Conservation designated for bats within 30km.

5.4 Baseline Conditions

5.4.1 Designated Sites

Designated sites within 1km of the proposed works are identified within the Environmental Constraints Plans presented within Appendix C.

No statutory designated sites are located within or immediately adjacent to the Scheme. The nearest Site of Special Scientific Interest (SSSI) is located approximately 500m to the east of the M5, between Junctions 4a and 5 (National Grid Reference SO 933 673). East Upton Warren Pools SSSI is designated for its ornithological interest. The pools provide an important habitat for wintering and passage waterfowl and wader species.

A number of Local Nature Reserves (LNR) have also been recorded within a 1km radius of Junction 6, with the nearest one being Offerton Wetlands LNR, 300m to the west of this junction. The LNR is made up of two wetland areas, originally created to provide a drainage balancing area to receive the rainwater runoff.

Due to the localised nature of the proposed works and the distance between the statutory designated sites and the works footprint, no direct adverse impacts such as noise and air pollution are anticipated on the qualifying features of the designated sites as a result of the works. Furthermore, due to lack of hydrological links, no indirect impacts are considered likely. Therefore, these sites will not be discussed any further in this report.

There are a number of non-statutory designation sites referred to as Special Wildlife Sites (SWS), registered with Worcestershire County Council, within 1km of the works. In the absence of mitigation, two of these SWSs (Battlefield Brook and River Salwarpe) are likely to be affected by the drainage upgrade works proposed as part of the Scheme.

5.4.2 Habitats

The scope of the works and the potential significance of effects warrant further assessment as the habitats present onsite are considered of Local Value.

The Environmental Constraints Drawing contained in Appendix C illustrates the location of all the designations within 1km of the Scheme. Habitats of conservation value identified within this study area are identified within Table 5.5 and any specific species of conservation value are identified within Table 5.6. The following habitats were recorded onsite during the Phase 1 Habitat Survey which was carried out by Mott MacDonald Ecologists in May 2013.

Semi-improved neutral grassland

Semi-improved grassland has been recorded within the survey area, mainly forming the verges, with relatively larger patches covering the embankments. The areas of rank grassland were dominated by rye grass *Lolium perenne*, common bent *Agrostis capillaries*, meadow grass *53o asp*. And fescue species *Festuca sp*. Other flora recorded in this habitat include yarrow *Achillea millefolium*, ribwort Plantain *Plantago lanceolata*, dock species *Rumex sp.*, common daisy *Bellis perennis* bluebell *Hyacinthoides* non-scripta, ground ivy *Glechoma hederacea*, speedwell species *Veronica sp.*, creeping buttercup *Ranunculus repens*, greater celandine *Chelidonium majus*, vetch species, common bird's foot trefoil *Lotus corniculatus*, cowslip *Primula veris*, herb-Robert *Geranium robertianum*, scarlet pimpernel *Anagallis arvensis*, garlic mustard *Alliaria petiolata*, cow parsley *Anthriscus sylvestris* and oxeye daisy *Leucanthemum vulgare*.

Semi-improved calcareous grassland

An area of herb rich, semi-improved, calcareous grassland was noted between Marker Posts (MPs) 29.0 to 29.7 (Northbound). The species recorded in this area include Lady's bedstraw *Galium verum*, ox-eye daisy, wild carrot *Daucus carota*, common Bird's-foot-trefoil *Lotus corniculatus*, creeping cinquefoil *Potentilla reptans*, mullein *Verbascum sp.*, and Dove's-foot Crane's-bill *Geranium molle*. Lowland base-rich grasslands are a Birmingham and Black Country Habitat Action Plan priority habitat.

Dense and scattered scrub

Within the survey area are different sized patches of dense and scattered scrub. These vary from patches dominated by bramble *Rubus fruticosus agg.*, blackthorn *Prunus spinosa* or hawthorn *Crataegus monogyna* to linear strips with a greater diversity.

Broad-leaved, plantation woodland

Strips of plantation woodland were noted in a number of areas. The majority are semi-mature woodlands with a good understory but poor ground flora. These wooded belts are typical of the highways roadside plantations and include species such as ash *Fraxinus excelsior*, alder *Alnus glutinosa*, poplar *Populous sp.*, willow *Salix sp.*, lime *Tilia platyphyllos*, dogwood *Cornus sanguinea*, sycamore *Acer pseudoplatanus,* hawthorn, horse chestnut *Aesculus hippocastanum,* oak *Quercus sp.*, pine *Pinus sp.*, elm *Ulmus sp.*, cherry *Prunus avium*, hazel *Corylus avellana*, beech *Fagus sylvatica*, field maple *Acer Campestre,* blackthorn and yew *Taxus baccata*.

Species-poor intact hedge

In some areas such as MP 41.3 to 41.7, 32.5 to 32.8 and 36.2 to 36.4 (Northbound), overhanging hawthorn hedge branches cover the Highways Agency boundary fence.

Scattered trees

A number of individual trees were noted across the site, some of which form avenues along the boundaries (e.g. MP 40.9 to 41.1 and MP36.2 to 36.4 Northbound). A wide range of species are present, however the dominant species are ash, oak and wild cherry. The trees are mainly mature and semi-mature.

Running Water

Sections of Battlefield Brook run through Highways Agency land. Located to the south of Junction 4a, a small section of the brook enters HA land at MP 27.1 (Southbound), with a longer section running along HA boundary from MP 27.9 to 28.8 (Northbound), separating an area of woodland into two parcels. The banks are vegetated with tall ruderal vegetation dominated by nettle, with a medium flow of water and a stoney bed. The brook finally passes under the M5 at approximately MP 28.7.

The River Salwarpe, Droitwich Canal and Worcester and Birmingham Canal also flow under the M5 at MPs 33.8, 37.3, 42.9 respectively.

5.4.3 Protected Species

The scope of the works and the potential significance of effects warrant further assessment as the habitats present onsite have the potential to support protected species considered of Local to County Value.

During the field survey, evidence of, or potential for the presence of protected species were recorded and the results are discussed below.

Breeding Birds

Scrub, wooded areas and scattered trees within the site provide suitable nesting opportunities for birds. Road verges are also known to provide a suitable habitat for raptors such as kestrels *Falco tinnunculus.*

Bats

Well-connected wooded belts and areas of scrub within the proposed works area are all considered suitable habitat for foraging bats and provide a continuous corridor for commuting bats. One dead tree between MPs 32.4 to 32.5, Northbound with features suitable for roosting bats such as natural holes, rot holes, lifted barks and split limbs has also been identified within the Scheme footprint. This tree is located immediately adjacent to HA land and may be required to be felled due to health and safety risk, should the area be affected by the proposed works.

Two mature willow trees are also located within HA land with suitable features for bats (MP 27.1 Southbound).

A dead Myotis bat was found under a bridge close to MP 37.4 (Southbound), in addition to an injured common pipistrelle *Pipistrellus pipistrellus* discovered under a bridge close to MP 28.4.

A number of under-bridges have been highlighted as having potential to support roosting bats (i.e. MP 33.8 and 28.4).

Badgers *Meles meles*

Evidence of presence of badgers such as setts, hair, tracks, snuffle pits and latrines were identified during the site visit in May and June 2013, with other suitable foraging and breeding habitat identified for this species within the works footprint.

Dormice *Muscardinus avellanarius*

A desk study confirmed the presence of dormice in the Droitwich area, approximately 1.7km to the west of the M5 motorway, between Junctions 5 and 6. Dormice are included in the Worcestershire Local Biodiversity Action Plan (LBAP) and are listed as declining in the County.

Well-connected areas of scrub and linear belts of semi-mature plantation woodland within the proposed works area are all considered suitable habitat for dormice and provide a continuous corridor for the movement and dispersal of this species. In some areas, the connectivity of the suitable habitats are maintained through the intact hedgerows immediately outside the Highways Agency land, with overhanging branches located within the highways boundary.

A total of 300 nest tubes were erected in accordance with the methodology outlined in the “Dormouse Conservation Handbook” (Bright et al., 2006), in habitats favourable to dormice. Monthly checks of the nest tubes were carried out between August and November 2013.

No dormice have been identified to date. During the erection of the nest tubes, the numbers of tubes were doubled in most locations in accordance with the Interim Natural England Advice Note WML-G37 (12/11). This was carried out to increase the survey effort and double the scores available for each month. However, due to the presence of breaks in vegetation connectivity on both sides of the motorway, difficulties in accessing sections of the site due to proximity of live traffic resulting in health and safety restrictions, as well as seasonal constraints, the absence of dormice from within the surveyed area could not be confirmed. Therefore, additional surveys will be undertaken in April and May 2014 to confidently confirm the negative survey results.

Reptiles

Areas of rank grassland and scrub along the verges of the M5 are all suitable habitats for reptiles and could provide a valuable foraging, basking and breeding habitat, in addition to corridors for the movement and dispersal of these species. Woodland parcels and embankments within the HA land provide suitable habitat for hibernating reptiles. Log piles have also been noted in areas of woodland, providing additional habitat for reptiles (e.g. MP 42.6 to 42.9 Northbound).

During the Extended Phase I Habitat Survey of the site, random checks of suitable refugia were undertaken and a number of slow worms *Anguis fragilis* were found to be present in the following locations (this does not constitute a reptile survey and did not cover all suitable habitats present within the HA land):

- x2 slow worms close to MP 38.2;
- x4 slow worms close to MP 38.7 (immediately adjacent to HA boundary fence); and,
- x4 slow worms close to MP 33.2.

Whilst all areas of rank grassland are considered to be suitable, some high potential areas have been confirmed such as between MP 26.3 to 26.5, 28.9 to 29.7 and 39.5 to 39.7 (Northbound) and 28.0 to 28.2, 39.5 to 39.6, 41.7 to 41.8 (Southbound).

No specific reptile surveys have been undertaken to date.

Great Crested Newt *Tritusus cristatus*

A desk study confirmed the presence of GCNs in a number of locations including three ponds, approximately 450m to the south of Junction 6 (NBN Gateway). These records are from 1990. A number of regionally important meta-populations of great crested newt are also present in the wider landscape surrounding the Scheme. Areas of particular importance include the Warndon area of Worcestershire (close to Junction 6), which has a pond density of between 5 to 10 per square kilometre (Worcestershire Biodiversity Action Plan).

