

M25 junction 10/A3 Wisley interchange

Requirement 10 Bolder Mere



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The Project Manager is responsible for production of this document, based on the contributions made by his/her team existing at each Stage

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1. Introduction

1.1 Requirement 10 in Schedule 2 of the Draft DCO

- 1.1.1 Requirement 10 in Schedule 2 of the draft Development Consent Order deals with the Bolder Mere Mitigation and Enhancement Area. This document has been prepared to set out the mitigation and enhancement measures that will be undertaken, to prevent any deterioration in the classification status of Bolder Mere as a surface water body and to ensure compliance with relevant environmental objectives in accordance with the Water Environment (Water Framework Directive) (England and Wales) Regulations 2017(a).
- 1.1.2 This is to enable the consultation with parties specified in the Requirement to take place and for the Secretary of State to approve the measures, after consideration of the consultation feedback, in due course. The full text of the Requirement is set out in Table 1.1.

Table 1.1: Requirement 10 in Schedule 2 of the Draft DCO

Bolder Mere Mitigation and Enhancement Area	
(1) No part of Work No.5(c) is to commence until details of the environmental mitigation and enhancement measures to be undertaken in the Bolder Mere mitigation and enhancement area (Work No.55) have been submitted to and approved in writing by the Secretary of State, following consultation with the Environment Agency, Natural England, Surrey County Council and the relevant planning authority. The details must substantially accord with the measures described in the Environmental Statement and in the Water Framework Directive Assessment Report certified under article 45 (certification of documents, etc.) of this Order and must include—	
(a)	details of any vegetation to be removed to improve the hydrosere of the shore of Bolder Mere;
(b)	the extent, shape and species composition of the replicate marginal vegetation to be provided alongside the proposed retaining wall, including the method of implementation;
(c)	a timetable for the completion of the environmental mitigation and enhancement works (Work No.55); and
(d)	a scheme for the maintenance, management and environmental monitoring of the mitigation and enhancement measures at Bolder Mere.
(2) The environmental mitigation and enhancement works must be carried out, maintained, managed and monitored in accordance with the details approved under sub-paragraph (1) and must be begun before any part of Work No.5(c) may commence.	
(3) No part of Work No.5(c) is to commence until details of the surface water drainage and pollution control measures for that part of the A3 southbound carriageway adjoining the proposed Bolder Mere retaining wall, reflecting the results of a detailed drainage survey, have been submitted to and approved in writing by the Secretary of State, following consultation with the Environment Agency, Natural England, Surrey County Council and the relevant planning authority.	
(4) The authorised development must be constructed in accordance with the detailed drainage scheme approved under sub-paragraph (3).	

Table Source: SCHEDULE 2 REQUIREMENTS PART 1 REQUIREMENTS (Article 4). Pages 60 – 61.

1.2 Bolder Mere Overview

- 1.2.1 Bolder Mere, Surrey (TQ077584) is a small (8 ha), shallow (maximum depth 1.1 m) lake situated within mixed woodland and bordered to the northwest by the A3 dual carriageway (Figure 1.1). It is classified by the Water Framework Directive (WFD) as being a heavily modified waterbody (ID GB30643218) with significant alterations to the drainage and shoreline having been made to accommodate the building and expansion of the A3. Despite this, the site, and surrounding areas are of significant conservation interest and are encompassed by the Ockham and Wisley Commons Site of Special Scientific Interest (SSSI). Bolder Mere is also located within the boundary of the Thames Basin Heaths Special Protect Area (SPA).



Figure 1.1: Bolder Mere Location Map

- 1.2.2 The overview presented here is based on results from the Bolder Mere macrophyte, aquatic macro-invertebrate and habitat survey of the lake undertaken in June 2018 (Goldsmith Ecology, 2018). This investigation was commissioned to assess the condition of the water body as inferred from its ecology and physical habitat. The report identified the value of the habitats therein and offered suggestions for their improvement in line with its designated status and the constraints that present on site e.g. shoreline scrub encroachment and the presence of invasive species.
- 1.2.3 The open water habitat of Bolder Mere is relatively uniform in both structure and species composition with the most botanically rich area for submerged plant species being on the more consolidated stony substrates around the southern shore of the lake.

- 1.2.4 Whereas much of the open water is relatively uniform in structure and species composition, the marginal wetland habitats of Bolder Mere show considerable variation, and some maintain areas of significant floristic interest.
- 1.2.5 The most species rich and botanically interesting areas are along the southern margin of the lake where previous management works have focussed on the removal of trees and scrub (birch, willow, alder and pine), to open up areas of the hydrosere allowing the development of a more natural acid bog flora characterised by the presence of species including purple moor-grass, Sphagnum species, sedges, marsh St John's-wort, lesser spearwort and cottongrass.
- 1.2.6 New Zealand pygmyweed is abundant along the southern shore, but despite the presence of this invasive non-native species, the targeted management of the area was identified as representing the best opportunity to preserve and improve botanical interest of Bolder Mere.
- 1.2.7 The most abundant emergent and marginal species is common reed which forms relatively extensive stands around the eastern margin and along the north and north-west shore and is the main component of the emergent flora forming the narrow emergent zone against the existing A3 alignment.
- 1.2.8 To the west, south-west and north-east of the lake, the margins have extensive areas of dense overhanging trees, mainly comprising willow and alder at the lake edge, with a mix of coniferous and deciduous species behind, including mature oak and birch with understory of bracken. Where the wetter areas extend into the woodland to the west and southeast of the site, there are stands of sedges.

1.3 Requirement 10 Item (1)

- 1.3.1 Item (1) calls for submission of the details of the environmental mitigation and enhancement measures to be undertaken in the Bolder Mere mitigation and enhancement area (Work No.55) and the requirement for consultation with the Environment Agency, Natural England, Surrey County Council and the relevant planning authority.
- 1.3.2 A series of consultation meetings on water matters including Bolder Mere was held during the latter part of 2020 and early 2021. A record of meetings held with consultees in relation Item (1) sub-items (a) through to (d) and Item (3) is presented in Table 1.2.

Table 1.2: Consultation Record

Meeting Title	Items Covered	Date of Meeting	EA	NE	SCC	SWT	GBC	EBC	Meeting Reference
Water Matters Consultation 1	Item (1) (a) and (1) (b); Item (3)	23/09/20	Y		Y	Y	Y	Y	HE551522-BBA-EWE-WHL_AL_SC HME-MI-LW-000001
Water Matters Consultation 2	Item (1) (a) and (1) (b)	28/10/20	Y	Y	Y				HE551522-BBA-EWE-WHL_AL_SC HME-MI-LW-000004
Water Matters Consultation 3	Item (1) (a), (1) (b) and (1) (c); Item (3)	02/12/20	Y	Y	Y			Y	HE551522-BBA-EWE-WHL_AL_SC HME-MI-LW-000006
Bolder Mere - shoreline management	Item (1) (a) and (1) (c)	08/01/21				Y			HE551522-BBA-EWE-STH_AL_BOLDER-MI-LW-000001
Water Matters Consultation 4	Item (3)	15/01/21	Y		Y				HE551522-BBA-EWE-WHL_AL_SC HME-MI-LW-000008
Water Matters Consultation 5	Item (1) (a) and (1) (b); Item (3)	10/02/21	Y		Y				HE551522-BBA-EWE-WHL_AL_SC HME-MI-LW-000009
Bolder Mere - Dead Hedging	Item (1) (a) and (1) (b)	11/03/21				Y			HE551522-BBA-EWE-STH_AL_BOLDER-MI-LW-000002
Surface water quality assessment	Item (3)	29/06/21	Y						HE551522-BBA-EWE-WHL_AL_SC HME-RP-LW-000017

Notes: EA = Environment Agency; NE = Natural England; SCC = Surrey County Council; SWT = Surrey Wildlife Trust; GBC = Guildford Borough Council; EBC = Elmbridge Borough Council

Item (1) (a) Vegetation Removal to Improve Hydrosere of Bolder Mere

- 1.3.3 Item (1) (a) of Requirement 10 calls for details of any vegetation to be removed to improve the hydrosere of the shore of Bolder Mere to be provided.

- Specification for Habitat Improvement Works on shores of Bolder Mere (HE551522-BBA-EWE-STH_AL_BOLDER-SP-LW-000004)



Figure 1.2: Bolder Mere Mitigation and Enhancement Area

- Scrub and tree cutting, treatment and removal:
 - Clearance of scrub woodland with trees varying in height from approximately 5 m to seedlings. The objective is to clear scrub encroachment from areas of acid bog around the shore.
- Selective coppicing within the alder carr:
 - To create space for regeneration of the coppice stools and to improve the light climate at the woodland floor.

- Distribution of cord cut trunks within the site and along the southern shore to provide valuable deadwood habitat.
- Rhododendron control:
 - removal of invasive species through hand pulling of seedlings and/or chemical treatment of bushes.
- Dead hedge creation:
 - Use of arisings from tree works to create a 'dead hedge' for the purpose of sustainable management of arisings and to deter access to the lake side off the informal footpath where there are sensitive wetland habitats and where New Zealand pygmyweed is present.

1.3.10 The specification details the requirement for the retention of marginal fringes of trees that act to improve the habitat for SSSI interest features e.g. Odonata, or where they act to check the landward expansion of existing reed bed habitat. Trees will be surveyed prior to works to ensure that specimen trees, trees of value to protected species and those of significant value for saprophytic invertebrates (e.g. standing dead wood) are clearly marked and retained.

1.3.11 Enhancements are not proposed for all habitat areas around the shore and whilst the shoreline habitats do not overlap with woodland enhancement area E4 East, the proposed enhancements in E4 East will integrate and complement the objectives of the work described in this section.

Item (1) (b) Replicate Marginal Vegetation Alongside Retaining Wall

1.3.12 Item (1) (b) of Requirement 10 calls for details of the extent, shape and species composition of the replicate marginal vegetation to be provided alongside the proposed retaining wall, including the method of implementation.

1.3.13 Reed bed losses in Bolder Mere associated with highways earthworks encroachment along the north-east shore will be mitigated through the creation of new single species common reed (*Phragmites australis*) planting, sourced from seed material collected from the existing reed bed.

1.3.14 The existing reed bed fringes the entire length of the north-east shore and is generally in poor ecological condition due to drying of the reed bed, accretion of organic material and presence of large volumes of debris and litter (e.g. plastics). Its landward extent is heavily shaded by scrub development, which is forcing the advancement of the reed fringe into the open water body of Bolder Mere where it is occupying habitat of value to submerged aquatic species. It is estimated that the proposed highways encroachment will result in the loss of around 700 m² of rooted reed bed.

1.3.15 The construction of six reed bed planting revetments in the arrangement shown in Figure 1.3 below (at project chainage 13620 to 13795, adjacent to the A3 Southbound) will result in the of creation of 450 m² of new, high quality, single species common reed planting alongside the proposed retaining wall.

1.3.16 The approach to replicating marginal vegetation has been developed in consultation with Natural England, Surrey County Council and Surrey Wildlife Trust. Removal of the existing reed bed and its substrate is seen as beneficial due to its poor quality and presence of deleterious material. The new planting revetments have been designed to control expansion of reed bed into Bolder

Mere to reduce potential for future loss of open water habitat. By leaving gaps between the revetments (i.e. not extending along the entire length of the new retaining wall) the replacement reed area equates to nominally 65% of the area of reed bed lost. However, gapping between the revetments has been agreed through consultation as ecologically beneficial by encouraging natural vegetation development alongside the revetment and the toe of the retaining wall.

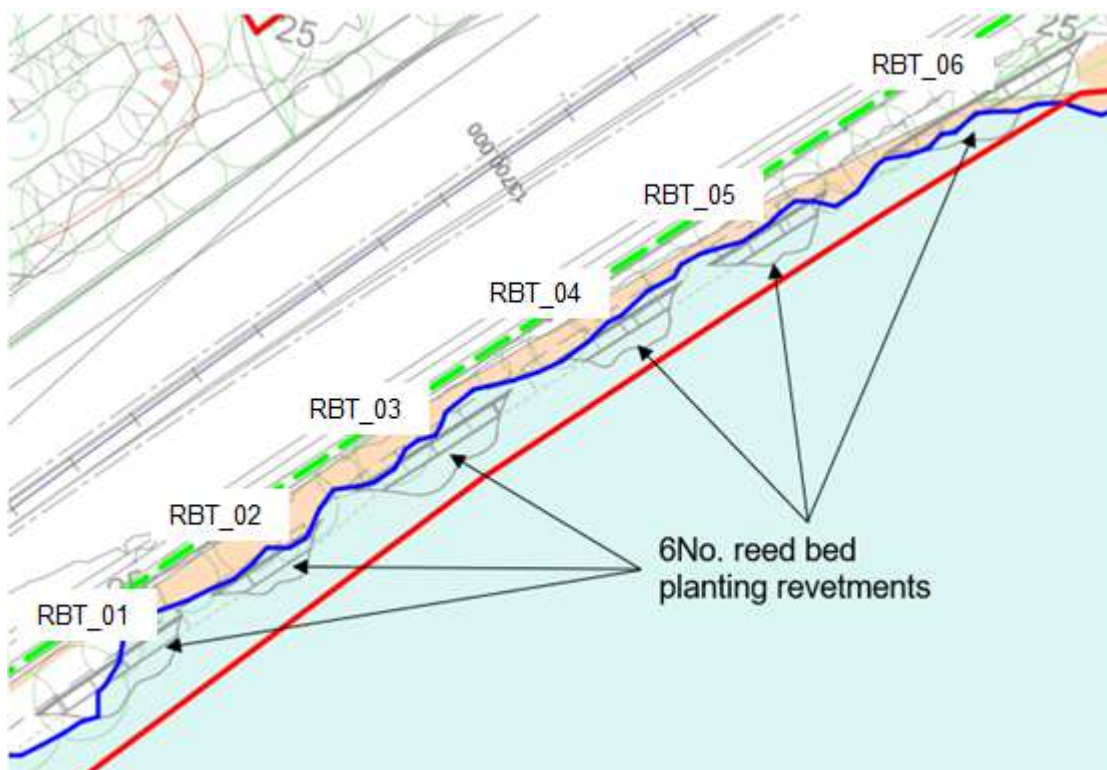


Figure 1.3: Reed Bed Planting Revetment General Arrangement

- 1.3.17 The area and dimension of each reed bed planting revetment are provided in Table 1.3. They are typically between 4.5 m and 6.0 m at their widest point and vary in length between 18 m and 31 m. Gaps of nominally 10 m will be retained between each reed bed planting revetment to facilitate the natural regeneration of marginal vegetation along the shore in addition to the replacement planting.

