A428 Black Cat to Caxton Gibbet improvements

TR010044

Volume 6

6.8 First Iteration Environmental Management Plan

Planning Act 2008

Regulation 5(2)(a)

Infrastructure Planning (Applications: Prescribed Forms and Procedure) Regulations 2009

26 February 2021

Infrastructure Planning

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A428 Black Cat to Caxton Gibbet improvements

Development Consent Order 202[ ]

First Iteration Environmental Management Plan

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1 Introduction and background to the Scheme

1.1 Purpose of the Environmental Management Plan

1.1.1 This document is the Environmental Management Plan (EMP), First Iteration, for the A428 Black Cat to Caxton Gibbet improvements Scheme (the Scheme). Powers to construct, operate and maintain the Scheme are being sought by Highways England through an application for a Development Consent Order (DCO) (refer to draft DCO **[TR010044APP/3.1]**).

1.1.2 An Environmental Impact Assessment (EIA) has been undertaken for the Scheme and an Environmental Statement (ES) **[TR010044APP/6.1]** has been prepared in accordance with the *Infrastructure Planning (EIA) Regulations 2017* (EIA Regulations) (Ref 1-1). In accordance with the requirements of the EIA Regulations, the ES contains the assessment of the potential impacts on the environment that may be caused during construction, operation and maintenance of the Scheme and describes proposed mitigation measures.

1.1.3 This EMP is based on the design for which the DCO for the Scheme is being applied. It has been prepared in accordance with the *Manual of Contract Documents for Highways Works* (Ref 1-2), the *Design Manual for Roads and Bridges: LA 120 Environmental management plans* (Ref 1-3) and *Design Manual for Roads and Bridges: GG 182 Major Schemes: Enabling Handover into Operation and Maintenance* (Ref 1-4).

1.1.4 This EMP contains a number of outline management plans for key environmental disciplines to be developed into the final management plans, by the Principal Contractor (PC), prior to construction as considered below.

1.1.5 This First Iteration EMP will be developed into a more detailed EMP (Second Iteration EMP) by the PC, with the assistance of the Authority once the detailed design has been finalised (subject to DCO being granted).

1.1.6 On completion of construction, the PC will prepare a final version of the EMP (Third iteration EMP) for the operational and maintenance phase of the Scheme. The Third Iteration EMP will be implemented by the maintenance authority responsible for the maintenance of the Scheme during the operational phase.

1.1.7 The purpose of this First Iteration EMP is to:

a. Document all environmental actions and commitments that are required to manage and minimise the environmental effects of the Scheme as identified in the ES **[TR010044APP/6.1]**.

b. Provide the equivalent of a Code of Construction Practice (CoCP), a suggested item for inclusion within the DCO application (see Appendix 1 of the Planning Inspectorate's *Advice Note Six: Preparation and submission of application documents* (Ref 1-5)). The scope of this EMP is such that it includes all those measures that would be expected within such a CoCP.

c. Provide the 'blueprint' for the more detailed iterations of the EMP (Second and Third iterations) that will follow.

d. Enable the Examining Authority and the Secretary of State for Transport to identify those mitigation measures proposed within the Scheme which are secured within this EMP.

1.1.8 This First Iteration EMP has been prepared using an iterative process and in parallel with the development of the Scheme design, proposed construction methodologies and the EIA. Measures within this EMP include proposed design, construction and operational mitigation, which, in part, arise from the technical assessments presented in the ES. The technical assessments within the ES have taken account of the measures within the First Iteration EMP as 'embedded mitigation' prior to the definition of potential Scheme environmental effects. Proposed mitigation measures embedded in the Scheme design are shown on the Environmental Masterplan on **Figure 2.4** of the ES **[TR010044APP/6.2]** and detailed in **Table 3-4** of Part 3 (Environmental Actions and Commitments) of the EMP.