Approximately 2.5km south-west of the Scheme is Lyppard Grange Ponds, designated as a Special Area of Conservation (SAC) for GCN. This network of ponds supports one of the largest known GCN breeding colonies in the Country (Worchester Biodiversity Action Plan).

The Wychavon District of Worcestershire has been found to have the highest density of GCNs in Worcestershire which is approximately 4km east of Junction 5 of the M5 (Worcestershire Biodiversity Action Plan).

A data request from the Worchester Biological Records Centre returned one GCN record to the north of Junction 5, approximately 450m to the east of the motorway in the Upton Warren area.

Anecdotal records of GCNs have also been received from within 250m radius of the works footprint which could not be verified due to lack of survey records.

Due to the presence of water bodies within a 250m radius of the proposed Scheme, and the provision of historical records of GCNs in the area, a Habitat Suitability Index (HSI) of 31 water bodies has been undertaken to assess their suitability for GCNs (Oldham et al. 2000).

Ponds that are greater than 250m away have not been included, on the basis that the project is unlikely to have a substantial negative effect on the overall GCN habitat in the locality.

An HSI is a numerical score where 0 indicates unsuitable habitat and 1 represents optimal habitats. The HSI for GCNs incorporates ten suitability indices, all of which are thought to affect this species. These include:

- Location;
- Pond area;
- Pond drying;
- Water quality;
- Shade;
- Wildfowl presence;
- Fish presence;
- No. of ponds within 1km;
- Quality of terrestrial habitat; and,
- Presence of macrophytes.

Based on the HSI survey results, historical records of GCNs and judgement of the ecologists, a total of 15 water bodies are considered to be suitable for GCNs within 250m of the proposed works, and GCN surveys are therefore required for these ponds. Due to seasonal constraints, no surveys have been undertaken to date. Therefore, the status of the GCNs is currently unknown within ponds the ponds highlighted as suitable during the HSI surveys. However, surveys are programmed to commence from March 2014, and the findings of these surveys will establish the presence or likely absence of this species and subsequently assess the impacts of the proposed works on GCNs and fulfil the requirements of a European Protected Species (EPS) licence. Mitigation requirements in the event of a positive survey result for GCN are fully detailed within Section 5.6 below.

Otters *Lutra lutra*

Otters are known to use the Droitwich Canal close to where it joins the River Severn, 4km to the west of Junction 7 of the M5.

River Salwarpe and Battlefield Brook are both considered suitable for commuting and foraging otters. These water bodies are unlikely to be affected by the proposed works and therefore no specialist surveys have been carried out to date or are considered to be required in the future, provided the preliminary design details remain unchanged.

Water Voles *Arvicola amphibious*

A section of the Worcester and Birmingham Canal located approximately 950m north of Junction 6 maintains some of the last known water vole populations in Worcestershire (Worcestershire Biodiversity Partnership). This Canal flows under the M5 at MP42/9.

No specific water vole surveys have been carried out to date. However, due to the presence of vegetated banks, Battlefield Brook (MP 27/2 and 28/6 to 28/7) and Worcester and Birmingham Canal are considered to be suitable for water voles.

The proposed works are unlikely to directly affect the water bodies which are considered suitable for water voles. The proposed works may have the potential to indirectly affect this species through disturbance (vegetation clearance activities at the banks) and pollution. These impacts however could be mitigated and therefore there is no requirement for undertaking any water vole surveys.

Value of resource

Table 5.4 outlines the value of habitats within the ZoI with Table 5.5 outlining the value of species within the ZoI.

Table 5.5: Habitats of Conservation Value within the ZoI

Habitat	Key Features of Conservation Significance	Qualitative Statement Regarding Association with Designated Site or BAP Habitat.	Qualitative Statement Regarding Support of Species of Conservation Significance.	Supportive Records	Level of Importance	Conservation Value
Hedgerows	Hedgerows provide linkages between areas of woodland habitat and through an agricultural and sometimes urban landscape. Hedgerows provide features for a variety of species including foraging opportunities for dormice and commuting routes for bats.	The hedgerows within the Scheme footprint are not associated with a designated site.	Species poor hedgerows located along the boundary of the Highways estate. The hedgerows within the site are likely to be used for foraging and commuting by a number of bat species, as well as providing foraging and nesting opportunities for dormice, badgers and other mammal species. They also provide nesting habitat for widespread bird species.	Records of bats and dormice exist within 2km of the works.	Local	Considered of low value as the hedgerows provide habitat for a group of protected species in the local context.
Broadleaved Plantation Woodland	Woodlands provide foraging opportunities and shelter to a variety of animals including dormice,	The areas of woodland within the Scheme footprint are not associated with a designated site.	Woodlands within the highways verge connect to offsite semi-natural woodland and provide areas of habitat	Records of bats and dormice exist within 2km of the works.	Local	Considered of low value as it provides a habitat resource important within

Habitat	Key Features of Conservation Significance	Qualitative Statement Regarding Association with Designated Site or BAP Habitat.	Qualitative Statement Regarding Support of Species of Conservation Significance.	Supportive Records	Level of Importance	Conservation Value
	badgers, birds, bats and reptiles.	However a number of sections of woodland in the verge are located adjacent to areas of offsite woodland which is BAP priority habitat.	suitable for protected species including bats, dormice, birds, reptiles and badgers.			the local context.
Neutral and calcareous semi-improved grassland	Irregularly managed grassland provides foraging and commuting habitat for a variety of species such as reptiles, amphibians and invertebrates.	These areas of grassland are not associated with a designated site or local BAP habitat.	Areas of grassland occur alongside stretches of the existing road network. They support populations of common reptiles and amphibians.	Records of common reptiles exist from within the Scheme boundary.	Local	Considered of low value as it provides a habitat resource important for common reptiles within the local context.
Freshwater Rivers and Canals	Environment Agency ecological rating: River Salwarpe – moderate quality Battlefield brook – moderate quality Worcester and Birmingham Canal – good quality. These rivers are rated	The 3 watercourses are designated as a Special Wildlife Site with Worcester County Council. There are likely to be BAP species associated with the watercourses such as otters and water voles.	The watercourses are likely to support a number of species including water voles and otters.	Records of water voles and otters exists from these watercourses.	Regional	Considered of medium value as the watercourses support habitats and species associated with designated sites.

Habitat	Key Features of Conservation Significance	Qualitative Statement Regarding Association with Designated Site or BAP Habitat.	Qualitative Statement Regarding Support of Species of Conservation Significance.	Supportive Records	Level of Importance	Conservation Value
	as of moderate to good ecological quality by the Environment Agency. There are likely to support an above average assemblage of macrophytes, invertebrates, fish and mammals.					
Battlefield Brook Special Wildlife Site (SWS)	An important watercourse acting as a wildlife corridor.	This site is a non-statutory designated site, registered with Worcestershire County Council.	The brook is known to support water voles which are Worcestershire Local BAP and a UK BAP Priority species.	The Environment Agency completed a water vole survey in May 2008 and confirmed their presence. Worcestershire Biological Record Centre also have records of water voles.	Regional	Considered of medium value due to its designation and for supporting UK BAP and Local BAP species (i.e. water voles).
River Salwarpe SWS	An important watercourse with the notable habitats including open water,	This site is a non-statutory designated site, registered with Worcestershire County	No records of species of conservation value are available for this site. Lack of records	N/A	Regional	Considered of medium value due to its designation.

Habitat	Key Features of Conservation Significance	Qualitative Statement Regarding Association with Designated Site or BAP Habitat.	Qualitative Statement Regarding Support of Species of Conservation Significance.	Supportive Records	Level of Importance	Conservation Value
	marshlands and reedbeds.	Council.	does not constitute absence and it is possible that such species are under-recorded.			

Table 5.6: Species of Conservation Value within the ZoI of Site of Works

Species	Key Features of Conservation Significance	Qualitative Statement Regarding Association with Designated Site or BAP Habitat.	Supportive Records	Level of Importance	Conservation Value
Dormice	Dormice and any place they use for shelter are protected under the provisions of the Wildlife and Countryside Act 1981 (as amended). Dormice are also protected under European legislation which is implemented through the Conservation of Habitats and Species 2010 (as amended).	Dormice are a local & UK BAP species and are listed as declining in the county.	A review of the available data confirmed the presence of dormice in the Droitwich area, approximately 1.7km to the west of the M5 motorway, between Junctions 5 and 6.	National	Considered of High value due to legal protection and rarity in the midlands.
Great	Great Crested Newts and any	A number of regionally	A data request from	National	High due to legal protection.

Species	Key Features of Conservation Significance	Qualitative Statement Regarding Association with Designated Site or BAP Habitat.	Supportive Records	Level of Importance	Conservation Value
Crested Newt	place they use for shelter are protected under the provisions of the Wildlife and Countryside Act 1981 (as amended). GCN are also protected under European legislation which is implemented through the Conservation of Habitats and Species 2010 (as amended).	important meta-populations of great crested newt are present in the wider landscape surrounding the Scheme. GCNs are a local and UK BAP species.	the Worchester Biological Records Centre returned one GCN record to the north of Junction 5, approximately 450m to the east of the motorway in the Upton Warren area.		This species is considered to be common and widespread in the region.
Bats	All species of bat and their roosts are protected under the Wildlife and Countryside Act 1981 (as amended) and under European law, the Conservation of Habitats and Species Regulations 2010 (as amended).	17 species of bat occur in the UK and 14 of these have been recorded in Worcestershire and are listed on the Worcestershire Local BAP.	A dead Myotis bat was found under a bridge close to MP 37.4 (Southbound), in addition to an injured common pipistrelle discovered under a bridge close to MP 28.4.	National	High due to legal protection
Reptiles	All widespread reptile species in the UK are protected by the Wildlife and Countryside Act 1981 (as amended).	Slow worms and Adders are listed on the Worcestershire Local BAP. Whilst adders are widespread and locally	Slow worms were recorded in a number of areas during the Phase 1 Habitat Survey which was carried	Regional	Medium due to the species being common and widely distributed in the County. Worcestershire county is considered to be nationally Important for slow worms.