Table 1.3: Dimensions of Reed Bed Planting Revetments

Planting Revetment Area Code	Planting Revetment Area (m ²)	Linear Length of Front Edge (m)	Back Length (m)	Maximum Width (m)
RBT_01	88.19	27.62	23.52	5.95
RBT_02	44.70	20.83	17.76	4.54
RBT_03	91.75	28.72	24.22	6.01
RBT_04	58.89	23.74	19.55	4.97
RBT_05	55.35	22.08	18.64	5.11
RBT_06	109.91	34.72	31.12	6.00
Totals	448.79	157.71	-	-

- 1.3.18 The methods of implementation are presented in full in the following sources, that have been included as Appendix B this document:
- Specification for construction and planting of Bolder Mere reed bed revetments
 - Document number - HE551522-BBA-EWE-STH_AL_BOLDER-SP-LW-000001
 - Reed bed planting revetment Bolder Mere – typical plan and section
 - Drawing number - HE551522-BBA-ELS-STH_AL_BOLDER-M2-LL-000001
- 1.3.19 Each of the planting revetments will integrate at their landward edge with the retaining wall earthworks (which are a tipped stone solution) and have an asymmetrical vertical front edge to increase edge extent and create a "reed cut off" to prevent reeds from encroaching into the lake.
- 1.3.20 The front edge of each revetment will be constructed from 3No. (maximum) brushwood fascines, secured by hardwood stakes and backfilled with a clean stone on top of which a clayey sub-soil will be placed to provide appropriate elevation and substrate for reed establishment. Revetment surface levels will vary in elevation between 100 mm and 200 mm below the top water level of the lake.
- 1.3.21 Replacement reeds are to be imported to site as pre-established coir pallets (Figure 1.4) that will be pegged to the surface of the revetment. The reed in each coir pallet will have been grown from seed stock harvested from Bolder Mere and established under specialist wetland nursery conditions. A grow and supply specification has been produced for this purpose.



Figure 1.4: Example of a Common Reed Coir Pallet Showing Rooting into the Coir Net Matrix

- 1.3.22 A small (nominally 10 m²) patch of water lily within the footprint of the new retaining wall will be translocated to a suitable location in Bolder Mere by the process of rhizome harvesting.

Item (1) (c) Timetable for Completion of Works

- 1.3.23 Item (1) (c) of Requirement 10 calls for a timetable for the completion of the environmental mitigation and enhancement works (Work No.55).
- 1.3.24 The timetable for vegetation removal to improve the hydrosere of Bolder Mere and for replicate reed bed planting along the retaining wall are scheduled below and provided in the programme in Appendix C of this document.

Vegetation Removal Timetable for Bolder Mere Hydrosere

- 1.3.25 Vegetation removal (scrub, tree cutting and control of Rhododendron) from around the shore of Bolder Mere is proposed for October – end of November 2023 to tie in with the Elm Lane SPA Enhancement Area (E4 East) tree works.
- Vegetation removal to improve hydrosere – October 2023 to end November 2023
 - Programming of works for 2023 ties the Bolder Mere shoreline vegetation removal with the E4 tree works. This will act to reduce the duration of disturbance created by the works and ensure that there are common access and arisings disposal procedures.
 - This period presents the fewest environmental/ecological constraints and because ground conditions should be at their driest to limit potential for ground condition alteration.

Retaining Wall Timetable

- 1.3.26 There are four components to the completion of the replicate reed bed planting along the retaining wall. These are, in order of completion: preparatory vegetation management works; grow and supply of reeds; construction of the revetments along the retaining wall; and reed planting out. Proposed timetables for these are presented below.
- Preparatory vegetation management works – September 2023 to May 2024
 - Works included the clearance of scrub along the existing retaining wall alignment which is timetabled for September/October 2023.
 - Prior to the construction of the new retaining wall and reed bed revetments the existing reed bed will need to be removed. In order to manage ecological constraints associated with nesting birds the reed bed top growth will be cut back and maintained at a height of typically not more than 100 mm.
 - This work is proposed to commence in February 2024. The initial cut of top growth shall only commence following confirmation from a suitability qualified ecologist that there are no signs of bird breeding e.g. active nests of signs of nesting building. The initial cut will generate stems and flower heads that will have dropped their seed. The dead stems will be bundled and placed adjacent to other reed bed habitats around the shoreline to encourage any invertebrate to disperse that may be utilising the dead

stems. The specifics of this activity will be determined in consultation and agreement with the Surrey Wildlife Trust.

- The subsequent existing reed bed cutting regime, required to check reed bed top growth at not more than 100 mm, will be on an ad hoc basis through to the period of completion of the new retaining wall programmed to end May 2024.
- Grow and supply – March 2022 to end of May 2024
 - The growing period for local provenance reed stock commenced in March 2022, with reeds being grown on from local provenance seed stock collected from the existing reed bed at Bolder Mere by a specialist wetland nursery contractor.
 - Common reed seeds were set into root trainers in April 2022.
 - Root trainers would be ready for transfer to coir pallets in June/July 2022 and establishment in outdoor wet beds through to end of May 2024 when they will be ready for supply. This will ensure that the reeds delivered to site for planting as pre-established coir pallets will have developed through two full growing seasons under nursery conditions.
- Reed bed revetment construction –April 2024 to end May 2024
 - Works to construct the retaining wall that will encroach into Bolder Mere are proposed to start in April 2024.
 - The reed bed revetment works will integrate with the highway works package, with the revetments constructed immediately following retaining wall completion. The revetment construction and reed planting programme is envisaged to run through the period of April 2024 to end of May 2024.
- Reed planting – June 2024
 - Following construction of the reed bed revetments coir pallets will be supplied to site.
 - Installation of established coir pallets onto the revetments in Bolder Mere is timed to start at the beginning of June 2024 and be completed by mid-November 2024.
 - Since reeds will be well established, having been grown on for two full growing seasons, planting out can be extended beyond this window without compromise to the establishment on site.
- Lily translocation – December 2023 to end February 2024
 - Translocation period for waterlily rhizome during dormant stage.

Item (1) (d) Maintenance, Management and Environmental Monitoring of the Mitigation and Enhancement Measures at Bolder Mere

- 1.3.27 Item (1) (d) of Requirement 10 calls for a scheme for the maintenance, management and environmental monitoring of the mitigation and enhancement measures at Bolder Mere.
- 1.3.28 Detailed information on these requirements is presented in Section 8 of the Surrey County Council Environmental Management Plan (HE551522-BBA-EGN-SCC_LR_SCHME-RP-LM-000001).

Maintenance

- 1.3.29 The Environmental Management Plan provides details of the Five-Year Maintenance Period (for years 0-5) for the mitigation and enhancement measures at Bolder Mere as shown in Table 1.4. These measures are the responsibility of the contractor undertaking the works.
- 1.3.30 Year 0 equates to 2024.

Table 1.4: Programme of Works for Years 0 – 5 of the Maintenance Period

Action			Years 0-5				
Task	Responsibility	Season	1	2	3	4	5
Assess establishment of reed bed reinstatement – check once a year in later Summer – overplant in accordance with professional advice to ensure full coverage by Year 5 Remove any litter / deleterious materials.	BBA	Late summer	Y	Y	Y	Y	Y
Assess establishment of water lily translocation (or planting) – provide additional native water lily in accordance with professional advice to increase coverage	BBA	Late summer	Y	Y	Y	Y	Y
Assess condition of dead hedge – remediate any significant structural issues that may compromise performance e.g. remove play from stakes, clear litter / debris, add additional staking and any suitable locally available material	BBA	Winter	Y	Y	Y	Y	Y

Table Source: Environmental Management Plan - HE551522-BBA-EGN-SCC_LR_SCHME-RP-LM-000001

- 1.3.31 In each of the five years, the establishment of the reed bed constructed to replicate marginal vegetation alongside the retaining wall and the success of the waterlily translocation (Item 1 b) will be checked and the actions undertaken as described in Table 1.4.

- 1.3.32 During this period, no maintenance is prescribed for the areas targeted for vegetation removal to improve the hydrosere of Bolder Mere (Item 1 a) beyond the requirement to assess and remediate dead hedge condition in late winter of each of the 5 years.

Management

- 1.3.33 The Environmental Management Plan provides details of the long term management prescriptions (for years 6-15) for the mitigation and enhancement measures at Bolder Mere as shown in Table 1.5.

Table 1.5: Programme of Works for Years 6 – 15 of the Management Period

Action			Years 6 – 15		
Task	Responsibility	Season	6	10	15
Assess spread of reinstated and existing reed bed in areas and carry out removal (if required). Remove any litter / deleterious materials in reed bed footprint.	SWT / SCC	Winter	Y	Y	Y
Assess scrub / tree encroachment in relevant re-set areas and carry out further removal if required to return the shoreline to its re-set state. From entire shoreline treat/remove rhododendron as required	SWT / SCC	Winter	Y	Y	Y
Carry out selective tree removals / coppicing alder carr on rotational basis	SWT / SCC	Winter		Y	Y
Assess condition of dead hedge and selectively add material generated from scrub / tree encroachment removal. Remove play from stakes, clear litter / debris, add additional staking and any suitable locally available material	SWT / SCC	Winter	Y	Y	Y

Table Source: Adapted from Environmental Management Plan - HE551522-BBA-EGN-SCC_LR_SCHME-RP-LM-000001

- 1.3.34 Management tasks are required every five years, in years 6, 10 and 15 and shall be the responsibility of Surrey County Council / Surrey Wildlife Trust.
- 1.3.35 Long term tasks include the assessment and management of spread of reed bed habitat to ensure that encroachment into both open water and terrestrial habitat is not having deleterious effects on the wider habitat. Any litter that may be acting as a mulch preventing reed growth will be removed.
- 1.3.36 The condition of the shoreline areas that were cleared of scrub in the Year 0 re-set activity will be assessed and any new scrub that has become established removed and rhododendron treated. In addition, rotational coppicing of the alder carr is will be undertaken to maintain habitat complexity and varied age structure.
- 1.3.37 Assessment of the dead hedge condition will also be undertaken, with any litter removed, stakes secured/replaced and new dead wood material added as required.

Monitoring

- 1.3.38 The Environmental Management Plan provides details of the monitoring required (for years 0-15) for the mitigation and enhancement measures at Bolder Mere. These monitoring activities are underpinned by area specific objectives and target measures as shown in Table 1.6.

Table 1.6: Monitoring Targets / Measures of Success

Objective	Targets Years 0-5	Targets Years 5-10	Targets Years 10-15
Objective 1: Reed bed re-established along the north west shoreline (Area 1.1)	Ensure full coverage of planting revetments is achieved with vigorous and well rooted reeds. No encroachment of reeds from the planting revetments into deep (>1.0 m) open water habitat. Noting that some landward and lateral expansion of the reed bed is expected towards the shoreline. Emergent macrophytes to have established at the shallow water zone between planting revetments.	As 0-5	As 0-5
Objective 2: Water lily translocation	Obvious signs of water lily establishment following translocation as evidenced by the presence of floating leaves in late summer. Expansion of surface area covered by water lily each and every year through to Year 5.	None	None
Objective 3a: No significant spread of reed bed (Area 1.2) into adjacent 'dry areas' or open water.	No increase in area coverage observed.	No increase in area coverage observed.	No increase in area coverage observed.
Objective 3b: Shoreline of Bolder Mere supporting a diverse macrophyte assemblage grading from shoreline through hydrosere.	Open structure achieved.	Open structure maintained. Acid bog, wetland habitats and / or heath / grassland communities establishing.	Semi-open structure maintained. Acid bog, wetland habitats and / or heath / grassland communities establishing.
Objective 3c: Varied canopy structure achieved within wet woodland (Area 12)	Create a transitional zone with a varied canopy structure and light climate.	Develop a transitional zone with a varied canopy structure and light climate.	Maintain a transitional zone with a varied canopy structure and light climate.

Objective	Targets Years 0-5	Targets Years 5-10	Targets Years 10-15
Objective 3d: Shading target in line with SSSI lake condition assessment	30-60% shading target for the margin achieved.	30-60% shading target for the margin achieved.	30-60% shading target for the margin achieved.
Objective 3e: Dead hedge	Hedge structurally sound and acting to deter unsolicited access to the shoreline. Noting that height is likely to be reduced due to rot down of material.	Hedge structurally sound and acting to deter unsolicited access to the shoreline. Noting that height is likely to be reduced due to rot down of material.	Hedge structurally sound and acting to deter unsolicited access to the shoreline. Noting that height is likely to be reduced due to rot down of material.

Table Source: Environmental Management Plan - HE551522-BBA-EGN-SCC_LR_SCHME-RP-LM-000001

- 1.3.39 The monitoring programme has been developed to ascertain whether the measures of success have been achieved. It has been developed to detect major changes within the Bolder Mere mitigation and enhancement area. During the initial establishment phase (i.e. first five years) monitoring will be carried out annually, at Year 5 this will change to surveying at five yearly intervals.
- 1.3.40 Highways England's appointed monitoring party will carry out the monitoring visits and feed back to a steering group comprised of interested parties such as Surrey Wildlife Trust, Natural England and Environment Agency who will oversee the effectiveness of the measures and advise any variation to the proposed management to ensure success.
- 1.3.41 Fixed point photography supplemented with detailed field notes will be used to document the changes within the reed bed at the northern shore, and the enhancement works along the south and south eastern shore.

Table 1-7 Frequency of Monitoring

Action			Years 0 – 15		
Task	Responsibility	Season	0-5	10	15
Fixed point photography supported with aerial photography if available.	HE's appointed MP	Summer and winter	Y (annually)	Y	Y

Table Source: Environmental Management Plan - HE551522-BBA-EGN-SCC_LR_SCHME-RP-LM-000001

1.4 Requirement 10 Item (2)

- 1.4.1 Item 2 of Requirement 10 calls for the environmental mitigation and enhancement works to be carried out, maintained, managed and monitored in accordance with the details approved under sub-paragraph (1) and must be begun before any part of Work No.5(c) may commence.
- 1.4.2 Highway England commit to the environmental mitigation and enhancement works to be carried out, maintained, managed and monitored in accordance with the details approved under sub-paragraph (1).
- 1.4.3 The programme provided in Appendix C shows environmental mitigation and enhancement works activities starting prior to the commencement of works No.5(c).

1.5 Requirement 10 Item (3)

- 1.5.1 Item (3) of Requirement 10 states that No part of Work No.5(c) is to commence until details of the surface water drainage and pollution control measures for that part of the A3 southbound carriageway adjoining the proposed Bolder Mere retaining wall, reflecting the results of a detailed drainage survey, have been submitted to and approved in writing by the Secretary of State, following consultation with the Environment Agency, Natural England, Surrey County Council and the relevant planning authority.
- 1.5.2 A detailed survey of the existing drainage system and surrounding topography was undertaken, principally in 2020. This information was used to inform the design of an upgraded drainage system for the Scheme. Further details on the design of the upgraded drainage system serving the southbound carriageway adjacent to Bolder Mere can be found in Appendix D.
- 1.5.3 The upgraded drainage system has been designed in accordance with industry standards (the Design Manual for Roads and Bridges). Critically, it does not connect with Bolder Mere and avoids surface water flooding of third-party assets (including Bolder Mere) in events with return periods of less than 1 in 100 years, including an allowance for climate change. The drainage system will be constructed in accordance with this design as per **Requirement 10 Item (4)**.
- 1.5.4 The design of pollution control measures incorporated into the design of the upgraded drainage system have been developed in accordance with an industry standard water quality modelling approach (HEWRAT). As of May 2022, the results of this modelling have been reviewed and accepted by Environment Agency specialists with the exception of a request for some minor clarifications for parts of the proposed drainage system distant from Bolder Mere.
- 1.5.5 The consultation record with the relevant authorities for surface water drainage and pollution control measures are provided in Table 1.2.