1.1.9 The ES and the assessments within it are based on the works proposed in the Works Plans **[TR010044APP/2.3]** and Engineering Section Drawings **[TR010044APP/2.10]** and the maximum area of land anticipated as likely to be required, taking into account the proposed limits of deviation (LoD) (refer to **Chapter 2, The Scheme** of the ES **[TR010044/APP/6.1]**), and the flexibility of the detailed design provided for in the DCO **[TR010044/APP/3.1]**. All distances, directions, areas and lengths referred to in this document are approximate.

1.1.10 The construction of the Scheme would be subject to measures and procedures defined within a Second Iteration EMP to be prepared by the PC. The Second Iteration EMP would be based on, and incorporate, the requirements of the First Iteration EMP relevant to that construction phase and the PC's contractual scope. It would also include the implementation of appropriate industry standard practices and control measures for environmental impacts arising during the Scheme works.

1.1.11 Subject to the potential for alternative measures set out in the DCO **[TR010044/APP/3.1]**, the measures defined in the Second Iteration EMP would be applied by the PC as stipulated in the relevant parts of the First Iteration EMP, throughout the duration of their contract to provide planning, management and control during the construction phases of the Scheme with the aim of controlling potential impacts upon the natural and historic environment, people and businesses.

1.1.12 All contractors would be required to comply with applicable environmental legislation, together with any additional environmental controls imposed within the DCO **[TR010044/APP/3.1]**. The induction, training and briefing procedures for staff are outlined in Part 7 of the First Iteration EMP.

1.1.13 The measures implemented, such as soil handling and dust management, are set out in relation to each environmental discipline of the ES **[TR01044/APP/6.1]** with the outline management plans contained in the Annexes of this First Iteration EMP and within the Register of Environmental Actions and Commitments (REAC) tables included in Section 3.

1.1.14 For the purposes of the First Iteration EMP, the following definitions apply:

a. The Authority is Highways England. The Authority would assist the PC in the preparation the Second Iteration EMP[1] and other Management Plans defined as being required within this First Iteration EMP, detailed method statements required by the First Iteration EMP; and variations to these and other matters as stated within this First Iteration EMP. The Authority would also prepare the Third Iteration EMP and other Management Plans defined as being required.

b. The PC means any contractor appointed by The Authority to deliver the construction works (and shall also include any sub-contractors appointed by the PC to carry out any part of the main construction works); and

c. The maintenance authority is a body tasked with the maintenance of the Scheme once operational. Once the Scheme is complete in its entirety, this would be The Authority, in relation to the trunked sections of the Scheme. Prior to full completion this would be the PC. Some components of the completed Scheme may be maintained by Bedford Borough Council, Central Bedfordshire Council or Cambridge County Council.

1.1.15 **Figure 1-1** provides an illustration of the EMP relationship from the first to third iterations and gives an overview of which authorities are responsible for measures implemented at each stage.

[1] Final approval of the Second Iteration EMP in the implementation of the Scheme will be by the Secretary of State for Transport in consultation with relevant bodies such as the local planning authority and highway authority.