Species	Key Features of Conservation Significance	Qualitative Statement Regarding Association with Designated Site or BAP Habitat.	Supportive Records	Level of Importance	Conservation Value
		common in some areas, their distribution is scattered and declining in Worcestershire. Worcester city is considered to be nationally important for slow worms	out in May 2013.		
Birds	All species of wild bird and their nests are protected under the Wildlife and Countryside Act 1981 (as amended). Schedule 1 birds receive additional protection against disturbance during nesting season.	Nightingales and Farmland Birds are listed on the Worcestershire Local BAP. The habitats within the HA land do not support Local BAP species.	No records identified	Local	Low due to lack of records of protected birds identified onsite and the presence of habitats which are likely to support common and widespread bird species.
Brown Hairstreak	Brown Hairstreak butterfly is of regional importance and has been included in the Natural Environment and Rural Communities (NERC) Act 2006. They are also a UK Biodiversity Action Plan Priority species.	The Brown Hairstreak is listed on the Worcestershire Local BAP.	An empty egg case was found between Marker Posts (MP) 36/3 – 36/6 Southbound, with a sighting of the butterfly at MP 41/7 – 41/9 Southbound	Regional	Medium due to being listed on the Worcestershire BAP as having regional importance.

Species	Key Features of Conservation Significance	Qualitative Statement Regarding Association with Designated Site or BAP Habitat.	Supportive Records	Level of Importance	Conservation Value
			(Amey 2007).		
Water Voles	Water voles receive full protection through their inclusion on Schedule 5 of the Wildlife and Countryside Act 1981 (as amended).	Water voles are listed on the Worcestershire Local BAP and a UK BAP Priority species. Battlefiled Brook (Special Wildlife Site) is the most important area for water voles in Worcestershire.	No records identified	National	High due to legal protection
Otters	Otters receive protection under both the Wildlife and Countryside Act 1981 (as amended) and the Conservation of Habitats and Species Regulations 2010 (as amended).	Otters are listed on the Worcestershire Local BAP and are a UK BAP Priority species.	No records identified	National	High due to legal protection and rarity.

5.5 Regulatory/Policy Framework

Dormice

Dormice and any place they use for shelter are protected under the provisions of the Wildlife and Countryside Act 1981 (as amended). Dormice are also protected under European legislation which is implemented through the Conservation of Habitats and Species Regulations 2010 (as amended). Dormice are listed in these regulations as a EPS. It is therefore an offence to:

- Capture, kill or injure;
- Deliberately disturb any such animal whilst occupying a place of shelter;
- Intentionally or recklessly damage or destroy the breeding site or resting place of such an animal; and,
- Obstruct access to such places of shelter.

Great Crested Newts

Great Crested Newts and any place they use for shelter are protected under the provisions of the Wildlife and Countryside Act 1981 (as amended). GCN are also protected under European legislation which is implemented through the Conservation of Habitats and Species Regulations 2010 (as amended). GCNs are listed in these regulations as a EPS. It is therefore an offence to:

- Capture, kill or injury;
- Deliberately disturb any such animal whilst occupying a place of shelter;
- Deliberately take or destroy the eggs of such an animal;
- Intentionally or recklessly damage or destroy the breeding site or resting place of such an animal; and,
- Obstruct access to such places of shelter.

Bats

All species of bat and their roosts are protected under the Wildlife and Countryside Act 1981 (as amended) and The Conservation of Habitats and Species Regulations 2010 (as amended). This legislation makes it an offence to deliberately intentionally kill, injure or take a bat or intentionally deliberately or recklessly damage, destroy or obstruct access to any place that a bat uses for shelter or protection.

Reptiles

All widespread reptile species in the UK, including adder *Vipera berus*, grass snake *Natrix natrix*, slow worm and common lizard *Zootoca vivipara* are protected by the Wildlife and Countryside Act

1981 (as amended). This means that the intentional killing and injuring of the four widespread species of reptiles is prohibited. Legal protection is not extended to their habitat.

Furthermore, all species of reptiles are in the list of Priority Species in the UK Biodiversity Action Plan (UKBAP).

Breeding Birds

All species of wild bird and their nests are protected under the Wildlife and Countryside Act 1981 (as amended) which prohibits the killing, injuring or taking of any wild bird and the taking, damaging or destroying of the nest (whilst being built or in use) or eggs. Schedule 1 birds receive additional protection against disturbance during nesting season.

Badgers

Badgers and their setts are afforded protection under the Protection of Badgers Act 1992. Under this Act it is an offence to:

- Capture, kill, injure and cruelly or ill-treat a badger;
- Damage, obstruct or destroy a sett; and,
- Disturb a badger when within a sett.

Water Voles

Water voles receive full protection through their inclusion on Schedule 5 of the Wildlife and Countryside Act 1981 (as amended). Water voles are protected against killing or taking, and their breeding and resting places are fully protected from destruction or obstruction. It is also an offence to disturb them while they are using such a place.

Otters

Otters receive protection under both the Wildlife and Countryside Act 1981 (as amended) and The Conservation of Habitats and Species Regulations 2010. Otters and their resting places are fully protected, making it an offence to deliberately capture, injure or kill them or to damage, destroy or obstruct their breeding or resting places. It is also an offence to disturb otters in their breeding or resting places.

Brown Hairstreak

Brown Hairstreak *Thecla betulae* butterfly is of regional importance and has been included in the Natural Environment and Rural Communities (NERC) Act 2006. They are also a UK BAP species.

Planning Policy Framework

Identified within the National Planning Policy Framework (2012), the UK Government has committed to promoting sustainable development by ensuring that biological diversity is conserved

and enhanced as an integral part of any development. In addition, the Highways Agency has a legal obligation under Section 40 of the Natural Environment and Rural Communities Act 2006 to have regard, so far as is consistent with the proper exercise of those functions, to the purpose of conserving biodiversity.

5.6 Mitigation and Enhancement Measures

There are a number of possibilities for habitat enhancement to increase the value of the retained habitats for protected species and offset net biodiversity loss as a result of the proposed vegetation clearance works. An Ecological Mitigation Strategy has been prepared (326073-30-0000-ST-001-P01 (Mott MacDonald, 2014), which details all of the proposals to manage and mitigate for ecological impacts associated with the Scheme. This document is a live document that will be updated following additional protected species surveys identified above. This document would also be used to inform the Construction Environmental Management Plan (CEMP) for the Scheme, which would be prepared by the Contractor prior to construction.

Once the status of protected species and the extent of vegetation clearance are known within the works footprint, landscape planting would be developed. Where the presence of EPS have been confirmed through further surveys, the Method Statement of the EPS licence will determine the mitigation planting to ensure no long term impact. Where there are no EPS constraints, the habitat loss is recommended to be offset through landscape mitigation planting detailed in the Ecological Mitigation Strategy - 326073-30-0000-ST-001-P01 (Mott MacDonald, 2014).

Non-statutory Designated Sites

Battlefield Brook and River Salwarpe Special Wildlife Sites (SWS) are located within the works footprint and are likely to be affected by the proposed drainage works. Whilst these water bodies flow under the M5 are would not be directly affected by the works, to ensure no adverse impacts the Environment Agency Pollution Prevention Guidelines will be adhered to by all personnel on site. In addition, the works in close vicinity of the SWSs should be supervised by an Ecologist and Toolbox Talks should be given to all Contractors prior to works commencing onsite.

Hedgerows

It is recommended that where hedgerows are required to be removed to facilitate the works, where possible these are replaced within the same location. Where the presence of protected species has been confirmed, Landscape Planting Plans to be developed as part of the Contract Documents Series 3000 Specification would reflect the legal requirements of the EPS licence conditions, to ensure no net loss in biodiversity in line with the Section 40 of the Natural Environment and Rural Communities (NERC) Act 2006.

Plantation Broadleaved Woodland

It is recommended that all woodland that is required to be removed to facilitate the works is replaced within the same location where possible. Where the presence of protected species has been confirmed, Landscape Planting Plans would be developed as part of the contract documents Series 3000 Specification which would reflect the legal requirements of the EPS licence conditions,

to ensure no net loss in biodiversity in line with the Section 40 of the Natural Environment and Rural Communities (NERC) Act 2006,

Semi-improved Grassland

It is recommended that where grassland is required to be removed to accommodate the proposed works, this is replaced within the same location where possible. Where the presence of protected species has been confirmed, Landscape Planting Plans would be developed as part of the Series 3000 Specification which would reflect the legal requirements of the EPS licence conditions, to ensure no net loss in biodiversity in line with the Section 40 of the Natural Environment and Rural Communities (NERC) Act 2006,

Freshwater rivers and canals

All excavation and vegetation clearance in the vicinity of water bodies should be supervised by an ecologist and Toolbox Talks should be given to all Contractors prior to works commencing onsite. In addition, the Environment Agency Pollution Prevention Guidelines including PPG5 'Works and maintenance in or near water' should be adhered to at all times.

Dormice

If the remaining dormouse surveys in 2014 confirm the likely absence of this species from the surrounding habitat then the works could be carried out with no restrictions (although consideration should be given to other protected species such as reptiles and great crested newts.)

If the 2014 surveys confirm the presence an EPS licence from Natural England would be required to allow the proposed works to be undertaken. The Method Statement of the EPS licence would detail a comprehensive mitigation strategy including a sensitive working method, timing of works and a habitat replacement package. Population monitoring would be required as part of the EPS licence.

All vegetation clearance would be supervised by a suitably experienced, licensed Ecologist and all Contactors would be given Toolbox Talks prior to works commencing onsite.

GCN

If the GCN surveys in 2014 confirm the absence of this species from the ponds located within 250m radius of the Scheme, the works could be carried out with no restrictions (although consideration should be given to other protected species such as reptiles and dormice).

If GCNs are confirmed to be present, a Natural England EPS licence must be applied for and appropriate mitigation sought. Likely mitigation measures could include a capture and relocation programme under licence and a habitat replacement package. Population monitoring would be required as part of the EPS licence.

All vegetation clearance would be supervised by a suitably experienced, licensed Ecologist and all Contactors would be given Toolbox Talks prior to works commencing onsite.