Appendix A. Vegetation Removal to Improve Hydrosere of Bolder Mere

A.1 Specification for Habitat Improvement Works on Shores of Bolder Mere (HE551522-BBA-EWE-STH_AL_BOLDER-SP-LW-000004)

Routes to Market – Delivery Integration Partnership

M25 Junction 10 / A3 Wisley Interchange Improvement

Specification for Habitat Improvement Works on shores of Bolder Mere

HE551522-BBA-EWE-STH_AL_BOLDER-SP-LW-000004

20/06/22

S3

Notice

This document and its contents have been prepared and are intended solely as information for and use in relation to M25 Junction 10 / A3 Wisley Interchange Improvement. Balfour Beatty assumes no responsibility to any other party in respect of or arising out of or in connection with this document and/or its contents.

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1. Introduction

- 1.1.1. Bolder Mere is a shallow lake of approximately 5.83 ha, forming part of Wisley and Ockham commons. The lake and shoreline are managed by the Surrey Wildlife Trust on behalf of Surrey County Council.
- 1.1.2. As part of the habitat management proposals for Bolder Mere it is intended to undertake a reset of the lake shore habitat, to prevent further encroachment of scrub to the lakeside and to create ecologically diverse transitional habitat from the open water environment, through the littoral (shore) into remnant heathland and plantation woodland.
- 1.1.3. This specification is to remove encroaching scrub and tree species between the water's edge (Figure 1-2) to the woodland fringe (compartment E4). The felling, herbicide treatment and removal of deciduous tree species will prevent further drying at the lake margin.
- 1.1.4. Following the habitat reset the Surrey Wildlife Trust will undertake long term management to develop the ecological interest.
- 1.1.5. Subsequent to the scrub control programme, other contractors will be carrying out felling and removal of mature Scots pine to the south of the lake (Figure 1-2.)

1.2. Location

- 1.2.1. Bolder Mere, is part of Ockham and Wisley Commons near Wisley in Surrey, to the south east of the M25 J10 / A3 interchange as shown in Figure 1-1. Grid reference for the southern lake shore is TQ 07733 58310. Parking is available at Bolder Mere Car Park (KT11 1NR) Grid reference TQ 07861 58655.

1.3. Area of works

- 1.3.1. The works packages within this specification are to be undertaken within the areas indicated in Figure 1-2.



Figure 1-1 - Bolder Mere location map

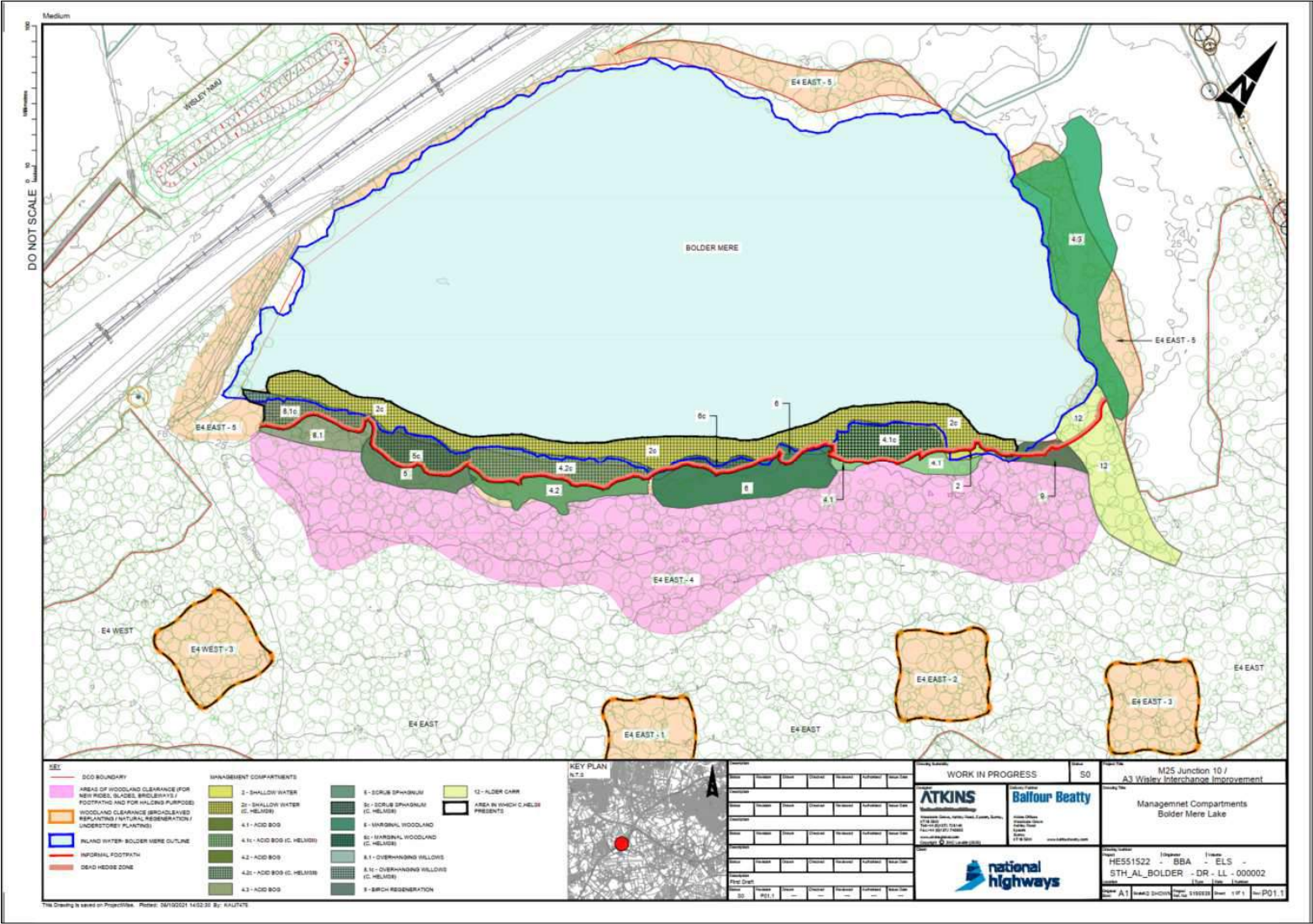


Figure 1-2 - Habitat improvement areas

2. Invasive non-native species

- 2.1.1. There is *Crassula helmsii* (*C.helmsii*), known as New Zealand Pigmy weed or Australian Stone Crop within Bolder Mere lake and along the shoreline. This is a highly invasive aquatic plant which is readily spread in the absence of rigorous biosecurity measures.
- 2.1.2. The contractor will set out arrangements for biosecurity within their method statement submission.
- 2.1.3. The contractor will be required to demonstrate a logical and considered approach to biosecurity which prevents the spread of *C.helmsii* within and beyond the site. The contractor should as a minimum consider:
- Operatives working within areas where *C.helmsii* is present.
 - Operatives working in areas where *C.helmsii* might be present.
 - Access within areas where *C.helmsii* is present.
 - Felling within areas where *C.helmsii* is present.
 - The management of arisings from *C.helmsii* areas.
 - Cleansing of plant, equipment and personal protective equipment.
- 2.1.4. A detail plan will be provided to the contractor prior to the commencement of works identifying the location of *C.helmsii*. In advance of the detailed plan all areas along the southern shore, between the informal footpath and lake are likely to have *C.helmsii*. These areas are indicated on Figure 1-2 as compartments 2c, 4.1c, 6c, 4.2c, 5c and 8.1c. A suggested area of 0.7245 ha.
- 2.1.5. To the landward side, south of the informal footpath the ground is dry and therefore the presence of *C.helmsii* is considered to be less likely.
- 2.1.6. Once the works have been completed in areas where *C.helmsii* is present, all clothing, PPE and equipment shall be thoroughly checked and cleaned before moving off site or to other areas without *C.helmsii*, to prevent its spread. Equally, everyone coming to site must have biosecurity measures in place to prevent spreading other INNS into Bolder Mere. This requirement shall form part of the method statement submission (see 2.1.2).

3. Tree and scrub species management objectives and requirements

- 3.1.1. All trees/scrub growing between the lake edge and forestry boundary (E4, Figure 1-2) are to be cut, treated with herbicide and removed unless otherwise indicated. The removal methodology is different where there is *C.helmsii* present. General exceptions are the retention of mature specimen trees and trees along the lake edge to provide dappled shade.
- 3.1.2. An Ecological Clerk of Works (ECoW) will be on-site throughout the shoreline clearance works. The ECoW will identify areas to be retained and operate a watching brief during the delivery of the work packages.
- 3.1.3. Prior to the use of any herbicides in, or within 1 m of water (Bolder Mere and any watercourses/ditches), the Contractor is required to have written agreement from the Environment Agency. The application form and guidance notes are available at: [Application to use herbicides in or near water - GOV.UK \(www.gov.uk\)](https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/612222/application-form-herbicides-in-or-near-water.pdf).

4. Work packages

4.1. Introduction

- 4.1.1. There are six work packages to be delivered over an area of 1.7 ha.
- 4.1.2. Packages one, two, three and four are **outside compartments with *C.helmsii***.
- 4.1.3. Packages five and six are **within compartments where there is *C.helmsii***.

Table 4-1 - Outside compartments with *C.helmsii*

Work package one	Cutting/felling and herbicide treatment of tree and scrub species. Trunk material (>5cm) cut to cord lengths and stacked with arisings extracted to E4 (Figure 1-2), chipped and removed from site.
Work package two	Coppicing stands of mature alder <i>Alnus</i> spp. Cutting timber to cord lengths, stacking cords with arisings extracted to E4, chipped and removed from site.
Work package three	Cutting/felling and herbicide treatment of birch <i>Betula</i> spp. regeneration. Arisings extracted to E4, chipped and removed from site.
Work package four	Stem treatment of <i>Rhododendron ponticum</i> (<i>R.ponticum</i>) in-situ.

Note: Should arisings from work packages one, two and three be identified as being suitable/required for dead hedging purposes then in shall be retained and/or processed as such in line with the dead hedge specification (see Section 6.1). This material shall then be formed into non-continuous lengths of dead hedge along the northern edge of the informal path.

Table 4-2 - Compartment where there is *C. helmsii*

Work package five	Cutting/felling and herbicide treatment of tree and scrub species. Arisings generated from the <i>C.helmsii</i> areas to be formed into non-continuous lengths of dead-hedge along the northern edge of the informal path (Figure 1-2, dead hedge zone).
Work package six	Stem treatment of <i>Rhododendron ponticum</i> (as per Work Package 4) with appropriate biosecurity arrangements.

4.2. Scheduling

- 4.2.1. The programme of works is to be sequentially completed:
- Work packages one to four (**no *C.helmsii* present**) to be completed first
 - Work packages five and six (***C.helmsii* present**) must not commence until all 'clean' works are complete.
- 4.2.2. This approach to scheduling is to reduce the risk of cross-contamination of areas within the site.
- 4.2.3. The contractor will set out within their methods statement a logical and methodical progression of works which provides for biosecurity and a safe system of work.

4.3. Access to site

- 4.3.1. Confirmation of access routes, works compound, parking and areas for welfare to be provided prior to commencement. No access is permitted along Elm Lane. Access to residential properties surrounding Bolder Mere must not be restricted at any time.
- 4.3.2. The site will be closed to public access during the course of the works.

4.4. Access within the site

- 4.4.1. Access routes within the work site are the contractor's responsibility to identify if they are suitable and which best suit their methods. The compartments to be worked will have wetter areas and obstacles such as stones and tree stumps. In addition, access routes and traffic within the site must consider biosecurity. We will expect the bidder to advise us of their preferred access routes as part of their submitted methods.

4.5. Work Package One – Scrub and tree cutting, treatment and removal

Background

- 4.5.1. The following section describes the working practices required in the delivery of this package in compartments where there is **no C.helmsii present**.
- 4.5.2. This work package will be delivered within compartments 4.1, 4.2, 4.3, 5, 6 & 8.1 (Figure 1-2).
- 4.5.3. This package is for the clearance of scrub woodland with trees varying in height from approximately 5 m to seedlings. The objective is to clear scrub encroachment from areas of acid bog, extending from the southern edge of the informal footpath to the northern boundary of E4 (Figure 1-2). Occasional specimen trees will be retained.

General description of works

- 4.5.4. Trees with a diameter at breast height (dbh) equal to or greater than 5 cm.
- Trees are to be felled.
 - Stumps to be lowered to ground level.
 - Limbs are to be snedded (cut) from each felled tree.
 - Trunks will be cut to a cord length (maximum of 2 m), which can be safely manually handled.
 - Cut trunks to be stacked on-site in areas to be agreed to form habitat piles.
 - Stumps to be treated with a herbicide on-label for use adjacent to standing water immediately following cutting (see Section 5).
 - Arisings to be extracted to compartment E4, chipped and removed off-site for disposal. Or used for dead hedging.
- 4.5.5. Trees/scrub trees with a dbh less than 5 cm.
- Trees/scrub trees are to be cut-off at ground level.
 - Stumps to be treated with a herbicide on-label for use adjacent to standing water immediately following cutting.
 - Arisings to be extracted to compartment E4, chipped and removed off-site for disposal. Or used for dead hedging.
- 4.5.6. Tree seedlings
- Seedlings are to be removed by hand pulling or popped, using a weed-popper (or similar device).

- Ensure entire seedling and root is removed.
- Collect and bag seedlings.
- Seedlings to be extracted to compartment E4, chipped and removed off-site for disposal.

Table 4-3 - Exceptions to clearance

Compartment reference	Action
4.3	Retain specimen trees or trees of value to protected species
9	Retain specimen oak tree
12	Coppice only marked alder trees
All Compartments	Any <i>R.ponticum</i> identified is to be dealt with as specified in Work Package Four

4.5.7. Note that specimen trees, *R.ponticum* and trees for retention will be clearly marked on site. These trees/bushes will be identified to the contractor on plans and by the ECoW at the commencement of works.



Figure 4-1 - Foreground birch scrub growing within acid bog compartment with scots pine visible in background in compartment E4.

4.6. Work package Two – Alder Carr coppicing

- 4.6.1. The following section describes the working practices required in the delivery of this package where there is **no *C.helmsii* present**.
- 4.6.2. This work package will be delivered within Compartment 12 Alder Carr (Figure 1-2.)
- 4.6.3. This package is for the coppicing of stands of mature alder. The objective is to create space within Compartment 12 for regeneration of the coppice stools and to allow light to reach the woodland floor.
- 4.6.4. This work will take place within an area of mature alder trees.
- Every two-in-five trees are to be coppiced.
 - The trees for coppicing will be identified to the contractor on a plan, marked on site and identified by the ECoW prior to commencement.
 - When felling the coppice stools the contractor should make every effort not to damage surrounding trees.
 - Felled trees are to be snedded removing the side branches.
 - Trunks will be cut to a cord length (maximum of 2 m), which can be safely manually handled.
 - The trunks will be distributed within the site and along the southern shoreline as directed by the ECoW.
 - Arisings are to be extracted to E4, chipped and removed for off-site disposal. Or used as dead hedging material.