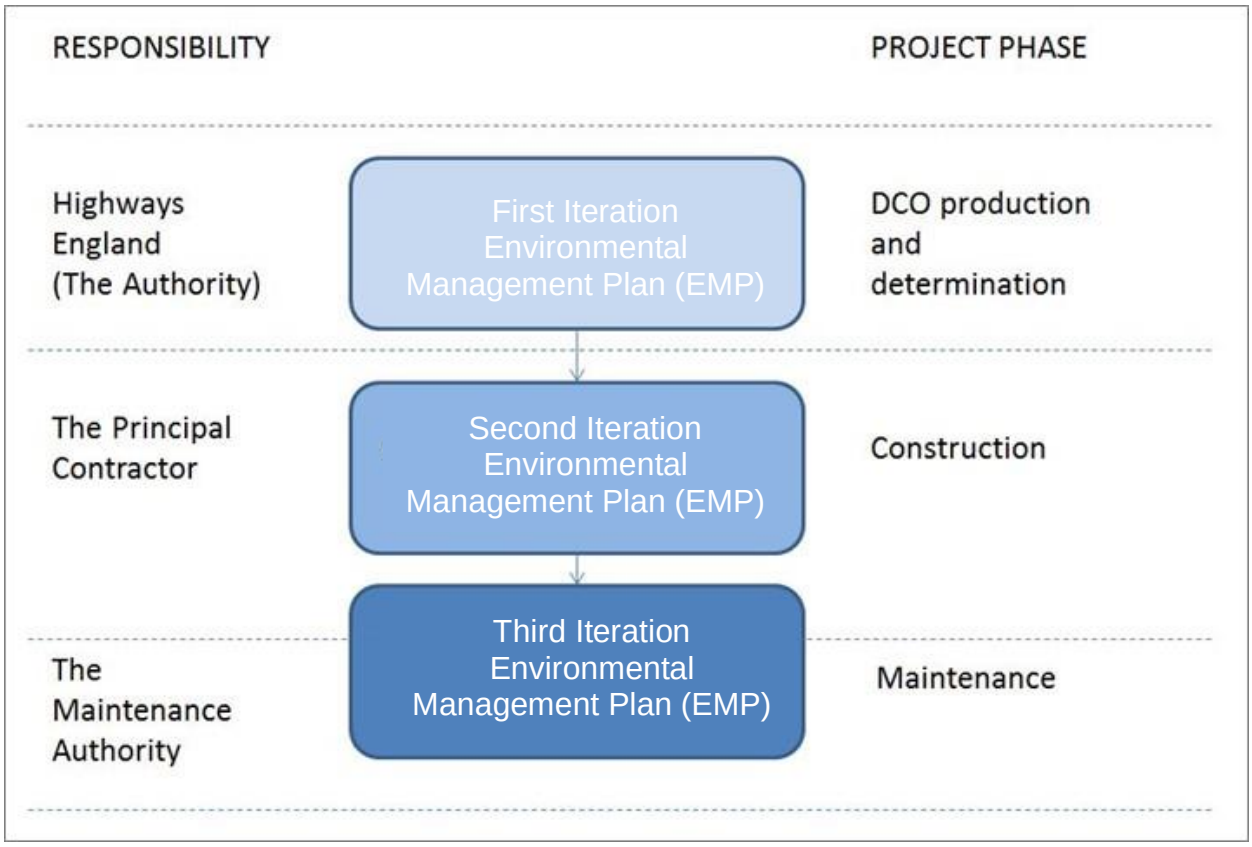


Figure 1-1: Development of the EMP through construction and handover

Development of the EMP through construction and handover

1.1.16 The Second Iteration EMP (and any other document that forms part of it) would be a live document that would be maintained by the PC throughout the construction phase of the Scheme. As a minimum, the Second Iteration EMP would be reviewed every six months to ensure that it is up to date.

1.1.17 Towards the end of the construction phase, the PC will develop the Second Iteration EMP into a Third Iteration EMP for the operational and maintenance phase of the Scheme, which will be subject to the approval of the Secretary of State for Transport, in consultation with the relevant planning authorities. The indicative contents of a Third Iteration EMP are set out in *LA 120* (Ref 1-3). This Third Iteration EMP would then be implemented by the maintenance authority responsible for the maintenance of the Scheme during the operational phase.

1.2 The Scheme

Location

1.2.1 The Scheme would be implemented on land within the administrative areas of the following authorities, located in the east of England:

a. Cambridgeshire County Council.

b. Huntingdonshire District Council.

c. South Cambridgeshire District Council.

d. Bedford Borough Council.

e. Central Bedfordshire Council.

1.2.2 **Figure 1.1** of the Environmental Statement **[TR010044/APP/6.2]** illustrates the geographic location of the Scheme in relation to these administrative areas.

Need for the Scheme

1.2.3 The existing A428 connects communities between St Neots and Cambourne and links the East of England to important regional, national and international hubs such as the Felixstowe and Harwich ports. The route also connects Bedford, Milton Keynes and the M1 motorway to Cambridge and the M11 motorway and is used by both local and long-distance traffic.