Bats

Whilst no suitable features for roosting bats are proposed to be affected by the works, should the proposals change and a bat roost be adversely affected by the works, a comprehensive mitigation strategy including a sensitive working method and a habitat replacement package will be required to accompany the EPS licence application to Natural England. All works likely to have an impact on bats would be supervised and Toolbox Talks would be given to the Contractor prior to any works commencing.

Reptiles

Sensitive working methods will ensure that the risk of killing or injuring reptiles is minimised. All vegetation clearance and construction activities likely to harm reptiles will be supervised by a suitably experienced ecologist and Toolbox Talks will be given to the Contractor prior to works commencing.

Birds

Sensitive working methods will ensure that the risk of disturbing nesting birds is minimised. All vegetation clearance carried out outside the nesting bird season (end of February to end of September) will be supervised by a suitably experienced Ecologist and Toolbox Talks will be given to the Contractor prior to works commencing.

Brown Hairstreak

Sensitive working methods will ensure that the impacts to the brown hairstreak will be minimised. These will be outlined within a Toolbox Talk to be given to the Contractor prior to site works.

Water Voles

Sensitive working methods will ensure that the risk of disturbing water voles is minimised. All works likely to impact on water voles will be supervised by a suitably experienced Ecologist and Toolbox Talks will be given to the Contractor prior to works commencing.

Otters

Sensitive working methods will ensure that the risk of disturbing otters is minimised. All works likely to impact on otters will be supervised by a suitably experienced Ecologist and Toolbox Talks will be given to the Contractor prior to works commencing.

5.7 Potential Impacts

5.7.1 Construction

Project activities shown to have the potential for significant effects on nature conservation have been assessed in Table 5.7 and 5.8 below for the construction stage. The mitigation outlined in Section 5.6 above has been taken into consideration when determining the magnitude of impacts and the significance of effects.

Table 5.7 Summary of effects upon habitats during construction

Habitat	Source of Impact	Value	Magnitude of Impact	Mitigation	Overall Appraisal
Hedgerows	Vegetation clearance	Low	The works have the potential to have a Minor Negative impact upon this habitat through partial loss or alteration of key features.	Ecological supervision during construction, to include nesting bird checks.	Slight Adverse
Broadleaved Plantation Woodland	Vegetation clearance	Low	The works have the potential to have a Minor Negative impact upon this habitat through partial loss.	Ecological supervision during construction, to include nesting bird checks.	Slight Adverse
Semi-improved grassland	Vegetation clearance	Low	The works have the potential to have a Minor Negative impact upon this habitat through partial loss.	Ecological supervision during construction, to include finger-tip searches for reptiles, and GCNs (if confirmed to be present). Replacement planting, where possible.	Slight Adverse
Freshwater Rivers and Canals	Pollution incident Vegetation clearance	Medium	The works have the potential to have a Minor Negative impact upon this habitat through a loss or alteration of key features.	Ecological supervision during construction. The Environment Agency's Pollution Prevention Guidelines would be implemented and followed for all construction activities.	Slight Adverse
Non-statutory designated sites (Battlefield Brook and River Salwarpe Special Wildlife Sites)	Drainage works Vegetation clearance Pollution incident	Medium	The works have the potential to have a Minor Negative impact upon these designated sites through pollution incidents which if uncontained may temporarily lower the water quality.	Ecological supervision during construction. The Environment Agency's Pollution Prevention Guidelines would be implemented and followed for all construction activities.	Slight Adverse

Table 5.8 Summary of effects upon species during construction

Species	Source of Impact	Value	Magnitude of Impact	Mitigation	Overall Appraisal
Dormice	Direct Killing or Injury during vegetation clearance/site activities Disturbance	High	The works have the potential to have a Minor Negative impact upon this habitat through partial loss of habitat, severance and disturbance if they are found to be present.	- If Dormice are found, an EPS licence would be sought from Natural England. - The Method Statement of the EPS licence would detail a comprehensive mitigation strategy including a sensitive working method, timing of works and a habitat replacement package. - Ecological Supervision. - Toolbox Talk provision to site personnel prior to commencement of works.	Slight Adverse
Great Crested Newt	Direct Killing or Injury during vegetation clearance/site activities Disturbance	High	The works have the potential to have a Minor Negative impact upon this habitat through partial loss of habitat, severance and disturbance if they are found to be present.	- If GCN are found, an EPS licence would be sought from Natural England. The Method Statement of the EPS licence would detail a comprehensive mitigation strategy including a sensitive working method, timing of works and a habitat replacement package. - Ecological Supervision. - Toolbox Talk provision to site personnel prior to commencement of works.	Slight Adverse
Bats	Disturbance	High	The works have the potential to have a Minor Negative impact upon this habitat through disturbance of commuting and	- Ecological Supervision. - Toolbox Talk provision to site personnel prior to commencement of works.	Slight Adverse

Species	Source of Impact	Value	Magnitude of Impact	Mitigation	Overall Appraisal
			foraging bats.		
Reptiles	Direct Killing or Injury during vegetation clearance/site activities	Moderate	The works have the potential to have a Minor Negative impact upon this habitat through partial loss of habitat, severance and disturbance.	- Ecological Supervision. - Toolbox Talk provision to site personnel prior to commencement of works.	Slight Adverse
Birds	Direct Killing or Injury during vegetation clearance/site activities Disturbance	Low	The works have the potential to have a Minor Negative impact upon this habitat through partial loss of habitat, severance and disturbance.	- Ecological Supervision. - Toolbox Talk provision to site personnel prior to commencement of works.	Slight Adverse
Brown Hairstreak	Direct Killing or Injury during vegetation clearance/site activities	Low	The works have the potential to have a Minor Negative impact upon this habitat through partial loss of habitat, severance and disturbance.	- Ecological Supervision. - Toolbox Talk provision to site personnel prior to commencement of works.	Slight Adverse
Water Voles	Pollution incident Disturbance	High	The works have the potential to have a Minor Negative impact upon this habitat through disturbance and due to the potential for a pollution incident.	- Ecological Supervision. - Toolbox Talk provision to site personnel prior to commencement of works.	Slight Adverse

Species	Source of Impact	Value	Magnitude of Impact	Mitigation	Overall Appraisal
Otters	Pollution incident Disturbance	High	The works have the potential to have a Minor Negative impact upon this habitat through disturbance and due to the potential for a pollution incident.	- Ecological Supervision. - Toolbox Talk provision to site personnel prior to commencement of works.	Slight Adverse

Tables 5.7 and 5.8 identify that whilst there would be adverse impacts of minor magnitude as a result of construction activities for all ecological receptors, with the provision of suitable mitigation measures, these impacts would be managed on site, and minimised through the provision of replacement and compensation planting if required for protected species. On balance, effects would be Slight Adverse during the construction period. These impacts are not considered to be significant.

5.7.2 Operation

Project activities shown to have the potential for significant effects on nature conservation have been assessed in Table 5.7 and 5.8 below once the Scheme has become operational. The mitigation outlined in Section 5.6 above has been taken into consideration when determining the magnitude of impacts and the significance of effects.

Table 5.9 Summary of effects for habitats during operation

Habitat	Source of Impact	Value	Magnitude of Impact	Mitigation	Overall Appraisal
Hedgerows	Severance of habitat /partial loss of habitat	Low	The works have the potential to have a Minor Negative impact upon this habitat through partial loss or alteration of key features.	Wherever possible, hedgerows to be removed would be replaced on a like for like basis. However, some loss is anticipated.	Slight Adverse
Broadleaved Plantation	Severance of habitat /partial	Low	The works have the potential to have a Minor Negative impact upon this habitat through partial	Wherever possible, woodland to be removed would be replaced on a like for like basis. However, some loss is	Slight Adverse

Habitat	Source of Impact	Value	Magnitude of Impact	Mitigation	Overall Appraisal
Woodland	loss of habitat		loss.	anticipated. Habitat management would be undertaken as part of the Landscape and Ecological Management Plan (LEMP) to be delivered during the aftercare period, and by the Highways Agency's Managing Agent in the longer term.	
Semi-improved grassland	Temporary and permanent habitat reduction	Low	The works have the potential to have a Minor Negative impact upon this habitat through partial loss.	Wherever possible, semi-improved grassland to be removed would be replaced on a like for like basis. However, some loss is anticipated. Habitat management would be undertaken as part of the LEMP to be delivered during the aftercare period, and by the Highways Agency's Managing Agent in the longer term.	Slight Adverse
Freshwater Rivers and Canals	No impact	Low	Neutral	None required	Negligible
Non-statutory designated sites (Battlefield Brook and River Salwarpe Special Wildlife Sites)	No impact	Medium	Neutral	None required	Negligible

Table 5.10 Summary of impacts required for the Simple Assessment of species during operation

Species	Source of Impact	Value	Magnitude of Impact	Mitigation	Overall Appraisal
Dormice	Severance of habitat	High	Minor Negative	Habitat management would be undertaken as part of the LEMP to be delivered during the aftercare period, and by the Highways Agency's Managing Agent in the longer term.	Slight Adverse
Great Crested Newt	Severance of habitat	High	Minor Negative	Habitat management would be undertaken as part of the LEMP to be delivered during the aftercare period, and by the Highways Agency's Managing Agent in the longer term.	Slight Adverse
Bats	Severance of habitat/partial loss of potential foraging habitat	High	Minor Negative	Habitat management would be undertaken as part of the LEMP to be delivered during the aftercare period, and by the Highways Agency's Managing Agent in the longer term.	Slight Adverse
Reptiles	Partial loss of habitat	Medium	Minor Negative	Habitat management would be undertaken as part of the LEMP to be delivered during the aftercare period, and by the Highways Agency's Managing Agent in the longer term.	Slight Adverse
Birds	Partial habitat loss and severance of habitat	Low	Minor Negative	Habitat management would be undertaken as part of the LEMP to be delivered during the aftercare period, and by the Highways Agency's Managing	Slight Adverse

Species	Source of Impact	Value	Magnitude of Impact	Mitigation	Overall Appraisal
				Agent in the longer term.	
Brown Hairstreak	Partial habitat loss and severance of habitat	Low	Minor Negative	Habitat management would be undertaken as part of the LEMP to be delivered during the aftercare period, and by the Highways Agency's Managing Agent in the longer term.	Slight Adverse
Water Voles	No impact	High	Neutral	None required	Negligible
Otters	No impact	High	Neutral	None required	Negligible

Tables 5.9 and 5.10 identify that there would be adverse impact of minor magnitude for some receptors, as a result of partial habitat loss and severance issues. However, with mitigation and management measures in place, such as habitat management to be delivered through a LEMP during the aftercare period and by the Highways Agency's Managing Agent in the longer term, adverse impacts would be minimised. The magnitude of impact for each resource means that overall, impacts would be likely to be Slight Adverse at worst for the long term. These impacts are not considered to be significant.