Figure 4-2 - Alder carr

4.7. Work Package Three – Birch clearance

Background

- 4.7.1. The following section describes the working practices required in the delivery of this package where there is **no *C.helmsii* present.**
- 4.7.2. This work package will be delivered within Compartment 9, Birch regeneration (Figure 1-2.)
- 4.7.3. This package is for the removal of young to semi-mature birch trees. The objective is to remove all trees within the compartment with the exception of a fringe of trees within 3 m of the shoreline to provide dappled shade. There may be occasional other tree species within Compartment 9, e.g., willow and alder. These trees are also to be removed unless otherwise indicated.

General description of works:

- 4.7.4. Birch trees with a dbh equal to or greater than 5 cm.
- Trees are to be felled.
 - Stumps to be lowered to ground level.
 - Stumps to be treated with an approved herbicide on-label for use adjacent to standing water immediately following cutting.
 - Limbs are to be snedded and removed from the felled trees.
 - Trunks will be cut to a cord length (maximum of 2 m), which can be safely manually handled.
 - Arisings are to be extracted to E4, chipped and removed from site for disposal. Or used as dead hedging material.
- 4.7.5. Birch trees with a dbh less than 5 cm
- Birch trees are to be felled.
 - Stumps to be lowered to ground level.
 - Stumps to be treated with an approved herbicide on-label for use adjacent to standing water immediately following cutting.
 - Arisings are to be extracted to E4, chipped and removed from site for disposal. Or used as dead hedging material.



Figure 4-3 - Birch regeneration Compartment 9



Figure 4-4 - Birch within acid bog Compartment 4.1

4.8. Work Package Four – *Rhododendron ponticum* control

Background

- 4.8.1. The following section describes the working practices required in the delivery of this package where there is **no *C.helmsii* present**.
- 4.8.2. This work package will be delivered across all compartments without *C.helmsii*.
- 4.8.3. This package is for the control of *R.ponticum*.
- 4.8.4. *R.ponticum* is occasional throughout the compartments ranging in size from seedlings to bushes.

Rhododendron seedlings

- Seedlings are to be hand pulled or popped, using a weed popper (or similar mechanical device). Care should be exercised to ensure all *R.ponticum* plants are identified and removed.
- *R.ponticum* seedlings must be bagged for disposal at an authorised waste management facility to be arranged by the contractor.

Rhododendron bushes

- Stem treat or stump each plant to kill the plant in situ. To be determined by the stem diameter (see Section 5).
- The herbicide used must be on-label and approved for use near water.
- Once treated, individual bushes should be marked and temporarily protected from accidental damage to ensure the maximum efficacy is achieved.
- The contractor will **return within 6-months** to assesses the efficacy of treatment and retreat any bushes or regrowth.
- The contractor will **return at 12 months**, cut and remove the dead bushes.
- The bushes can then be used within the dead hedge.



Figure 4-5 - *R.ponticum* (left) in acid bog habitat birch regeneration (right)

4.9. Work packages Five and Six scrub and tree cutting, treatment and removal and *R.ponticum* control where there is *C.helmsii* present

- 4.9.1. The following section describes the working practices required in the delivery of this package where **there is *C.helmsii* present**.
- 4.9.2. The contractor should present a methodology which prevents personnel, machinery or arisings coming into contact with areas of *C.helmsii*.
- 4.9.3. This work package will be delivered within Compartments 4.1c, 4.2c, 5c, 6c, and 8.1c (Figure 1-2).
- 4.9.4. This package will be the last package of works to be delivered. All areas where there is no *C.helmsii* will be managed first.
- 4.9.5. This package is for the removal of all scrub and scrub trees from the southern shoreline of Bolder Mere to the informal footpath (Figure 1-2). The only exceptions are mature specimen trees and tree cover within 3 m of the lake edge to provide a shaded margin. These exceptions are provided in Table 4-4. Trees for retention will be identified to the contractor on plans and marked on site and by the ECoW prior to commencement of works.
- 4.9.6. All scrub cleared from areas 4.1c, 4.2c, 5c, 6c, and 8.1c **is assumed to be contaminated with *C.helmsii*** and will therefore be retained on-site and used to form habitat piles with the brash being used along the northern margin of the informal footpath to create dead hedges (see Section 6.1).

Table 4-4 - Exceptions to clearance

Compartment reference	Action
8.1c	Retain a 3 m fringe of trees adjacent to the lake to provide shade
4.1c, 4.2c, 6c	Retain specimen trees



Figure 4-6 - Scrub within acid bog Compartment 4.2c

- 4.9.7. Work package six is the stem treatment of *Rhododendron ponticum* (as per Work Package 4) taking into account the presence of *C.helmsii*. The contractor is required to set out within the method statement how these works will be approached to ensure biosecurity is achieved. All other activities for the control of *Rhododendron* remain the same as in work package four.

5. Chemical treatment

5.1. Stump treatment all deciduous species including *R.ponticum*

- Cut stumps of deciduous species will be treated with undiluted glyphosate herbicide approved for stump treatment (Roundup ProBio or ProVantage or equivalent, 36% active ingredient) applied using a spot-gun or similar applicator to holes drilled into the stump.
- Make holes of 1 millilitre volume (or other volume as per herbicide label guidance) using a cordless drill with an 8 mm wood bit, by drilling a hole in the stump, at an angle between 45 degrees & vertical (preferable), depending on stump orientation (use a drill stop on the drill to avoid drilling deeper).
- Fill the hole completely with neat Glyphosate by means of a spot-gun or similar applicator, which can be set to dose at a millilitre (or other volume as per herbicide label guidance).
- For stumps of diameter 3 cm or less, one dose is sufficient. For each additional 3 cm diameter, a further dose as above must be given i.e., a stump of 9 cm diameter will receive a 3 ml dose in 3 separately drilled holes. Herbicide must be applied immediately after the holes are drilled.
- Smaller stumps should be injected if possible, but it may be necessary to make the hole in a larger shared stump if too small. If not possible, painting the stump is acceptable.
- Effective methods to clearly mark treated stumps must be used to avoid double dosing or missing any trees or shrubs.
- To prevent dilution of herbicide by rainfall the operation should not be carried out if rain is expected within 2-hours of application.
- Stem or stump injection should not be carried out during periods of frost.

5.2. Stem treatment for *R.ponticum*

- All stems greater than 3cm are to be treated as follows: Make a downwards cut into the stem using a billhook at an angle of ~30° to a length of approximately 2cm. The cut should not be deeper into the stem than 20% of the stem diameter.
- Apply neat Roundup Pro Biactive (36% active ingredient, approved trade product 'Roundup') to the cut by means of a spot-gun with a brush applicator or similar applicator, which can be set to dose at 1 millilitre.
- For large multi-stemmed bushes, it is recommended that at least 80% of the stems are treated.
- For stems of diameter 3cm or less, one dose is sufficient.
- Herbicide must be applied immediately after the cut is made.
- Smaller stems should be cut as low down as possible.
- An approved marker dye must be added to the herbicide to prevent double dosing.
- If the rhododendron bush is too small, then the application of herbicide to the stump is acceptable (see Section 5).
- To prevent dilution of herbicide by rainfall the operation should not be carried out if rain is expected within 2-hours of application.
- Stem injection should not be carried out during periods of frost.

6. Additional Items

6.1. Dead Hedge

- 6.1.1. The following section describes the working practices required in the construction of a dead hedge. The dead hedge is a non-continuous feature to be created in alignment with the informal path marked dead hedge zone (Figure 1-2). A typical image of a dead hedge is provided as Figure 6-1.
- 6.1.2. The purpose of the dead hedge is the sustainable management of arisings from the shoreline works and to deter access to the lake side of the informal footpath where there are sensitive wetland habitats and where *C.helmsii* is present.

Approach

- 6.1.3. The contractor shall supply evidence of experience of the construction of high-quality dead hedges.
- 6.1.4. Due to uncertainty around the volumes of hedging material that will be generated, its suitability for use and the exact locations along the identified zone for hedge placement, the on-site delivery will be a collaborative design approach between the contractor's site supervisor, client representative (BBA) ECoW and site manager representative (Surrey Wildlife Trust) as to the exact location and finish of the dead hedge.
- 6.1.5. The locations of the dead hedge shall be marked on the ground prior to construction. In the first instance, a run of dead hedge, nominally 20 m, shall be constructed under the supervision of the aforementioned. This run of dead hedge shall be signed-off by all parties as being of an appropriate quality and form to act as the standard template to be applied and achieved for the remaining dead hedging.

Location

- 6.1.6. This work will be delivered along the length of shoreline marked as dead hedge zone (Figure 1-2). This equates to a length of 485 m.
- 6.1.7. The dead hedge will be formed from all arisings generated within areas where there is *C.helmsii* present (4.1c, 4.2c, 5c, 6c, and 8.1c). The exceptions are logs which will be stacked separately to create habitat piles within compartments where *C.helmsii* is present.
- 6.1.8. Arisings generated from compartments without *C.helmsii* can also be used for dead hedge creation where material needs are identified. Due to the age of the regeneration in areas without *C.helmsii* it is likely that the material will be suitable for creating posts as well as branches for hedge construction.

Description

- 6.1.9. The dead hedge is a linear feature constructed using two parallel rows of wooded upright posts set nominally 60 to 80 cm apart. The parallel posts provide a frame to retain brash placed horizontally. The brash is laid in layers to the design height of between 120 and 200 cm.
- 6.1.10. The approach shall be as follows:
- Mark on the ground the location and length of each run of dead hedge.
 - Vertical posts are to be cut (and one of the ends pointed / sharpened) from the available dead hedging material.
 - Posts shall, where practically possible, be sourced from the dominant species being used to layer the hedge run and be a total length of nominally 180 to 200 cm.
 - The vertical posts are to be driven 1/3 into the ground (or to refusal), leaving nominally 120 to 130 cm above ground.

- The vertical posts within each row are to be spaced at 60 cm intervals.
- Along each run the distance between each parallel row of vertical posts shall vary between 80 and 120 cm. With vertical posts within each row located opposite each other.
- The space between the two rows of vertical posts is to be infilled with brash i.e., cut birch, alder and other species which have been previously cleared. Brash shall be aligned in the same orientation along the run i.e. butt to tip.
- Side branches along stems should be cut or torn to allow them to fold-in to the main stem when horizontally compacted into the dead hedge.
- Brash is to be added in layers, each layer is to be firmly compacted, eliminating any gaps greater than ~5 cm. Layering height shall be to a minimum of 1.2 m, maximum 1.8 m and vary along the hedge run.
- Following horizontal laying any irregular branches protruding from either end of the hedgerow are to be cut-off leaving an even vertical surface.
- All irregular branches extending beyond the vertical posts on the front and rear faces of the dead hedge are to be cut-off leaving an even vertical surface.
- Cut materials created from (j) and (k) are to be added back into the hedge-top as fill.



Figure 6-1 – Image of dead hedge (taken from <https://www.mudchute.org>)

7. List of known hazards

7.1.1. Below is a non-exhaustive list of known hazards associated with site. There may be additional hazards, or additional hazards associated with the methods proposed. Each bidder is to satisfy themselves of all potential hazards before bidding.

- Services; TBC
- Uneven ground
- Standing water
- Mud/slippery conditions
- Adverse weather
- Animal faeces
- Weils disease (Leptospirosis)
- *C.helmsii*
- *R.ponticum*

- Other contractors and plant
- Soft/wet ground conditions
- Covid-19
- Access arrangements
- General public who ignore signs and barriers

7.1.2. Access and constraints map to be produced detailing access routes and any specific work constraints additional to the above generic hazards.

8. Contract details

To be completed once contact known.

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Appendix B. Specification for Construction and Planting of Bolder Mere Reed Bed Revetments

B.1 Specification for Construction and Planting of Bolder Mere Reed Bed Revetments (HE551522-BBA-EWE- STH_AL_BOLDER-SP-LW-000001)

Routes to Market – Delivery Integration Partnership

M25 Junction 10 / A3 Wisley Interchange Improvement

Specification for construction and planting of Bolder Mere reed bed revetments

HE551522-BBA-EWE-STH_AL_BOLDER-SP-LW-000001

20/06/22

S3

Notice

This document and its contents have been prepared and are intended solely as information for and use in relation to M25 Junction 10 / A3 Wisley Interchange Improvement. Balfour Beatty assumes no responsibility to any other party in respect of or arising out of or in connection with this document and/or its contents.

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P02	S3	For review	IM	MH	NDW	DS	20/06/22
P01	S3	First Draft	MH	ED	NDW	TR	07/05/21

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1. Introduction

1.1. Reed Bed Revetment

Purpose and approach

- 1.1.1. 450 m² of *Phragmites australis* (common reed) planting will be installed to mitigate for reed bed habitat losses in Bolder Mere associated with highways earthworks encroachment into the water body.
- 1.1.2. This shall be achieved through the creation of 6No. reed bed planting revetments as shown in the Project Information Model (HE551522-BBA-GEN-WHL_AL_SCHME-CM-CX-000001) at chainage 13620 to 13795, adjacent to the A3 Southbound. These integrate at their landward edge with the tipped stone of the highways earthworks that encroach into the lake.
- 1.1.3. A vertical front edge is required to the planting revetment to create a “reed cut off” edge preventing reed from encroaching into the lake out from the newly created areas. The front edge shall be constructed from 3No. brushwood fascines.
- 1.1.4. This revetment shall be backfilled with a clean stone on top of which a clayey sub-soil will be placed to bring the elevation of the revetment to an appropriate level for reed establishment. Reeds are to be imported to site as pre-established coir pallets, which will have been grown from seed stock harvested from Bolder Mere and established under nursery conditions (specification for these works in [HE551522-BBA-EWE-STH_AL_BOLDER-SP-LW-000002](#)).
- 1.1.5. The dimensions of each planting revetment area are as provided in Table 1-1. A range of hard and soft bed levels from surveys undertaken in 2020 is also provided. Please note that the area of each planting revetment refers to surface area to be planted with pre-established coir pallets. It does not include the front edge detail for which a linear length is provided.