1.2.4 The existing A428 between Wyboston interchange and Caxton Gibbet in Cambridgeshire remains the only stretch of single carriageway between the two key economic hubs of Milton Keynes and Cambridge. The existing A428 provides a vital link between the M1 (at Milton Keynes) and the M11 (at Cambridge), connecting the communities of Bedford, St Neots, Cambridge and Cambourne. The road carries twice the traffic it was designed for, with drivers suffering daily congestion, delays and incidents.

1.2.5 There is potential for significant growth in the local area, with new housing and transport developments likely to come forward in the near future which will exacerbate the current problems on this section of the road network.

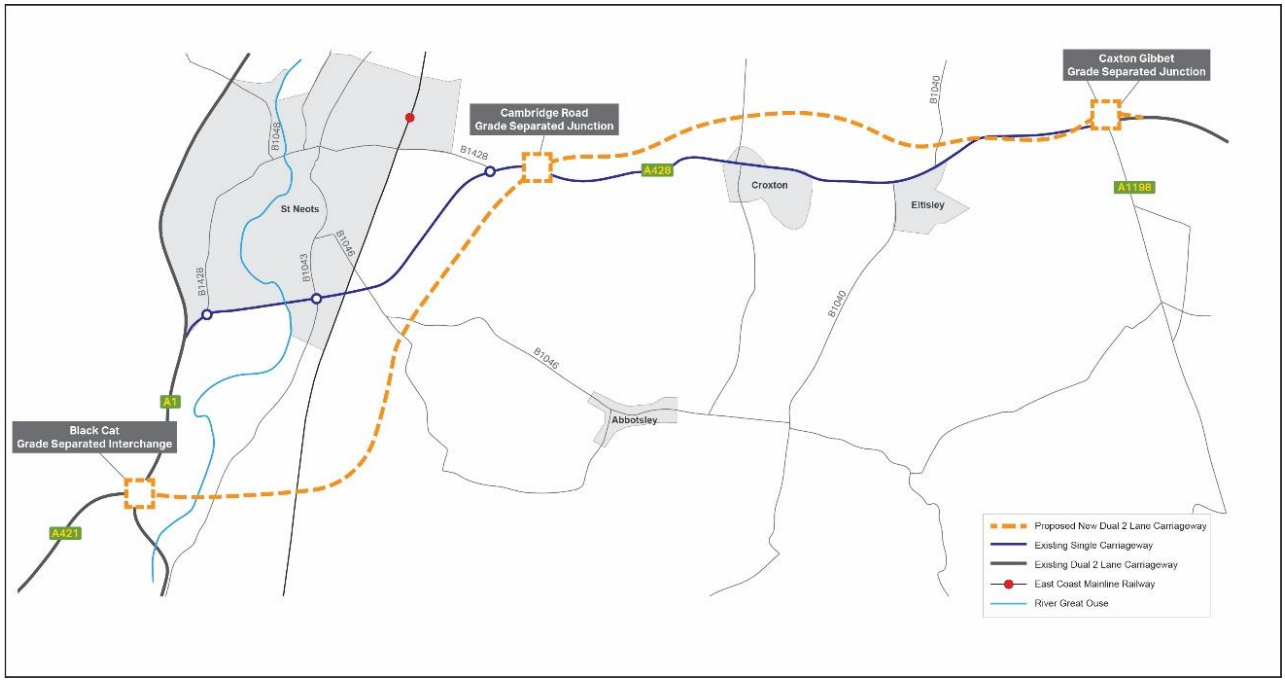
1.2.6 The Department for Transport outlined in its *Road Investment Strategy: for the 2015/16 – 2020/21 Road Period* (Ref 1-6) the case for *"improvement of the A428 near St Neots, linking the A421 to Milton Keynes with the existing dual carriageway section of the A428 to Cambridge… The scheme is expected to include significant improvements to the Black Cat roundabout, where the A1 currently meets the A421".* The Scheme is also included within the Department for Transport's *Road Investment Strategy 2: 2020 – 2025* (Ref 1-7) *"dualling of remaining single carriageway section between Cambridge and the M1, including three grade separated junctions: one at the junction of the A1 and A421 (Black Cat); a second at Cambridge Road / B1428 east of St Neots; and a third at the junction of the A428/A1198 at Caxton Gibbet. The Black Cat interchange will provide free-flowing movements for traffic on the A1 and the A421/A428."*

1.2.7 The purpose of the Scheme is to address the problems of congestion, poor journey time reliability and poor resilience against incidents between the Black Cat and Caxton Gibbet roundabouts.