5.8 Conclusions

The Scheme would result in both permanent and temporary loss of habitat within the verge on completion of the works.

Where areas of woodland, scrub, hedgerow and grassland would be lost as a result of the proposed works, replacement planting would be undertaken with native species of local provenance. If replacement of the lost habitats is not possible on a like for like basis, habitat enhancement/management would be undertaken.

All outstanding protected species surveys (i.e. GCNs and dormice) must be conducted and completed prior to the commencement of the proposed works to establish their presence or likely absence. If the presence of EPS licences would be submitted to Natural England and appropriate mitigation measures in accordance with the Method Statements contained within those licences would be implemented prior to and during the proposed works.

Where presence of other protected species such as reptiles, badgers and nesting birds is confirmed within the works footprint, appropriate mitigation measures would be undertaken based on the Ecological Mitigation Strategy - 326073-30-0000-ST-001-P01 (Mott MacDonald, 2014), which would be used to inform the CEMP. With these mitigation measures in place, it is considered that the Scheme would result in an overall **Slight Adverse** impact upon Nature Conservation both during the construction stage, and once the Scheme has become operational. These impacts are not considered to be significant.

6 Air Quality – Detailed Assessment

6.1 Introduction

The Environmental Scoping Report for the M4 Junction 4a to 6 SM-ALR identified that the scope of the works and the potential significance of effects warrants further assessment to a Detailed Level for Air Quality since the Scheme meets the criteria as set out in the DMRB, Volume 11, Section 3, Part 1 for further assessment to be undertaken. This is because Air Quality receptors have been identified within 200m of the proposed works and there would be the potential for significant impacts once the Scheme is operational since the road alignment and traffic flow would change as a result of the installation of the ALR.

6.2 Impact Assessment Methodology

An Air Quality Impact Assessment has been undertaken to a Detailed Level in accordance with DMRB Volume 11, Section 3, Part 1, and is presented as an Air Quality Assessment Report within Appendix E of this EAR (contained within Volume 2).

Construction effects

Construction activities can result in temporary effects from dust. A qualitative assessment of potential dust effects has been undertaken as part of the Air Quality Detailed Assessment (Appendix E of this EAR), based on a review of likely dust raising activities and identification of sensitive receptors within 200m. However, due to the likely reduced emissions associated with a 50mph speed restriction which would be in place during the construction period, potential impacts from any traffic management are considered to be negligible, and have not been assessed further within the Air Quality Assessment. In addition, construction traffic movements are considered to be insignificant compared to existing flows, and therefore potential impacts from the Scheme are considered to be negligible and have not been assessed further.

Operational effects

Outputs from the Scheme traffic model have been used for the assessment of air quality impacts at the operation stage. The assessment has considered the Base Year scenario (2012), the Do-Minimum (DM) Scenario (2015 - opening year), and the Do-Something (DS) Scenario (2015). An analysis of the traffic data for a further future year of 2030 shows that, although an increase in traffic is predicted, it is relatively small and likely to be outweighed by the improvement in vehicle emissions and background concentrations expected. The opening year of the proposed Scheme is therefore considered to represent the worst case within the first 15 years of opening and so no further future year has been considered.

The assessment uses a dispersion model called ‘ADMS-Roads’ (version 3.1); a PC-based model of dispersion in the atmosphere of pollutants released from road traffic sources. Only road traffic emission sources have been explicitly included within the dispersion model. Non-road traffic related emission sources have been accounted for within the assessment by assigning appropriate ‘background’ concentrations to modelled receptor locations.

The assessment has included all sensitive receptors that have a reasonable risk of exceeding the air quality objectives, and those that are likely to experience the highest total concentrations and/or greatest change. There are no nature conservation sites (Designated Sites) within 200m of affected roads. Therefore potential impacts on Designated Sites from the Scheme are considered to be negligible and have not been assessed further.

6.3 Mitigation

During construction, the Contractor will carry out the works in accordance with the Best Practicable Means, as described in Section 79 (9) of the Environmental Protection Act (EPA) 1990, to reduce fumes or emissions which may impact upon air quality. This would include, but not be limited to the following, which would be encompassed within a Method Statement contained within the CEMP:

- Avoid double handling of materials;
- Minimise height of stockpiles and profile and locate stockpiles out of the wind;
- Ensure that all vehicles with open loads are securely sheeted or enclosed;
- Provide a means of removing mud and other debris from vehicles leaving the site;
- Maintain a low speed limit on site to prevent the generation of dust by fast moving vehicles;
- Damp down surfaces in dry conditions;
- Water should be sprayed during cutting / grinding operations (i.e. cutting curb slabs); and,
- All vehicle engines and plant motors shall be switched off when not in use.

7.4 Summary and Conclusions

Construction

A qualitative assessment of potential dust effects has been undertaken, based on a review of likely dust raising activities and identification of sensitive receptors within 200m. Potential dust impacts would be suitably controlled using the best practice mitigation measures proposed. Potential construction dust effects are therefore concluded to be **not significant.**

Operation

Due to the potential impacts of the Scheme and indication of existing exceedences of air quality objectives in the area, a 'Detailed Level' local air quality assessment has been undertaken, and is presented within Appendix E of this EAR (contained within Volume 2).

The maximum increase in long term NO_2 concentrations at receptors experiencing concentrations above the objective is 'small' and all changes in PM_{10} concentrations are 'imperceptible'. The Scheme's effect on local air quality is concluded to be **not significant** and no mitigation measures are considered necessary.

7 Noise and Vibration – Detailed Assessment

7.1 Introduction

The Environmental Scoping Report for the M4 Junction 4a to 6 SM-ALR identified that the scope of the works and the potential significance of effects warrants further assessment for Noise and Vibration to a Detailed Level, since the Scheme meets the criteria as set out in the DMRB, Volume 11, Section 3, Part 7. This is because, once the Scheme is implemented, there would be a change to the existing road layout and operating conditions such as road surface, and traffic flows. There is potential for traffic flow changes and the change in road alignment to result in a noise increase of greater than 1dB for residential receptors within close proximity of the road.

7.2 Impact Assessment Methodology

A Noise and Vibration Assessment has been undertaken to a Detailed Level in accordance with DMRB Volume 11, Section 3, Part 7, and is presented as a Noise and Vibration Assessment Report within Appendix F of this EAR (contained within Volume 2). In accordance with this methodology, the assessment has identified potential impacts associated with the construction stage, as well as at operation. The DMRB methodology requires that the study area is identified as an area within 1km of the physical works associated with the proposed extents of the J4a to J6. Within this study area, road traffic noise predictions are performed at any sensitive receptor within 600m of a road where there is the possibility of a change of 1 dB $L_{A10,18hr}$ upon Scheme opening.

Construction Effects

The baseline for noise and vibration conditions with respect to temporary effects during construction is represented by the conditions immediately prior to construction. The effects during construction are compared to this baseline for as long as construction continues. The total period of construction is expected to be 24 months, but as construction activities would be mobile, the period for which any one location is subject to noise impacts would be considerably less.

Operational Effects

The assessment of operational noise and vibration effects considers the change, hence impact, brought about by the proposed Scheme between conditions in the year of opening (in the absence of the proposed Scheme) and the design year (15 years after Scheme opening). Night-time noise is also considered within the Noise and Vibration Assessment Report (Appendix F; contained within Volume 2 of this EAR).

Traffic data has been used to calculate and compare traffic noise levels with (Do Something) and without (Do Minimum) the proposed Scheme in operation in the baseline and future assessment years, 2015 and 2030 respectively. To demonstrate these changes in traffic noise, calculated noise difference contours have been prepared as part of the Detailed Noise Assessment for the following scenario comparisons (all figures presented within the Detailed Noise and Vibration Report within Appendix F of this EAR):

- The short-term change in road traffic noise level upon the proposed Scheme opening;
- The long-term change in road traffic noise level should the Scheme not be built; and,
- The long-term change in road traffic noise level should the proposed Scheme be built.

7.3 Mitigation

The Scheme design includes the proposal to resurface the full Scheme extents (full length, all lanes) with Thin Surface Course (TSC), which would comply with a Category 3 surface for noise predictions. As a result, this design assumption has been included within the noise impact assessment. For the Category 3 surface a Road Surface Correction of -3.5dBA has been applied.

7.4 Summary and Conclusions

Construction

At times when construction activities occur immediately adjacent to residences, then a noise increase of greater than 5dBA may occur in conjunction with overall noise levels of greater than 65dBA. These periods would however be relatively short in duration at each individual receptor. A requirement for the best practicable means (BPM) of noise control (as described in BS5228-1) would also be included within the CEMP, and the limits for noise and means of noise control would be agreed with the Local Authority well in advance. With these measures in place, impacts at the construction stage are considered to be **Slight Adverse** overall, for the duration of the construction period. These impacts are not considered to be significant.

Operation

On Scheme opening the benefits of using TSC to a Category 3 level are clear. There would be no dwellings at which an increase in noise level would occur. There would be, however, Moderate decreases at 1321 dwellings, which would result in a **Moderate Beneficial** and significant effect. Minor decreases would occur at 4213 dwellings and Negligible decreases at 650 dwellings, which would result in a **Slight Beneficial** effect.

Beneficial impacts of the Scheme are reduced over the long term due to the fact that in the 'Do Nothing' scenario there would be a decrease in speed caused by congestion which would result in a small decrease in noise level. However, there would be a Negligible decrease in noise level at over 5000 dwellings and Minor decrease at 12 dwellings in the long-term, and a Negligible increase at 900 dwellings with the application of TSC in the long-term. These impacts would be **Neutral** in the long term.