Table 1-1 - Dimensions of planting revetments

Planting revetment area code	Planting revetment area (m ²)	Linear length of front edge detail (m)	Indicative hard bed level (m)
RBT_01	88.19	27.62	23.3 m AOD
RBT_02	44.70	20.83	
RBT_03	91.75	28.72	
RBT_04	58.89	23.74	
RBT_05	55.35	22.08	
RBT_06	109.91	34.72	
Totals	448.79	157.71	-

1.2. Translocation of Lilies

Purpose and approach

- 1.2.1. A bed of water lilies, no greater 10 m², in Bolder Mere is to be safeguarded through a local translocation within the water body outside of the footprint of the highway encroachment works.
- 1.2.2. Prior to any works taking place the site supervising Ecologist should identify the area being harvested (donor site) and the area to receive the lilies (the receptor site). The receptor site shall have a similar depth of water and substrate character (hard bed and soft bed level) to the area that the lilies are being harvested from (donor site).
- 1.2.3. Lilies form a network of rhizomes that anchor to the bed of a waterbody. Operatives shall attempt to retain the integrity of the rhizome network and carefully hand lift the rhizomes whilst avoiding snapping or damaging individual plant's rhizomes. As much of the finer white anchoring roots should be preserved when the rhizomes are lifted.
- 1.2.4. Translocation works should be undertaken during the dormancy period between December and the end of February. The sub-contractor shall provide a method statement detailing the works for approval.
- 1.2.5. Once detached from the bed the lily tubers may become buoyant, so each rhizome should be placed into a tub ready for replanting. The following applies:
 - Any pieces of lily rhizome that snap off and are less than 50 mm in length shall be discarded.
 - Any soft or "mushy" rhizome shall be discarded.
 - Only pieces of rhizome that have a growing tip should be used for replanting.
 - Any damaged or dead leaves on the lily stems should be carefully cutaway but the young or unfurled leaves close to the rhizome should be retained undamaged.
- 1.2.6. The lily rhizomes should be placed in a container with a clayey aquatic soil. The preference is that this shall be undertaken on site for immediate replanting.
- 1.2.7. Alternatively, there shall be provision made for the rhizomes to be sent to a specialist nursery where they can be "grown on" into pots.

1.3. Drawings

1.3.1. The drawings that apply to the reed bed revetment are listed in Table 1-2.

Table 1-2 - Drawings of reed bed revetment

Title	Number
General arrangement of reedbed	as shown in the Project Information Model (HE551522-BBA-GEN-WHL_AL_SCHME-CM-CX-000001)
Typical section through reed bed planting revetment	HE551522-BBA-ELS-STH_AL_BOLDER-M2-LL-000001

1.4. Location

- 1.4.1. Bolder Mere is part of Ockham and Wisley Commons. Approximate grid reference of the centre point of encroachment location on north west shoreline TQ 07516 58450 (Figure 1-1).
- 1.4.2. Parking at Bolder Mere Car Park (KT11 1NR). Grid reference TQ 07861 58655. Bolder Mere is located immediately to the south west of the junction of the M25 and the A3.



Figure 1-1 - Location map

2. Specification

2.1. Organisations

Glossary of Parties involved

2.1.1. A glossary of the parties involved is presented in the table below.

Table 2-1 - Glossary of Parties involved

Role	Party
Employer	Highways England
Project Manager	BBA (whose designated representative is Howard Williams);
Designer	Atkins Limited
Contractor	Balfour Beatty
Specialist Sub-contractor(s)	Details to be populated following confirmation of the Sub-contractor
Supplier(s)	Salix Wetland Services Ltd for coir products
Project Supervisor:	Details to be populated following confirmation of the Project Supervisor

2.2. Other Specifications

2.2.1. Reference Standards

2.2.2. The following are reference standards

- National Plant Specification (NPS) - Horticultural Trades Association 2002.
- Standard Form of Tender for the Supply and Delivery of Plants - Joint Council for Landscape Industries/Committee on Plant Supply and establishment (JCLI/CPSE) (7th edition, July 1992).
- Handling and Establishing of Landscape Plants - Horticultural Trades Association 1995.
- The Plant Health (Great Britain) Order 1993 - Statutory Regulations HMSO 1993.

2.3. General Requirements

General Notes

2.3.1. The Contractor or specialist sub-Contractor shall:

- In relation to the reed bed revetment be a company that specialises in bioengineering design and wetland installation with a recognised history and documented experience. Bioengineering refers to applications such as coir pallets, geotextiles and reed beds.
- In relation to lily translocation be experienced in uplifting lilies with operatives that can demonstrate appropriate training and use of PPE such as dry suits and a snorkel and mask.
- Provide information substantiating its capability to provide staff expertise and suitable and enough quantity of equipment and labour to meet contract requirements in both river and wetland environments. Proof of capability shall include case studies and letters of recommendation from previous clients noting specific projects. Of the case studies 3 shall be available for inspection by the Contractor prior to award and shall be of different ages, techniques, and location.

- Provide, for The Contractor approval, details of any subcontractor being utilized to deliver the contract.

Work In Adverse Weather

- 2.3.2. Work shall not be carried out in adverse weather if such work is likely to be injuriously affected by weather conditions. Works may also be restricted, at the discretion of the Project Manager, should water levels or water clarity in Bolder Mere be likely to injuriously affect installation to the design requirements.
- 2.3.3. Suitable protective covers shall be made available at all times to cover up work in progress or recently completed work either of which may be damaged by adverse weather.

Protection of Bolder Mere

- 2.3.4. The Specialist Sub-contractor shall make provision to install and maintain effective measures to protect Bolder Mere from pollution risk and the effects of mobilisation of fine sediment during the construction of the reed bed planting revetments. The Specialist Sub-contractor shall submit for approval by the Project Manager, a method statement and provide product details, and an inspection and maintenance plan for implemented pollution control measures.

2.4. Classification, Definitions and Uses of Earthworks Materials

Planting Revetment Stone Fill

- 2.4.1. The planting revetment stone fill will be composed of washed clean stone without fines, ranging in size from 20 – 50 mm diameter.

Installation

- 2.4.2. Following the installation of the vertical front edge to the reed bed revetments and the erosion control matting, stone fill shall be added and tamped to the finished design level as shown on drawing HE551522-BBA-ELS-STH_AL_BOLDER-M2-LL-000001.

Clayey Subsoil

- 2.4.3. The low nutrient clayey subsoil is required on top of the planting revetment to provide the medium into which the pre-established coir pallets will be fixed and take root. This clayey subsoil shall be suitable for sustaining vegetation growth and conform to BS8601:2013 and the LQM/CIEH 'Suitable 4 Use Levels' soil assessment criteria.

- 2.4.4. The clay content shall be at a minimum 20% with sand content no higher than 50%.

Installation

- 2.4.5. The low nutrient clayey subsoil shall:

- be placed on top of the stone fill.
- be lightly compacted to the design height to provide a varied level within the elevation range shown on the section drawing HE551522-BBA-ELS-STH_AL_BOLDER-M2-LL-000001.

- 2.4.6. Pre-established coir pallets shall be installed within 2 weeks of the placement of the subsoil on the planting revetment. Should this not be possible due to weather, water level or seasonal constraints then the Specialist Sub-contractor shall make provision to install and maintain a cover over the surface of the subsoil using a 100% biodegradable erosion control blanket. This cover shall be maintained until such a time that the coir pallets can be installed to reduce the risk of wash out and sediment generation. The Specialist Sub-contractor shall provide product and fixing details for approval.

- 2.4.7. It is anticipated that the coir pallets will be fixed directly on top of any protection measure applied.

Material Certification

- 2.4.8. The Contractor shall provide appropriate certification obtained from his suppliers to authenticate the grade or quality of materials or goods as requested by The Project Manager. Where quality of materials or goods depends upon the continued standard of the supplier's manufacturing process the Contractor shall provide evidence that the quality of materials or goods can be assured. Materials may be rejected if evidence of compliance with the Specification is not forthcoming.

Storage Handling and Use of Materials

- 2.4.9. All fill and planting substrate material brought to the site shall be kept free from contact with deleterious matter including Invasive Non-Native Species known to present in and around Bolder Mere.
- 2.4.10. Aggregates shall be stored on clean well-drained hard standings at permanent mixing positions. There shall be separate compartments for each size of aggregate specified, and the bottom 200 mm of the aggregate heaps shall not be used so that it will form a drain for the rest of the pile.

2.5. Special Structures

Pre-Established Coir Pallets

Manufacture

- 2.5.1. Pre-established single species *Phragmites australis* coir pallets will have been pre-grown in a specialist UK nursery with a proven track record of growing high-quality coir. The nursery has been pre-approved by The Contractor. All coir pallets will be supplied as 2 m long by 1 m wide by 40 mm to 50 mm thick pallets at manufacture. It is recognised that the coir pallets are a natural product and may not always adhere to this dimension since they may deform over time.

Netting

- 2.5.2. On manufacture the coir pallet netting shall be 3 mm coir twine in a square mesh pattern, with a nominal mesh opening of 50 mm. The outer net shall have a minimum tensile strength of 10 kN/m.

Stuffing

- 2.5.3. On manufacture the coir pallets shall be stuffed with coir fibre which shall be virgin mattress fibre with dust content removed at manufacture stage. Each fibre shall be of no less than 50 mm long and be typically 100 mm to 150 mm long. Coir fibre stuffing shall be at a rate of 2.5 kg per m² as a dry weight at manufacture.

Pre-establishment of vegetation

- 2.5.4. Pallets will have been planted at a rate of 20 plants per m² using 230cc root trainer sized plug plants and will have had a minimum growing period of 6 months during the growing season (March-September) prior to transport to site and installation. Pallets will have been grown in standing water from plug plants grown from seed stock previously collected from Bolder Mere.
- 2.5.5. On supply plants shall be fully rooted through and free from any invasive sub species or fauna. Only pallets in which established plugs clearly display additional rooting into the coir net matrix (roots and rhizome are emerging through the bottom of base coir) shall be acceptable for installation on site, as depicted in the following photograph.



Figure 2-1 – Example of a *Phragmites australis* coir pallet showing rooting into the coir net matrix

Installation

2.5.6. The following applies:

- The coir pallets shall be pegged in position on top of the planting revetment using nominally 8 coir pallet pegs per 2 by 1 m pallet – being 6No at 1 m centres around the outside of the pallet and 2No in the half-centres.
- Each pallet shall be laid next to, but not overlapping, the adjacent pallet. Only where pallet handling leads to misshapen units, may edges of the pallet be buried beneath the adjacent pallet.
- To achieve coverage of the reed bed planting revetments, pallets may be nominally orientated and manipulated.
- Pallets shall not be stretched beyond their natural limits and laid to maximise coverage within the planting revetment. This shall require spacing of the pallets which shall be undertaken with a preference to maintaining gaps inside the margin, as opposed to at the rear or along the frontage.
- No pallets shall be cut to fit a smaller area, instead the pallet shall be allowed to extend into the water or onto the land as required and secured with timber pegs. It is not envisaged that the pallet will be buried into the ground by excavation except where the natural line of the frontage requires. Where the excess pallet far exceeds the area for coverage, the pallet shall be concertinaed or folded under itself to suit and fixed in place with timber pegs.
- The optimum timing for pegging of the coir pallets to the revetment surface is between April and June, although the works can be undertaken at any time of year, as long as freezing and flood conditions are avoided.

Brushwood Fascines

Manufacture

- 2.5.7. Fascines shall consist of hazel sourced from sustainably managed coppice woodlands with minimum delivery response time. The rods shall be fresh cut straight hazel from the latest cutting season with a maximum diameter of nominally of 20 to 40 mm diameter and have an overall length of 2 m. Each fascine shall be securely tied equidistantly in 3 places with polypropylene twine to give a nominal fascine diameter of 0.4 m resulting in nominal mass of 8 kg per linear metre.

Installation

- 2.5.8. The following applies:
- Brushwood fascines will be installed on top of each other as per the design drawings and secured between front stakes at 400 mm centres and back stakes at 800 mm centres.
 - The bottom length of fascines shall be pushed down so that they are in contact with the hard bed level i.e. the soft sediment below them is displaced.
 - Pressure will need to be applied to each layer of fascines to achieve the design height and to overcome buoyancy as the revetment face is laid.
 - The ends of the fascines shall be tightly butted together to provide a meshed overlap of 0.3 m.
 - The fascines shall be secured between the stakes using high tensile strength polypropylene twine, stapled to the stakes in a zig-zag formation as shown on the design drawings.

Transport & storage of pre-established vegetated coir pallets

- 2.5.9. All materials shall be delivered to site at a time agreed with The Project Manager and in a healthy condition. Coir pallets shall be stored for no more than 24 hours on the transport lorry. All coir pallets shall be transported on pallets or similar for unloading by machine (forklift or similar) on site. Care shall be taken to avoid detrimental damage to the foliage and roots of the plants in the coir pallets during all transportation activities.
- 2.5.10. The method of transportation shall be at the Supplier's discretion based on standard good practice for transportation of such products. Details of the intended method of transportation and off-loading shall be agreed with the Project Manager in good time prior to delivery of all materials to site.
- 2.5.11. No plants shall be cut prior to delivery to site unless previously agreed by the Contractor. Cutting will only be permitted where it can be demonstrated that the cutting of the plants will limit damage otherwise caused by folding and subsequent transportation of the coir pallet
- 2.5.12. Coir pallets can be stored on site for a maximum of 5 days so long as they are kept wet and upright. If installed in the hot weather, provision shall be made for watering coir products to prevent them drying out.

Fixings

Chestnut stakes

- 2.5.13. Brushwood fascines are to be fixed to delineate the front face of the reed bed planting revetment using chestnut stakes. All chestnut stakes shall be from UK sourced woodland and be FSC certified with a full, unbroken chain of custody.
- 2.5.14. Chestnut stakes shall be:
- 1.8 m long (+/- 5%)
 - 70 mm to 100 mm diameter (as measured at the mid-point of the stake) (+/- 5%).
 - Pointed at the lower end for driving
 - Chestnut stakes will require no form of pressure treatment
 - With or without bark

- 2.5.15. Stakes shall be driven to design level by hand or by mechanical means. Where stakes are driven to refusal due to hard ground, they shall be inspected to ensure that sufficient retention can be achieved. Stakes that are driven to refusal shall be cut off by hand or by a chainsaw at the level indicated on drawing HE551522-BBA-ELS-STH_AL_BOLDER-M2-LL-000001.

Coir pallet pegs

- 2.5.16. Coir pallets will be secured to the surface of the reed bed planting revetment using timber pegs. The pegs shall be wooden and "T" shaped. Pegs must exhibit ample rigidity to enable being driven through both the sub-soil and stone fill, with sufficient flexibility to resist breakage. The pegs will have the dimensions set out in the table below.

Table 2-2 - Peg dimensions

	Dimension (cm)
Leg length	50
Head width	5
Head thickness:	0.8 to 1.5
Leg width:	1.5 to 2 (tapered to point)
Leg Thickness:	0.8 to 1.5

Polypropylene twine

- 2.5.17. The twine used securely tie each brushwood fascines (see 2.5.7) and to provide the fixing between the front and backline of stakes (see 2.5.8) to hold the stakes and fascines in place shall be:
- Made from polypropylene: either a straight one-twist twine or a plied twine.
 - Have a nominal diameter of between 2 mm and 5 mm.
 - Be coloured green or tan.
- 2.5.18. Alternative products to polypropylene twine e.g. biodegradable non-plastic based twines, will be considered for use as a substitute following supply of specification/performance details by the Contractor for approval. Biodegradable twine will need to provide secure fixing for a period of nominally 5 years.

Wire staples

- 2.5.19. Wire staples (U nails) shall be used to attach twine to the hardwood stakes. These shall be 40 mm x 4 mm nominal diameter zinc coated and manufactured to comply with BS443.

Geotextiles

Erosion control matting

- 2.5.20. A tightly woven 100% biodegradable erosion control blanket is required to provide an effective barrier between the stone and subsoil fill in the reed bed planting revetment and the front line of stakes and hazel fascines. This is required to prevent the fill within the revetment from bleeding into the spaces within the fascines.
- 2.5.21. The matrix of the blanket shall be composed of 100% coir with a woven jute and/or coir fibre netting of appropriate mesh size to retain the fill. A sample shall be provided by the Specialist Sub-contractor for the Project Manager's approval.
- 2.5.22. The erosion control matting shall be stapled to the row of stakes delineating the back line of the revetment and returned in an 'L-shape' as shown on drawing HE551522-BBA-ELS-STH_AL_BOLDER-M2-LL-000001.

Protection Against Waterfowl

Waterfowl protection fencing

- 2.5.23. All reed bed planting revetments shall be protected from waterfowl grazing by robust waterfowl fencing.
- 2.5.24. Waterfowl fencing, e.g. Tenax Cintoflex, should be installed to the front face of the reed bed planting revetments, as could be achieved through attaching timber battens to the chestnut stakes to support the temporary fencing, as shown indicatively in the typical section through reed bed planting revetment (drawing HE551522-BBA-ELS-STH_AL_BOLDER-M2-LL-000001). The temporary fence should be 1 m high.
- 2.5.25. Fencing shall be taught, with no gapping, and with a mesh size that prevents ducklings and other young waterfowl entering the planted area and becoming trapped.
- 2.5.26. The Contractor shall submit proposals for erection and maintenance of the waterfowl fencing immediately following the installation of coir pallets for the Project Manager's approval.
- 2.5.27. The Contractor shall also allow for all maintenance and replacement of waterfowl fencing to ensure protection for a minimum two growing seasons following the installation of the reeds, after which the Contractor shall be responsible for the removal of the fence and any temporary fence fixings.

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B.2 Reed Bed Planting Revetment Bolder Mere - Typical Plan and Section (HE551522-BBA-ELS-STH_AL_BOLDER-DR-LL- 000001_P02)

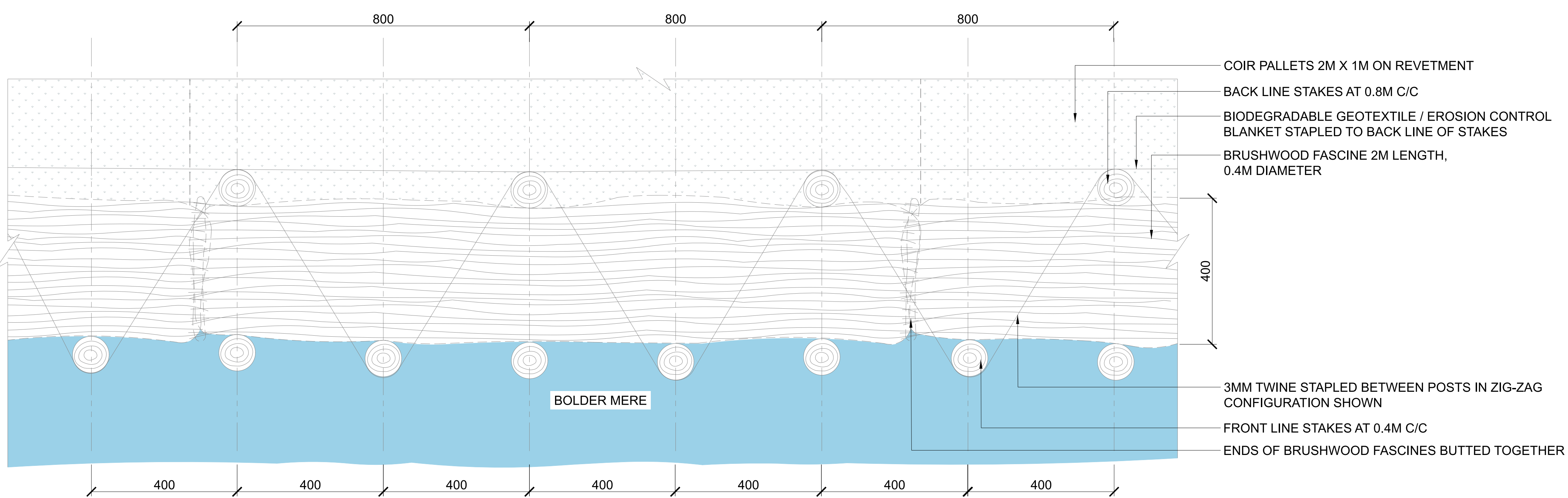
DO NOT SCALE

Millimetres

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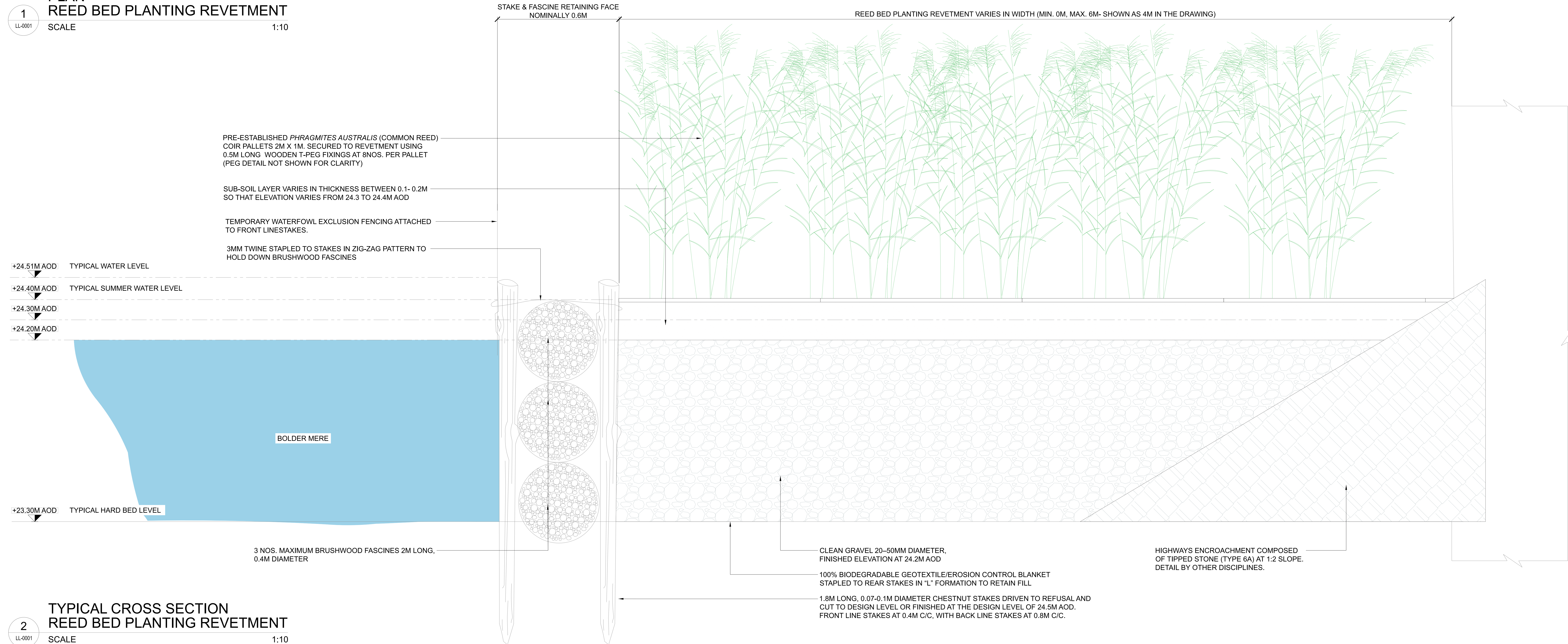


- COIR PALLETS 2M X 1M ON REVETMENT
- BACK LINE STAKES AT 0.8M C/C
- BIODEGRADABLE GEOTEXTILE / EROSION CONTROL BLANKET STAPLED TO BACK LINE OF STAKES
- BRUSHWOOD FASCINE 2M LENGTH, 0.4M DIAMETER
- 3MM TWINE STAPLED BETWEEN POSTS IN ZIG-ZAG CONFIGURATION SHOWN
- FRONT LINE STAKES AT 0.4M C/C
- ENDS OF BRUSHWOOD FASCINES BUTTED TOGETHER

PLAN REED BED PLANTING REVETMENT

1
LL-0001

SCALE 1:10



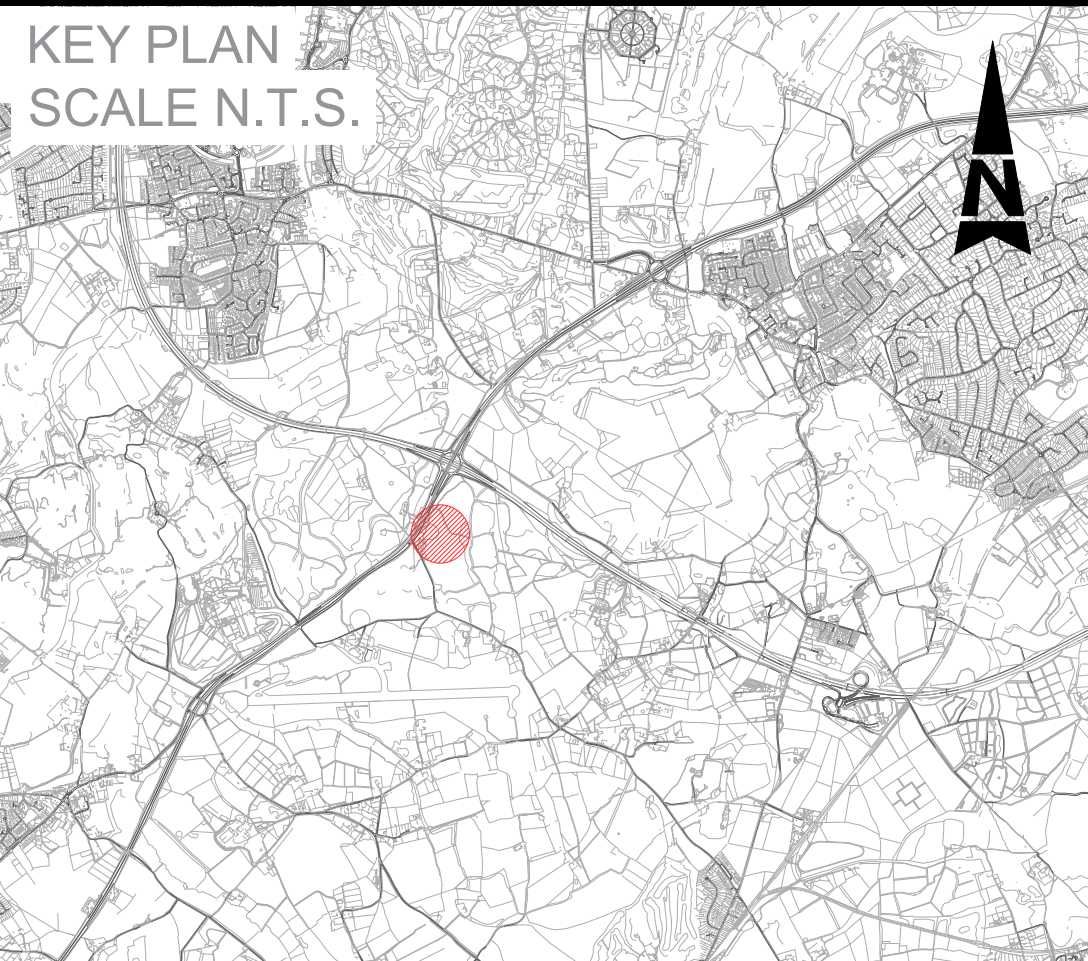
TYPICAL CROSS SECTION REED BED PLANTING REVETMENT

2
LL-0001

SCALE 1:10

- KEY
- BOLDER MERE LAKE
 - COIR PALLETES
 - BRUSHWOOD FASCINE
 - FRONT & BACK LINE STAKES

- NOTES:
- ALL MEASUREMENTS IN MILLIMETERS AND LEVELS IN METERS AOD, UNLESS OTHERWISE STATED.
 - WATERFOWL FENCING TO BE INSTALLED TO PROTECT ALL NEWLY PLANTED REVETMENTS.
 - HARD BED LEVEL TYPICALLY 23.30M AOD.
 - SOFT BED DEPTHS VARY BETWEEN 0 AND 0.55M.
 - WOODEN T-PEGS 0.5M LONG INSTALLED AS 6NOS. AT 1M C/C AROUND THE OUTSIDE OF THE PALLET AND 2 NOS. IN THE HALF CENTRES.
 - COIR PALLETS WILL BE SUPPLIED BY THE SPECIALIST WETLAND NURSERY CONTRACTED TO GROW PRODUCTS FROM BOLDER MERE REED BED SEED.



Description						
Status	Revision	Drawn	Checked	Reviewed	Authorised	Issue Date
Description						
Status	Revision	Drawn	Checked	Reviewed	Authorised	Issue Date
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Status	Revision	Drawn	Checked	Reviewed	Authorised	Issue Date
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Status	Revision	Drawn	Checked	Reviewed	Authorised	Issue Date
Description						
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SAFETY, HEALTH AND ENVIRONMENTAL INFORMATION

In addition to the hazards/risks normally associated with the types of work detailed on this drawing, note the following significant residual risks (Reference shall also be made to the design hazard log).

Construction

- Designer's Risk Assessment, see HE551522-BBA-QSD-WHL_AL_SCHME-RA-ZS-000001.
- Bolder Mere is in a designated site (SSSI and SPA). All designs have been agreed with site owners and regulating authorities. Any deviation will need to be confirmed with owners and Natural England.
- Working in, over and adjacent to water. All usual hazards apply, including drowning, submerged obstacles, soft bed sediments and waterborne diseases. Water level may rise during and after rainfall. Implement a safe system of work in or near water and emergency flood evacuation plan for staff and equipment.
- Sediment management plan to be developed to minimise fine sediment input into the water body and propagation to downstream watercourses. This should be in accordance with Guidance for Pollution Prevention (GPP) documents. Further details within CEMP Appendix I: Surface Water Management Plan HE551522-BBA-EGN-WHL_AL_SCHME-RP-LM-000010 and CEMP Appendix M: Pollution Prevention Plan HE551522-BBA-EGN-WHL_AL_SCHME-RP-LM-000014.
- Safe system for identifying and constructing around overhead or buried services to be developed and methods of working and approvals agreed with necessary utility provider.
- Adopt procedures to avoid harm to protected species, sensitive habitats and heritage assets. Seek advice from suitability qualified persons if in doubt about legislation and best practice.
- Appropriate biosecurity protocols to be implemented that ensure no transfer of invasive species to and/or from site. Further details within CEMP Appendix L: Invasive Species Management Plan HE551522-BBA-EGN-WHL_AL_SCHME-RP-LM-000013.
- Working in an area used by the public. Contractors must consult with landowners and adopt standard site demarcation and marshalling procedures to prevent potential hazards to members of the public or third parties in the vicinity of the site.