Provided that a Category 3 TSC is used, there would be no significant adverse noise impacts caused by the Scheme which require further noise mitigation under the normal DMRB methodology, either on opening or in the long term.

8 Cumulative Effects

8.1 Introduction

This Chapter presents the assessment of Cumulative Effects for the M5 Junction 4a to 6 SM-ALR Scheme. The assessment has been written following the guidelines contained within DMRB Volume 11, Section 2, Part 5.

8.2 Methodology

DMRB Volume 11, Section 2, Part 5 states that cumulative impacts result from multiple actions on receptors and resources and over time and are generally additive or interactive (synergistic) in nature. Cumulative impacts can also be considered as impacts resulting from incremental changes caused by other past, present or reasonably foreseeable actions together with the project. There are principally two types of cumulative impact in environmental impact assessment, and these are identified as:

- Cumulative impacts from different projects (with the project being assessed); and,
- Cumulative (combined) impacts from a single project.

Cumulative Effects from Different Projects

For cumulative impacts from different projects, the impact may arise from the combined action of a number of different projects in combination with the project being assessed, on a single receptor/ resource. This can include multiple impacts of the same or similar type from a number of *reasonably foreseeable* projects upon the same receptor/resource. For the purposes of this EAR and in accordance with the DMRB, reasonably foreseeable is interpreted to include other projects that are 'committed'. It includes:

- Trunk road and motorway projects which have gone through the statutory processes.
- Development projects with valid planning permissions as granted by the Local Planning Authority, and for which formal EIA is a requirement or for which non-statutory environmental impact assessment has been undertaken.

For the M5 Junction 4a to 6 SM-ALR Scheme, confirmation of all reasonably foreseeable projects has been required for inclusion within the Uncertainty Log which is used to develop the Traffic Model for the Scheme (refer to the M5 J6-J4a Scenario Planning Scheme Traffic and Economic Appraisal Report (TEAR) for further details). This process identified that there are no major highways improvement or approved developments within the Scheme corridor that should be included within the Traffic Model for future traffic forecasting purposes. As a result, no further assessment of potential effects as a result of cumulative impacts from different projects has been undertaken, since no reasonably foreseeable projects have been identified.

Cumulative (combined) effects from a single project

Cumulative impacts from a single project may arise from the combined action of a number of different environmental topic specific impacts upon a single receptor/resource. As a result, the assessment methodology for these combined effects involves the identification of impact interactions associated with the Scheme upon separate environmental resources. The significance of construction and operational phase environmental impacts are brought forward from the preceding chapters of the EAR and the Environmental Scoping Report (Appendix B) into matrices, providing a clear summary of potential impacts. The significance of combined effects upon each environmental resource is then made based upon the balance of significance scores. For the purposes of this assessment combined effects of moderate adverse or beneficial and above are considered significant, although minor effects are still worthy of note. Weighting of impacts has not been applied to the matrices as such an approach is considered subjective and would make interpretation of the results difficult.

8.3 Combined effects

Construction Effects

Table 8.1 summarises the significance of construction phase impacts as assessed in the relevant preceding chapters of this EAR and sets the impacts in the context of the range of environmental resources or receptors likely to be affected by the Scheme. The final column in the table provides an assessment of the likely combined effects of the Scheme after mitigation upon each environmental resource.

The combined effects of the Scheme upon Land Use and Landscape would be Slight Adverse, as a result of construction plant and stockpiles being present within the landscape for a temporary period, and constraints on material resources. In addition, construction noise may result in a temporary adverse effect within the local landscape, as this may impact upon audible tranquillity. However, the Built Environment would be unlikely to experience substantial change as a result of the Scheme, since the majority of the route passes within rural areas, and residential and commercial properties are only likely to be affected by construction noise (Slight Adverse, for a temporary period).

Local communities would be likely to experience a combination of Slight Adverse impacts associated with construction traffic, localised dust and construction noise. A reduction in accessibility to facilities, services, amenities and employment during the construction phase may also arise. Views from the road may be temporally affected due to the presence of construction activities and stockpiles, resulting in an overall Slight Adverse effect for vehicle travellers. In addition, a temporary Slight Adverse effect would be anticipated for the water environment and for local ecological features, due to construction noise, pollution potential from construction plant and the potential disturbance of contaminated soils and construction dust. However, all of these potential impacts would be mitigated through the implementation of a CEMP for the Scheme, which would be prepared by the Contractor prior to construction. Impacts would also only be for a temporary period. On balance, the combined effects of the Scheme at the construction stage are therefore considered to be **Slight Adverse**. These impacts are not considered to be significant.

Operational effects

Table 8.2 summarises the significance of operational phase impacts set in the context of the environmental resources likely to be affected by the Scheme. The final column in the table provides an assessment of the likely combined effects of the Scheme after mitigation upon each environmental resource.

Impacts upon Landscape would be likely to be Slight Beneficial or Neutral, since overall effects for visual receptors would be Neutral, but there would be a beneficial effect associated with reduced road traffic noise in the local landscape. In addition, impacts upon the Built Environment would be Neutral due to these Neutral effects for visual receptors, and since Air Quality impacts are predicted to be Neutral on Scheme opening. Some benefits would arise from reduced noise within the built environment, which is a result of the proposed resurfacing of the road with Category 3 Thin Surface Course, included within the Scheme design. This resurfacing also provides a benefit in terms of reduced noise for Local Communities, although on balance, the combined impacts for Communities would be Neutral.

There would be no change upon the view from the road for vehicle travellers on Scheme opening, and a Neutral impact upon the water environment since the drainage design for the Scheme would ensure that the existing situation outside of the Highways boundary is maintained (with regards to flood risk and pollution potential).

Some adverse effects are anticipated for Ecology and also Land-use as a result of potential impacts upon protected species, and the loss of habitat associated with vegetation clearance required to accommodate the ERAs. Wherever possible, these impacts would be minimised through the provision of replacement planting and appropriate habitat management during the maintenance and aftercare period. On balance, the combined effects of the Scheme once it is operational are considered to be **Neutral,** and therefore not significant.

Table 8.1: Combined Construction Phase Effects of the Scheme

Topic Area	Noise and Vibration	Air Quality	Nature Conservation	Materials	Landscape	Cultural Heritage	Road Drainage and the Water Environment	Effects on All Travellers	Community Effects	Geology and Soils	
Resource											**Combined Effects**
Land Use			-		-					□	-
Landscape	-			-	-	□					-
Built Environment	-	□			□	□					□
Communities	-	-		□		□			□		□
Vehicle Travellers					-			-	□		-
Water Environment			-	-			□				-
Ecology	-	-	-								-
Overall Combined Effect of the Scheme during Construction											-

Notes:

Topic Area Impact Key: *Blank = No Impact* □ *= Negligible / Neutral* *- /- - /- - - = slight, moderate, large adverse impact* *+ / ++ / +++ = slight, moderate, large beneficial impact*

Combined Effect Key: *Blank = No effect* □ *= Negligible / Neutral* *- /- - /- - - = minor, moderate, major adverse effect* *+ / ++ / +++ = minor, moderate, major beneficial effect*

Table 8.2: Combined Operational Effects of the Scheme

Topic Area	Noise and Vibration	Air Quality	Nature Conservation	Materials	Landscape	Cultural Heritage	Road Drainage and the Water Environment	Effects on All Travellers	Community Effects	Geology and Soils	
Resource											**Combined Effects**
Land Use			-							□	□ / -
Landscape	+				□	□					□
Built Environment	+	□			□	□					□
Communities	+	□		□	□	□			□		□
Vehicle Travellers					□			□	□		□
Water Environment			□	□			□				□
Ecology		□	-								□ / -
Overall Combined Effect of the Scheme during Operation											□

Notes:

Topic Area Impact Key: Blank = No Impact □ = Negligible / Neutral - /- - /- - - = slight, moderate, large adverse impact + / ++ / +++ = slight, moderate, large beneficial impact (□/-/+) = Impact in Yr 15

Combined Effect Key: Blank = No effect □ = Negligible / Neutral - /- - /- - - = minor, moderate, major adverse effect + / ++ / +++ = minor, moderate, major beneficial effect (□/-/+) = Effect in Yr 15

8.4 Conclusions

Combined effects of the Scheme during construction would, on balance, be **Slight Adverse**. This would be as a result of the temporary effects of construction noise, construction plant, stockpiles and dust. However, measures to minimise the temporary effects of the Scheme during the construction stage would be implemented through the CEMP, which would be prepared by the Contractor. Overall, impacts are not considered to be significant.

Once the Scheme is operational, the combined effects of the Scheme are considered to be **Neutral** on balance. This is a result of Slight Beneficial noise impacts associated with the proposed resurfacing of the road, which would act to balance some of the potential Slight Adverse effects associated with impacts upon nature conservation features. The majority of receptors would experience a Neutral effect once the Scheme is operational, as adverse impacts would be mitigated through the provision of additional screening and replacement planting and the sensitive design of the proposed Scheme. Overall, impacts are not considered to be significant.

9 Outline Environmental Management Plan

This Outline Environmental Management Plan (EMP) has been prepared in accordance with DMRB Volume 11, Section 2. It provides a checklist of the measures and a basis on which monitoring and auditing of the delivery of the environmental performance of the Scheme can be measured. This checklist would be further developed as the Scheme progresses through the design process, and would inform the CEMP to be produced by the Contractor at the construction stage, as well as eventually the Handover Environmental Management Plan (HEMP) to be passed to the network Managing Agent at operation.

Table 9.1 below presents the Outline EMP for the M5 Junction 4a to 6 SM-ALR Scheme.

Table 9.1: Outline Environmental Management Plan

Reference	Issue	Proposed mitigation/Enhancement Measures	Further Assessment /Survey/ Monitoring
Air Quality (AQ)			
AQ01	During construction, potential for changes in air quality due to dust emissions along the route, emissions from site plant equipment and vehicles and also from changes in traffic flows along the scheme with traffic management in place.	Construction works to be carried out in accordance with best practice. Control measures to minimise dust emissions. Follow actions as specified within Appendix 1/23 of the Contract Documents.	**Detailed Design:** Measures to be specified in CEMP (produced by the Contractor). **Construction:** Refine CEMP during works. **Operation / Maintenance:** Audit of CEMP performance.
AQ02	During operation, potential for changes in air quality due to emissions from operational traffic.	Assessment identifies no significant effects and no requirements for mitigation.	N/A
Landscape and Visual Effects (LV)			
LV01	Removal of vegetation within the existing highway boundary during construction to erect new gantries, Emergency Refuge Areas (ERAs), supporting earthworks and drainage.	Consideration of retaining existing vegetation has been included in landscape design proposals to, minimise the loss of vegetation during construction. Some areas of replacement planting identified.	**Detailed Design:** Develop detailed landscape mitigation and construction drawings. **Construction:** Vegetation survey to be undertaken prior to site clearance, to identify vegetation to be retained. Landscape audits to be undertaken during construction phase to ensure vegetation has been retained. **Operation / Maintenance:** Undertake maintenance works and check establishment in accordance with a

Reference	Issue	Proposed mitigation/Enhancement Measures	Further Assessment /Survey/ Monitoring
			management / maintenance plan. Defects to be addressed.
LV02	Visual impacts and increased influence of the motorway on visual receptors through intensification of highway infrastructure(introduction of new gantries and CCTV masts, modification of existing signs/gantries) and density of traffic (increased width of traffic to four operational lanes within the highway boundary would increase perception of volume/density of traffic).	Sensitive positioning of respective highway infrastructure elements has been undertaken at preliminary design stage to reduce visual impacts wherever possible.	**Detailed Design:** Assess detailed design and update landscape mitigation drawings and measures. Schedule planting programme to be undertaken during optimal planting seasons/ conditions. **Construction:** Landscape audits to be undertaken during construction stage to confirm planting establishes. **Operation/Maintenance:** Undertake maintenance works and check establishment in accordance with a management / maintenance plan. Defects to be addressed.
Nature Conservation (NC)			
NC01	EPS Species presence – Great Crested Newts All water-bodies beyond 250m were discounted. Habitat Suitability Index (HSI) of 31 water bodies has been undertaken to assess their suitability for GCNs (Oldham et	If GCN found within the site the EPS licensing procedures for GCN and consultation with Natural England must be followed by suitably qualified ecologist. - Period of survey in the terrestrial habitat to ascertain whether there are any great crested newts present. - Render the small areas of habitat	**Detailed Design:** GCN surveys involve four visits in suitable weather conditions between mid-March and mid-June. Undertake appropriate surveys and if required prepare Method Statement and application for EPS licensing May – June 2014. Inform works of any risks to programme and identify area of restriction on works activities to be put in place.

Reference	Issue	Proposed mitigation/Enhancement Measures	Further Assessment /Survey/ Monitoring
	al. 2000).	to be lost/disturbed unsuitable prior to commencement of work. - A licence may be required to allow a trapping/mitigation regime to be - conducted following the terms of the licence. Method Statement of the EPS licence will determine if any mitigation planting to ensure no long term impact.	**Construction:** Instigate GCN mitigation and deliver a Tool box Talk to provide an identification key and reference the EPS Method Statement. CEMP to be followed during works. **Operation/Maintenance:** Undertake maintenance works and check growth in accordance with a management/ maintenance plan.
NC02	Small numbers or individual reptiles may be present and thus disturbed in verge areas to be lost or disturbed during construction.	Method statement to be provided to minimise any risk to reptiles from the construction activities. Construction works to be undertaken under the supervision of an environmental clerk of works where necessary.	**Detailed Design:** Prepare Method Statement to protect reptiles. Include method statement in the CEMP. **Construction:** Ecologist to supervise construction activities affecting the verge.
NC03	**Brown Hairstreak -** An empty egg case was found between Marker Posts (MP) 36/3 – 36/6 Southbound, with a sighting of the butterfly at MP 41/7 – 41/9 Southbound (Amey 2007). The Brown Hairstreak butterfly breeds on young growth of Blackthorn (Prunus spinosa) and occasionally other Prunus species such as Bullace (P.	Sensitive working methods will ensure that the impacts to the brown hairstreak will be minimised.	**Construction:** Toolbox Talk which will be given to the Contractor prior to works commencing. Planting plans/ species mix to include blackthorn *Prunus spinosa* as interest to Brown Hairstreak.

Reference	Issue	Proposed mitigation/Enhancement Measures	Further Assessment /Survey/ Monitoring
	domestica).		
NC04	Potential to encounter breeding birds during construction.	Vegetation to be removed outside of the breeding bird season (February to September) under supervision. Vegetation clearance within the breeding season to be checked by an experienced ecologist. Nest sites of breeding birds to be avoided until it is confirmed by an ecologist that the breeding cycle is complete and that the young have fledged.	**Construction:** Vegetation clearance outside and within bird breeding season, to be supervised by an experienced Ecologist. Toolbox Talks to be delivered prior to site clearance and during works (vigilance of nesting birds in vehicles and around storage areas as well as vegetation)
NC05	Badgers are present within a limited area (*Confidential information*).	No materials should be stored in the vicinity of identified setts and any excavations left open overnight should be equipped with a means of escape for any animal that may fall into them. Measures are to be included in the CEMP.	**Detailed Design:** Prepare a Method Statement to protect badgers, for inclusion in the CEMP. **Construction:** Measures outlined in the CEMP to be undertaken during works.
NC06	I**nvasive/Injurious Weeds:** Himalayan balsam and has been recorded within the Site but is not restricted to the following areas: • Between MP 27.4 to 27.5 and MP 27.6 to 28.1	Adopt good practice guidance to prevent the spread or injury from these species.	**Detailed Design:** Prepare Method Statement for working in vicinity of Invasive/Injurious Weeds for inclusion in the CEMP. **Construction:** Deliver a Tool box Talk to provide an identification key and reference the Method Statement produced at detail design stage as outlined in the CEMP to be followed during works.

Reference	Issue	Proposed mitigation/Enhancement Measures	Further Assessment /Survey/ Monitoring
	(Northbound); • Around Battlefield Brook (28.6 6o 28.7); • Approximately 20m to MP 27.3 (Northbound); • Around MP 28/7 (Southbound); and, • Around River Salwarpe (MP 33.8).		**Operation/Maintenance:** Undertake maintenance works and check growth in accordance with a management/ maintenance plan.
NC07	**EPS - Dormice**	Further Surveys in key areas: • Northbound MP 28/8 and 31/1; and, • Southbound between MP 28/8 and 31/1. If dormice are present, a comprehensive mitigation strategy including a sensitive working method and a habitat replacement package will be required to accompany the EPS licence application to Natural England.	**Detailed Design:** Undertake appropriate surveys and if required prepare Method Statement and application for EPS licensing May – June 2014. Inform works of any risks to programme and identify area of restriction on works activities to be put in place. **Construction:** All vegetation clearance will be supervised by a suitably experienced ecologist and all Contractors will be given Toolbox Talks prior to works commencing onsite. All works to be managed with direct reference to the EPS Method Statement and license.
NC08	**EPS - Bats** No suitable features for roosting bats are proposed to be affected by the works.	If bat presence is identified during the works a comprehensive mitigation strategy including a sensitive working method and a habitat replacement package will be required.	**Detailed Design:** Undertake appropriate surveys and if required prepare Method Statement and strategy for EPS licensing within the CEMP. Inform works of any risks to programme and identify area of restriction on works activities to be put in place.

Reference	Issue	Proposed mitigation/Enhancement Measures	Further Assessment /Survey/ Monitoring
			Construction: All vegetation clearance will be supervised by a suitably experienced ecologist and all Contractors will be given Toolbox Talks prior to works commencing onsite. All works to be managed with direct reference to the EPS Method Statement and license.
NC09	**Reptiles**	Sensitive working methods will ensure that the risk of killing or injuring reptiles is minimised.	**Construction:** All vegetation clearance and construction activities likely to harm reptiles will be supervised by a suitably experienced ecologist and Toolbox Talks will be given to the Contractor prior to works commencing.
NC10	**Water Voles** Battlefield Brook (MP 27/2 and 28/6 to 28/7) is considered to be suitable for water voles. The Worcester and Birmingham Canal which flows under the M5 also supports water voles.	Sensitive working methods will ensure that the risk of disturbing water voles is minimised.	**Construction:** All works likely to impact on water voles will be supervised by a suitably experienced ecologist and Toolbox Talks will be given to the Contractor prior to works commencing.
NC11	**Otters** River Salwarpe at MP 33.8 and Battlefield Brook are both	Sensitive working methods will ensure that the risk of disturbing otters is minimised.	**Construction:** All works likely to impact on otters will be supervised by a suitably experienced ecologist and Toolbox Talks will be given to the Contractor prior to works commencing.

Reference	Issue	Proposed mitigation/Enhancement Measures	Further Assessment /Survey/ Monitoring
	considered suitable for commuting and foraging otters.		
Materials (MT)			
MT01	Impacts associated with the transportation of construction materials; unnecessary imports of primary aggregates and/or fill material and disposal of waste associated with the removal of existing material.	Primary materials to be sourced locally wherever possible. Site Waste Management Plan (SWMP) to minimise waste generation, address materials handling and identify opportunities for re-use and recycling on or off site and minimise offsite disposal.	**Detailed Design:** Measures to be specified in CEMP and SWMP (produced by the contractor). Opportunities for reduction, re-use and recycling to be identified. **Construction:** Refine CEMP/SWMP during works. **Operation/Maintenance:** Audit of CEMP/ SWMP performance.
MT02	Potential to encounter small amounts of contamination with risk to construction/ maintenance workers, future site users, Infrastructure and controlled waters.	Contaminated materials would be subject to waste acceptance criteria testing and would require disposal at an appropriately licensed facility.	**Detailed Design:** Measures to be specified CEMP and SWMP (produced by the contractor). **Construction:** Development of the CEMP/SWMP and updates during works. **Operation/Maintenance:** Audit of CEMP/ SWMP performance
Noise and Vibration (NV)			
NV01	Noise and vibration disturbance to local residents associated with construction activities	Construction works to be carried out in accordance with best practice. Measures to be recorded within Appendix 1/9 and agreed with the Environmental	**Detailed Design:** Measures to be specified in CEMP (produced by the Contractor). **Construction:** Refine CEMP during site works.