Maintenance / Cleaning

- Monitoring and maintenance schedule, see SCC Environmental Management Plan HE551522-BBA-EGN-SCC_LR_SCHME-RP-LM-000001. Adjustment to the form of the reed bed revetments is expected post construction. This management plan has been developed to assess and manage the effect of these changes on habitats.
- Check revetments and shoreline at specified frequency and undertake maintenance as required.
- Identification and appropriate controls for working in areas containing invasive plants and animals on site during monitoring period.

Use

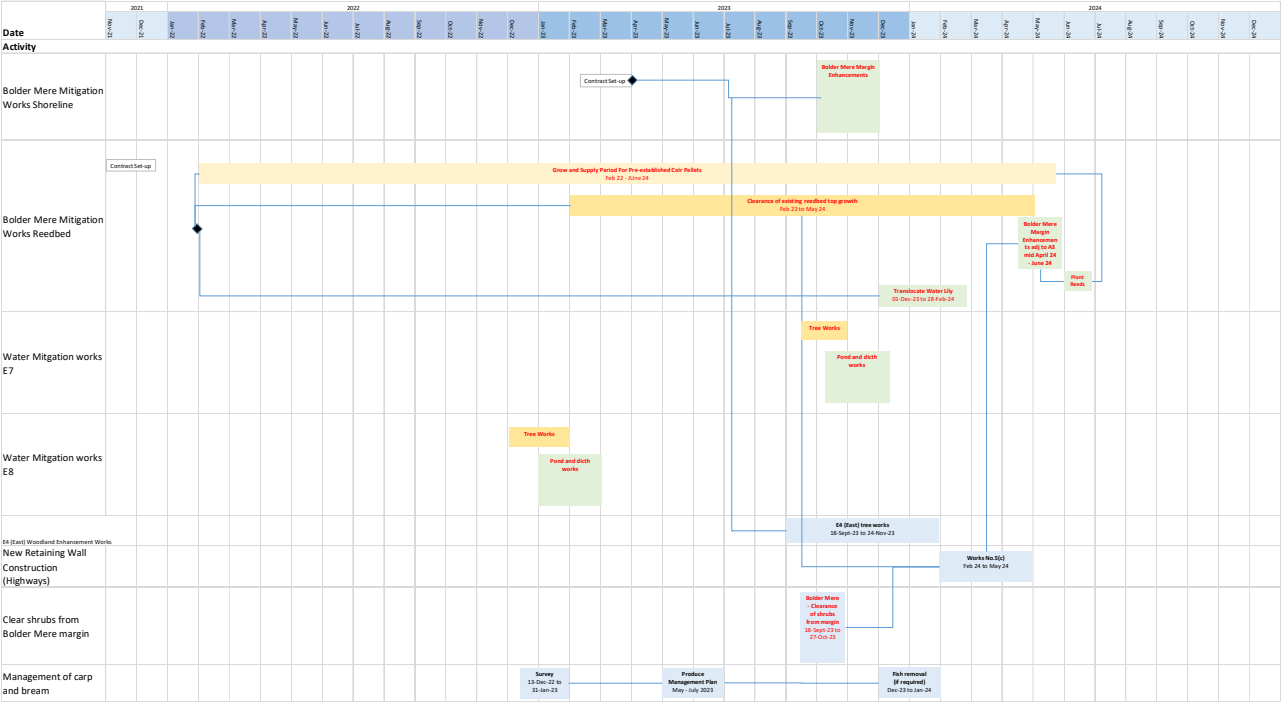
Not applicable.

Decommissioning / Demolition

None anticipated.

Appendix C. Timetable for Completion of Works

C.1 Timetable



Appendix D. Improvements to A3 road drainage system adjacent to Bolder Mere

D.1 Introduction

Both carriageways of the A3 between Cockcrow Hill and the crossing of the Wisley Lane Diversion are drained to a natural low-point in the road adjacent to Bolder Mere. The areas of southern carriageway that drain to this low-point are shown in orange on Figure 1. The lighter orange area (highway catchment 3a) drains north eastward toward Bolder Mere. The darker orange area (highway catchment 3b) drains south westward, also towards Bolder Mere. Both of these catchments discharge to an Ordinary Watercourse that then immediately flows in a culvert beneath the A3 (the 'Bolder Mere Culvert') and eventually into the River Wey.

D.2 Highway catchment 3a

Details of the drainage system for highway catchment 3a is shown in Figures 2, 3 and 4. Runoff from the carriageway is collected in a slot drain located on the inside edge of the carriageway and then conveyed to the outfall to the Ordinary Watercourse via a sequence of pipes and open ditches. Discharge at the outfall is attenuated by two features within the drainage system: an attenuation pond (Figure 2) and a mechanical throttle that backs water into an oversized attenuation pipe (Figure 4). Vegetation in the attenuation pond and open ditches traps sediment and pollutants.

D.3 Highway catchment 3b

Details of the drainage system for highway catchment 3b is shown in plan in Figures 4 and 5. Runoff from the carriageway is collected in a slot drain located on the inside edge of the carriageway and then conveyed to the outfall principally via a sequence of pipes. Discharge at the outfall to the Ordinary Watercourse (a connection direct to the Bolder Mere Culvert) is attenuated by another mechanical throttle that backs water into an oversized attenuation pipe running adjacent to Bolder Mere (best seen in plan in Figure 4 and cross section in Figure 6). There are no connections between the drainage system and Bolder Mere.

D.4 Design standards

The drainage system is designed to accommodate runoff events with return periods of up to 5 years without flooding the highway and 100 years without flooding 3rd party assets, in accordance with DMRB CG 501 (ref 1). This includes an allowance for climate change. The new and modified structures on the receiving Ordinary Watercourse are designed to operate to the same standard (ref 2). The effect of the discharge from the whole of highway catchment 3 on the water quality in the River Wey Catchment is considered to be of 'negligible' magnitude, 'slight' significance and compliant with relevant standards (ref 3).

D.5 Conclusion

The drainage system for the A3 adjacent to Bolder Mere is to be upgraded as part of the Scheme. This upgrade has been designed in accordance with current DMRB guidance (ref 1 & ref 4) with particular attention on water quality and flood risk. The scheme proposals consider water quality (ref 3) through the implementation of vegetated drainage features and reduces flood risk to Bolder Mere by ensuring that the highway drainage system accommodates return periods up to the 100 year event including climate change allowance without flooding 3rd party assets, including Bolder Mere.

References cited in Appendix D

No	Title	Reference
1	Drainage Design Input Statement	HE551522-BBA-HGN-WHL_AL_SCHME-MS-CH-000008
2	Technical Note - Flood Modelling: A3 Culvert and Bolder Mere	HE551522-BBA-EWE-SCC_LR_BOLDER-RP-LW-000002_P01
3	Road drainage and the water environment: surface water quality assessment	HE551522-BBA-EWE-WHL_AL_SCHME-RP-LW-000017
4	Drainage Strategy	https://infrastructure.planninginspectorate.gov.uk/wp-content/ipc/uploads/projects/TR010030/TR010030-000203-TR010030_6.5_environmental_statement_appendix8.1_drainagesstrategy.pdf

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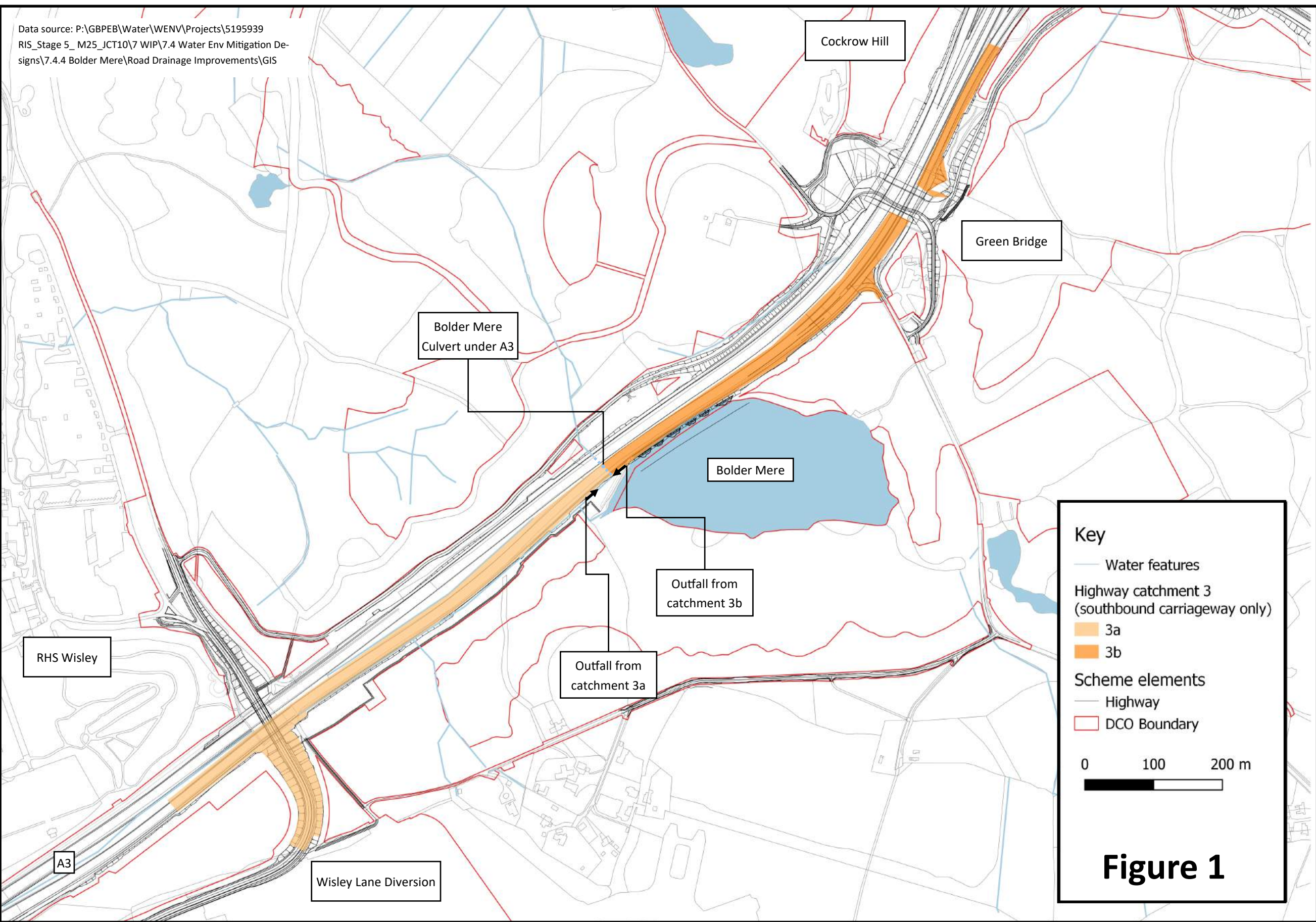
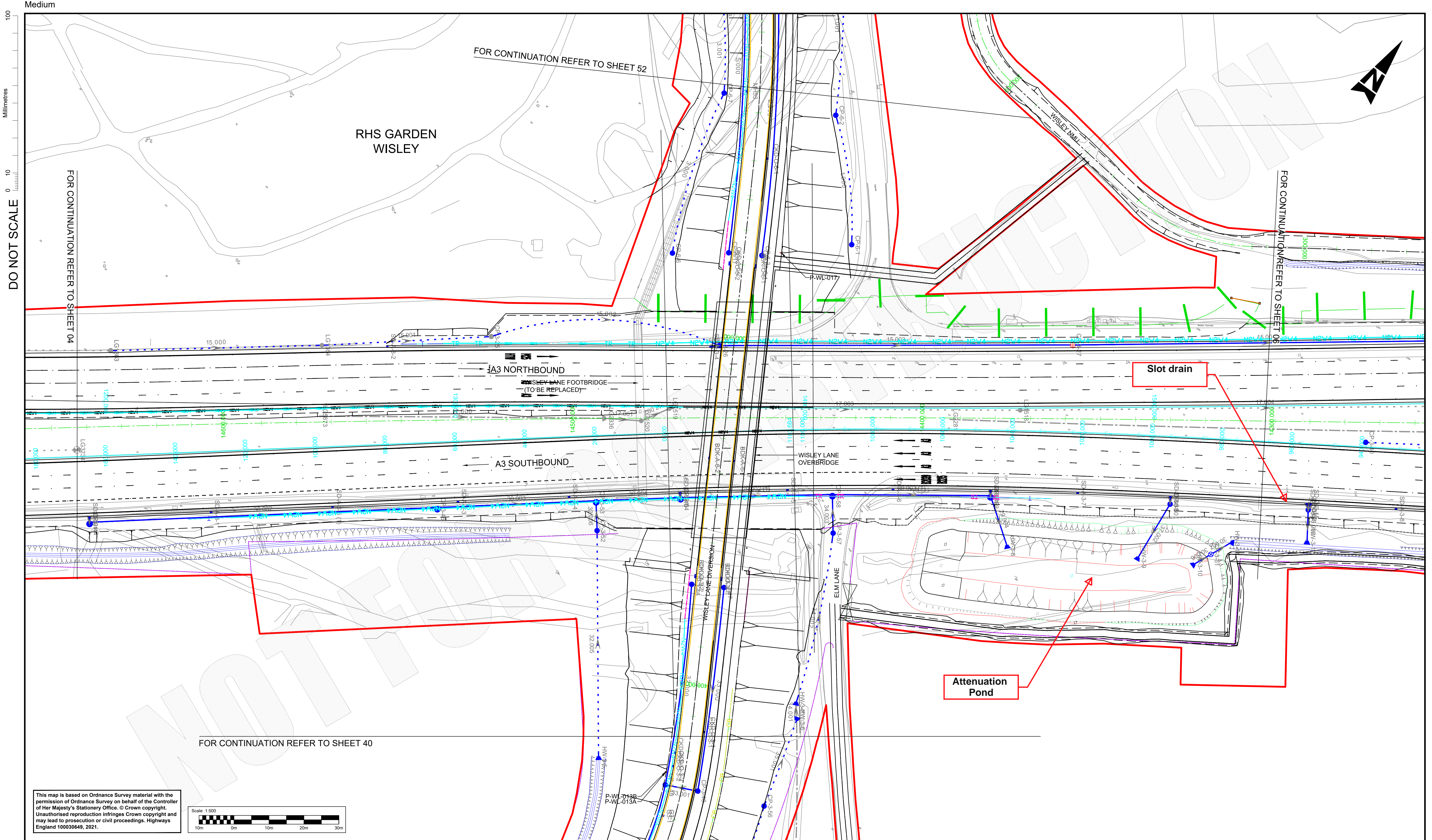


Figure 1



NOTES:

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 - PROPOSED DRAINAGE
 - EXISTING DRAINAGE
 - ROAD RESTRAINT SYSTEMS (TYPE VARIES)
 - FENCES (TYPE VARIES)
 - DEVELOPMENT CONSENT ORDER (DCO) BOUNDARY