Reference	Issue	Proposed mitigation/Enhancement Measures	Further Assessment /Survey/ Monitoring
		Health officer (EHO) from relevant Local Authority.	**Operation/Maintenance:** Audit of CEMP Performance.
NV02	Increased noise resulting from road traffic along the highway corridor of the scheme.	Resurfacing of the Road	**Detailed Design:** Contractor to confirm that the proposed noise mitigation is still effective with the detailed design implemented. No further requirement for monitoring at this stage.
Water (W)			
W01	Potential temporary impacts upon water resources associated with construction activities. Battlefield Brook and River Salwarpe Special Wildlife Sites are located within the works footprint and are likely to be affected by the proposed drainage works.	Construction works to be carried out in accordance to best practice, including implementation of Environment Agency Pollution Prevention Guidelines.	**Detailed Design:** Good practice measures to be within CEMP (produced by the contractor). **Construction:** Development of the CEMP and tool box talks promoting working near water best practise to be delivered. Monitor and maintain water course protection measures with regular checks and updates during site works. **Operation/Maintenance:** Audit of CEMP Performance.
W02	Construction of ERAs increases impermeable area with potential for increased flood and pollution risk.	Proposed design solution to accommodate additional surface water runoff for newly paved area (including climate change) without causing carriageway flooding for 1 in 5 year storm. Run off from ERAs would	No requirement for monitoring or survey.

Reference	Issue	Proposed mitigation/Enhancement Measures	Further Assessment /Survey/ Monitoring
		be attenuated and discharged into filter drains or to ditches. Outflow rate restricted to existing 1 in 5 years storm by means of providing online attenuation. 'Additional' flooding (caused by the newly paved area plus climate change) during a 1 in 100 year storm would be contained within the existing highway boundary and would not give rise to any additional flooding implications. Filter drains provide absorption of suspended solids and heavy hydrocarbons therefore reducing downstream pollution risks from routine run off.	

10 Conclusions

10.1 Summary

This EAR document presents the EIA that has been prepared for the proposed M5 Junction 4a to 6 SM-ALR Scheme.

The proposed Scheme is being promoted by the Highways Agency. It will include the installation and/or upgrade of technology to enable the variation of speed limits along the route of the Scheme during times of high traffic flow and congestion, as well as the conversion of the hard shoulder to enable its use as a running lane to create additional capacity. The works aim to deliver benefits of reduced congestion, improved journey time reliability and improved traffic flows at a substantially lower cost than conventional motorway widening.

The Scheme comprises the installation of signal gantries, CCTV cameras, ERAs and supporting infrastructure. All proposed work would be undertaken within the existing highway boundary. A schematic of the proposed design is included within Appendix A of this EAR.

10.2 Environmental Impact Assessment Scoping

An Environmental Scoping Report has been prepared for the Scheme, and is presented within Appendix B of this EAR. The Scoping Report has identified which environmental topics included within Volume 11 of the DMRB require additional assessment to either a Simple of Detailed level for the proposed Scheme and which topics may be scoped out of the requirement for additional assessment. It identified the need for further assessment for the topics of Visual Impacts, Materials and Nature Conservation to a Simple Level, and Air Quality and Noise and Vibration to a Detailed Assessment, which are presented within this EAR. In addition, this EAR considers Cumulative Effects and presents and Outline EMP for the Scheme.

The environmental assessment process has been undertaken alongside the development of the Scheme design. Environmental mitigation measures have been developed as part of this iterative design process in order to reduce the severity of potential environmental impacts, and have been included within this EAR to aid the determination of the overall environmental effects of the Scheme during construction and operation.

10.3 Significance of Effects

A summary of the potential impacts and overall significance of effects for those topics identified at the Scoping stage as requiring further assessment is provided below.

Visual Impacts

At the construction stage, visual impacts would be anticipated as a result of the removal of existing gantries, installation of proposed gantries, ERA material storage and ERA construction. These impacts would be for a temporary period, and would be likely to result in a minor change from the baseline of the existing highways corridor. Given this context, it is likely that Slight Adverse effects

would be experienced for visual receptors, for a temporary period. These impacts are not considered to be significant.

Once the Scheme is operational, the visual baseline is unlikely to be substantially altered. The proposed ERA locations would impact receptors looking directly down on the proposed Scheme, where open views are afforded and a slight increase of road surface and vegetation loss would be experienced. However, middle and long distance views would be unlikely to be altered to such an extent as to have a significant effect on receptors, due to the lack of vertical intrusion, and the existing context of the road. On balance, the effect for the majority of receptors would be Neutral, and therefore not significant.

Materials

The likely material resources and waste arising from the Scheme have been identified within this EAR. Mitigation to minimise the use of raw materials and ensure the efficient re-use of existing materials and recycling where possible has been proposed, and would include a SWMP, which would be produced in advance of the construction stage, in line with best practice. Soil materials onsite would be re-used in the works where practicable, and concrete and metal materials would, where design constraints and specifications allow, contain high proportions of recycled content. Existing infrastructure such as ducts and cabinets would be re-used where possible, reducing the need for new construction. Un-reusable concrete, metal and plastics would be sent for recycling off site, therefore minimising waste sent to landfill.

Given the above mitigation, the effect of the Scheme upon material resources is not considered to be significant.

Nature Conservation

The Scheme would result in both permanent and temporary loss of habitat within the verge. Outstanding protected species surveys (i.e. GCNs and dormice) would be conducted and completed prior to the commencement of the proposed works to establish their presence or likely absence. If the presence of European Protected Species is confirmed, licences would be submitted to Natural England and appropriate mitigation measures undertaken in accordance with agreed Method Statements.

Where the presence of other protected species such as reptiles, badgers and nesting birds is confirmed within the works footprint, appropriate mitigation measures would be undertaken based on the Ecological Mitigation Strategy - 326073-30-0000-ST-001-P01 (Mott MacDonald, 2013). With these mitigation measures in place, it is considered that the Scheme would result in an overall Slight Adverse impact upon Nature Conservation both during the construction stage, and once the Scheme has become operational. These impacts are not considered to be significant.

Air Quality

Construction activities can result in temporary effects from dust. A qualitative assessment of potential dust effects has been undertaken as part of the Air Quality Detailed Assessment, and best practice mitigation measures have been proposed to manage and mitigate for these potential

impacts at the construction stage. These measures would be detailed within the CEMP for the Scheme. Construction dust effects would be Slight Adverse at worst and not significant.

Once the Scheme is operational, there is the potential for adverse impacts on Air Quality receptors. Given the indication of existing exceedences of air quality objectives in the area, a Detailed Level local air quality assessment has been undertaken and is presented within Appendix E of this EAR (contained within Volume 2). The maximum increase in long term NO_2 concentrations at receptors experiencing concentrations above the objective has been assessed as 'small' and all changes in PM_{10} concentrations are 'imperceptible'. The Scheme's effect on local air quality is therefore considered to be not significant and no mitigation measures have been proposed.

Noise and Vibration

Construction activities would be likely to result in an adverse noise impact for residences that are located within close proximity to the works. However, construction activities would be undertaken for relatively short periods of time at each individual receptor. Combined with the use of BPM for noise control (as described in BS5228-1), and the implementation of a CEMP, with the limits for noise and means of noise control being agreed with the Local Authority well in advance, the impacts at the construction stage are considered to be Slight Adverse and not significant.

On Scheme opening, and with the application of TSC to a Category 3 level, there would be no dwellings at which an increase in noise levels would occur. Moderate and Slight Beneficial effects are predicted for a large number of properties, with Negligible decreases at 650 dwellings. On balance, this would result in a Slight Beneficial effect for noise receptors on Scheme opening. These benefits would be reduced over the long term as, in the Do-Minimum scenario, there would be a decrease in speed caused by increasing congestion over time. However, there would be a Negligible decrease in noise level at over 5000 dwellings, a Minor decrease at 12 dwellings and a Negligible increase at 900 dwellings in the long-term if the Scheme is implemented. On balance, these impacts are considered to be Neutral in the long term..

Provided that a Category 3 TSC is used, there would be no significant adverse noise impacts caused by the Scheme which require further noise mitigation under the normal DMRB methodology, either on opening or in the Long Term.

Cumulative Effects

Cumulative impacts result from multiple actions on receptors and resources over time and are generally additive or interactive (synergistic) in nature. Cumulative impacts can also be considered as impacts resulting from incremental changes caused by other past, present or reasonably foreseeable actions together with the project. No major highways improvement or approved developments have been identified within the Scheme corridor, and as a result, no further assessment of potential effects as a result of cumulative impacts from different projects has been undertaken.

However, the combined effects from multiple actions on receptors and resources have been considered. During construction, the combined effects of the Scheme would, on balance, be Slight Adverse. This would be as a result of the temporary effects of construction noise, construction

plant, stockpiles and dust. Measures to minimise these temporary effects would be implemented through the CEMP, and overall, impacts are not considered to be significant.

Once the Scheme is operational, the combined effects of the Scheme are considered to be Neutral. This is a result of Slight Beneficial noise impacts associated with the proposed resurfacing of the road, which would act to balance potential Slight Adverse nature conservation effects. The majority of receptors would experience a Neutral effect once the Scheme is operational, as adverse impacts would be mitigated through the provision of additional screening and replacement planting and the sensitive design of the proposed Scheme. Overall, combined effects are not considered to be significant.

10.4 Environmental Impact Assessment Determination

The assessment presented within this EAR concludes that, with proposed mitigation such as the implementation of a CEMP and SWMP at the construction stage, and use of Category 3 TSC, there would be no significant beneficial or adverse effects upon environmental receptors.

This assessment is made for both the construction and operational stages of the Scheme. As a result, it is not considered necessary to undertake more detailed environmental assessment in the form of Statutory EIA and the publication of an Environmental Statement for the Scheme.

The conclusions of this EAR will be presented within the RoD. The NOD will be published on completion of all consultation with the Statutory Environmental Bodies.

Appendices

Appendix A Scheme schematic

Appendix B Scoping Report

Appendix C Environmental Constraints

Appendix D Key Viewpoints

Appendix E Air Quality Detailed Assessment

Included within Volume 2 of this EAR.

Appendix F Noise and Vibration Detailed Assessment

Included within Volume 2 of this EAR.