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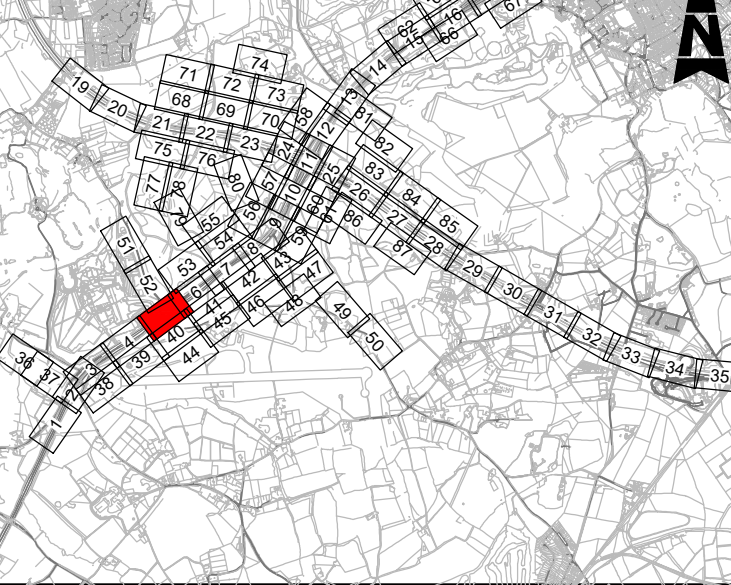
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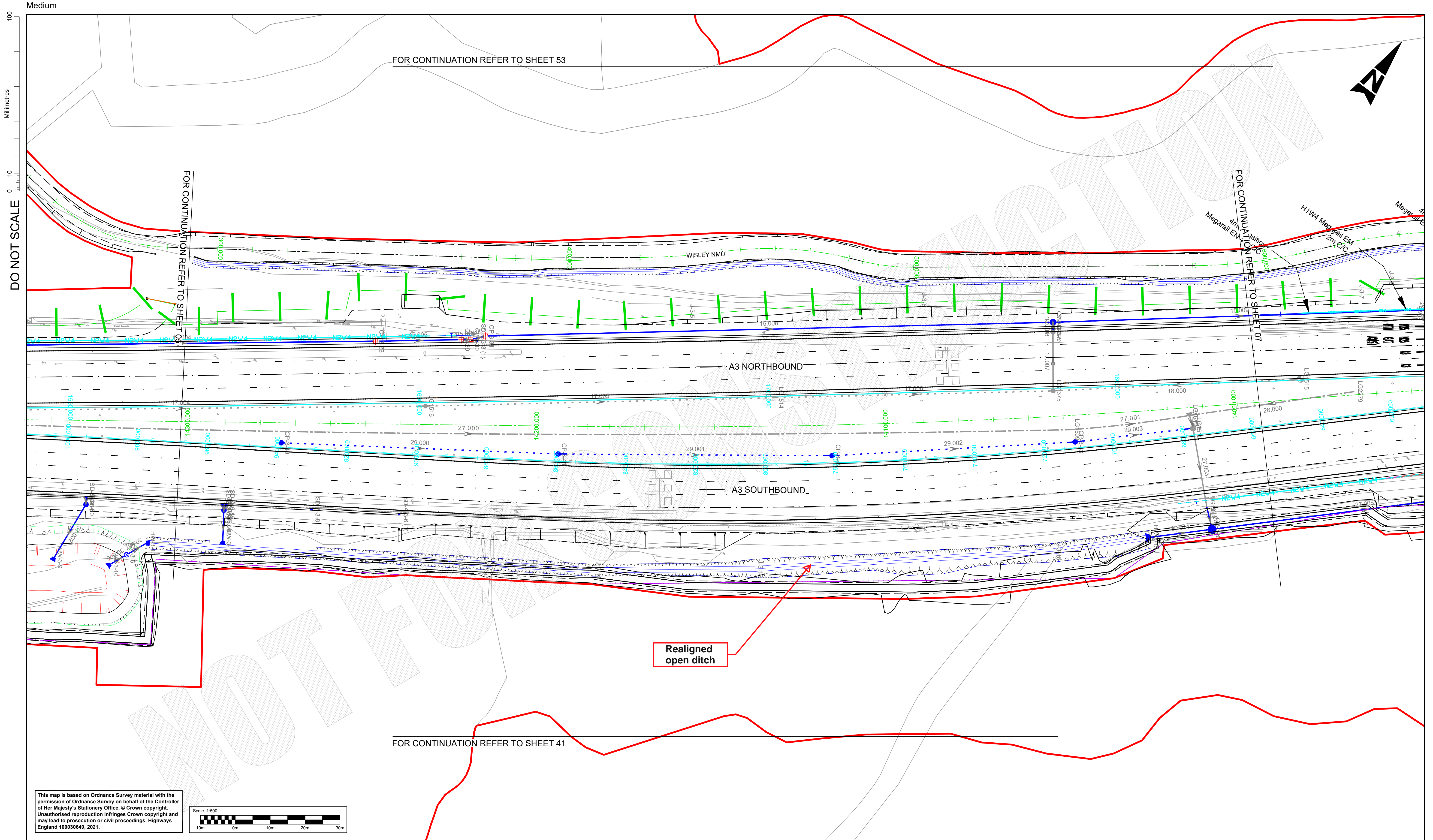
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Drawing Title		Highways General Arrangement				
ATKINS		Balfour Beatty				
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		HE551522		- BBA	- HGN -	
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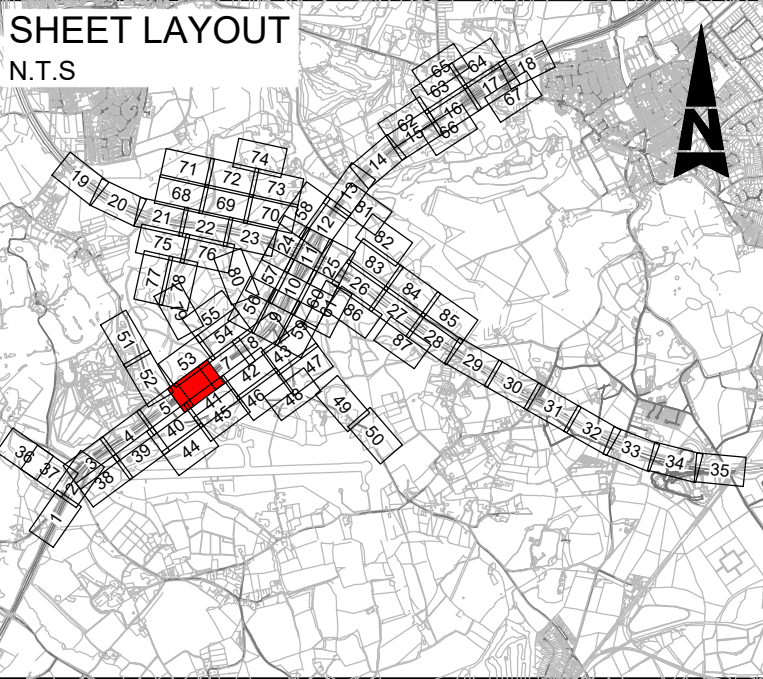
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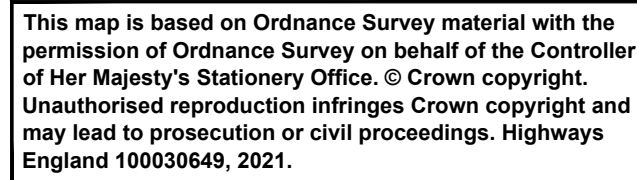
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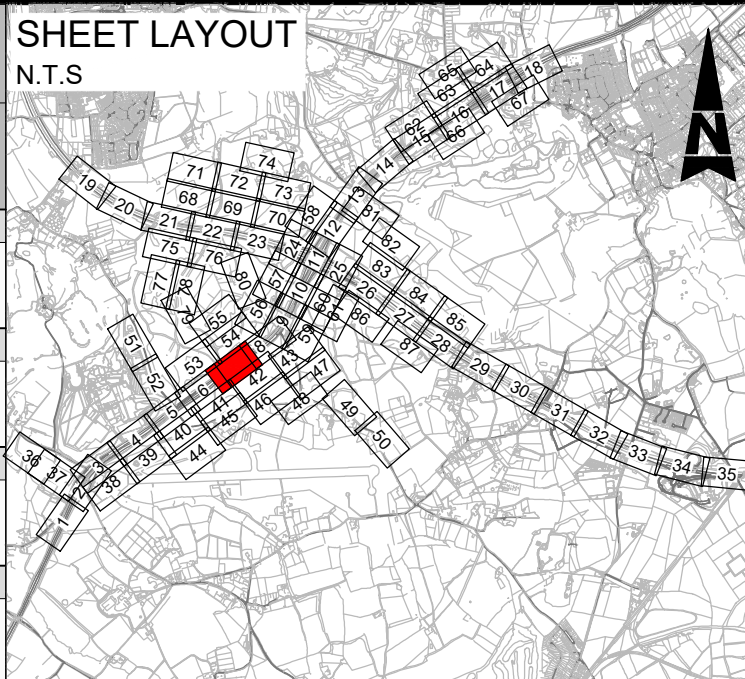
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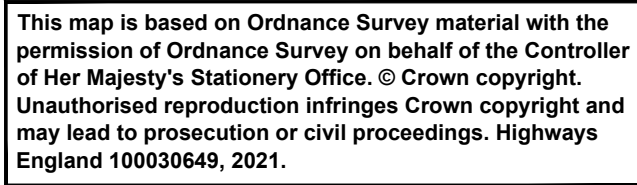
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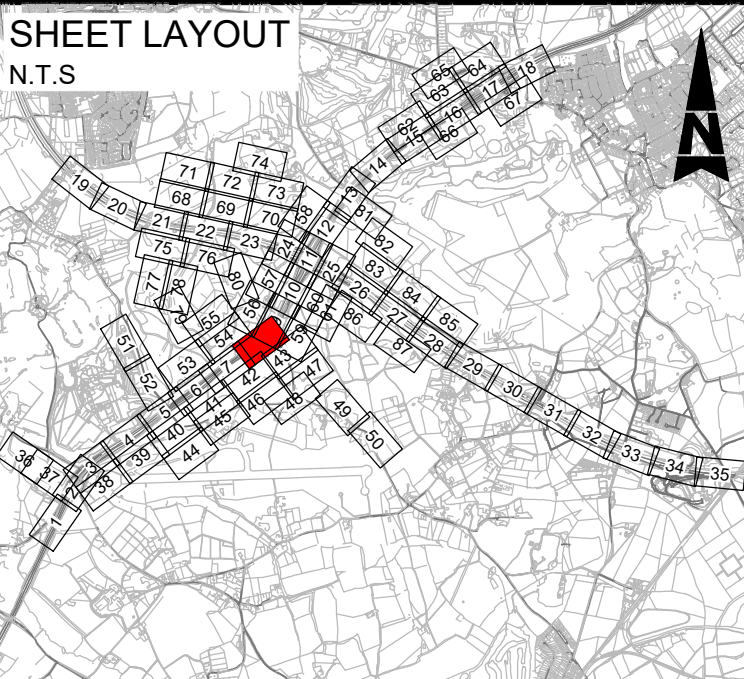
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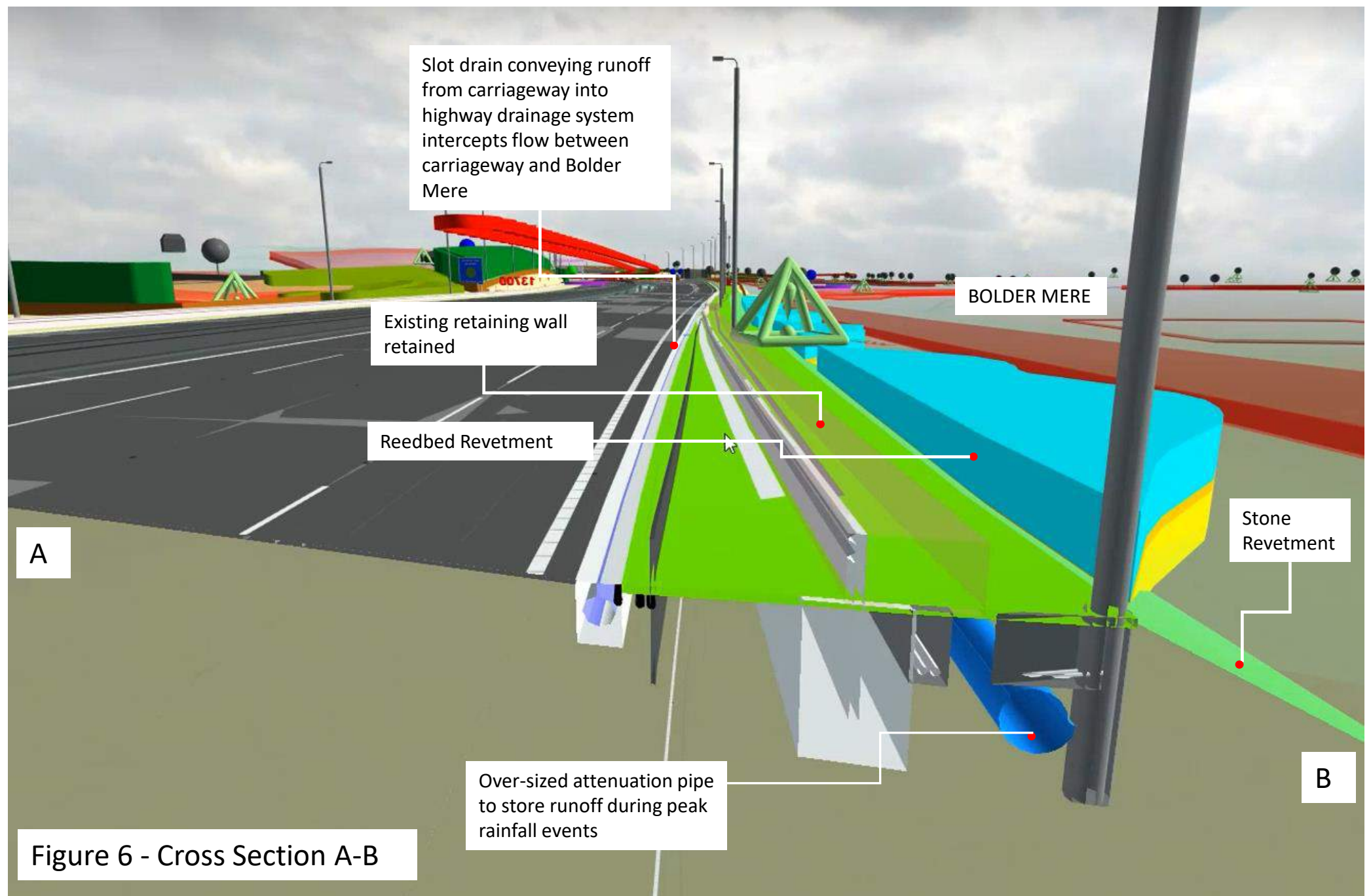


Figure 6 - Cross Section A-B

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