Brief outline of proposed works

1.2.8 The Scheme seeks to address these problems through construction of a new 10 mile (16km) dual 2-lane carriageway from the Black Cat roundabout to Caxton Gibbet roundabout, to be known as the A421 (hereafter referred to as the 'new dual carriageway') and in addition approximately 1.8 miles (3km) of tie-in works shown in schematic form in **Figure 1-2**.

Figure 1-2: The Scheme



1.2.9 The Scheme includes the following main components:

a. A new three-level grade separated junction at the existing Black Cat roundabout, with the A1 at the lower level, the new dual carriageway on the upper level and a roundabout between the two at approximately existing ground level. In addition to slip roads a new free flowing link between the A421 eastbound carriageway and the A1 northbound carriageway would also be provided.

b. A new grade separated all movements junction would be constructed to the east of the existing Cambridge Road roundabout to provide access to the new dual carriageway and maintain access to the existing A428.

c. At the existing Caxton Gibbet roundabout, a new grade separated all movements junction would be constructed, incorporating the existing roundabout on the south side of the new dual carriageway and a new roundabout on the north side. The new dual carriageway would then tie-in to the existing A428 dual carriageway to the east of the new Caxton Gibbet junction.

d. In the vicinity of the new Black Cat junction, direct access onto the A1 from some local side roads and private premises would be closed for safety reasons. A new local road would provide an alternative route. The existing Roxton Road bridge would be demolished and replaced with a new structure to the west to accommodate the realigned A421.

e. New crossings would be constructed to enable the new dual carriageway to cross the River Great Ouse, East Coast Mainline railway, Barford Road, the B1046/Potton Road, Toseland Road and the existing A428 at Eltisley.

f. The existing A428 between St Neots and Caxton Gibbet would be de-trunked and retained for local traffic and public transport with maintenance responsibility transferred to the local highway authorities.

g. An alternative access would be provided to side roads at Chawston, Wyboston and Eltisley.

h. The implementation of safer routes for walkers, cyclists and horse riders.

Programme

1.2.10 The key construction programme dates are provided in **Table 1-1**.

Table 1-1: Key construction programme dates (indicative)

Key programme element	Date
DCO application granted by the Secretary of State for Transport	Q2 2022
Notice to proceed (construction begins)	Q2 2022
Scheme open for traffic	Q2 2026
Defects correction period (1 year)	Q2 2027
Landscape maintenance period ends (up to 5 years)	Q2 2031

1.3 Scheme Objectives

1.3.1 The objectives of the Scheme have been developed in light of the problems identified above and Highways England's wider environmental and customer satisfaction aspirations. They have been included in the EMP to ensure compliance with *LA 120* (Ref 1-3). The objectives are set out below.

a. **Connectivity**: Cut congestion and increase capacity and journey time reliability between Milton Keynes and Cambridge, including by providing a free flowing network.

b. **Safety**: Improve safety at junctions, side roads and private accesses by reducing traffic flows on the existing A428. Improve safety on the A1 by removing existing side road junctions and private accesses onto the carriageway.

c. **Economic growth**: Enable growth by improving connections between people and jobs and supporting new development projects.

d. **Environmental improvements**: Maintain existing levels of biodiversity and have a beneficial impact on air quality and noise levels in the surrounding area.

e. **Accessibility**: Ensure the safety of cyclists, walkers and horse riders and those who use public transport by improving the routes and connections between communities.

f. **Resilience**: Improve the reliability of the road network so that it can cope better when accidents occur.

g. **Customer** Satisfaction: Listen to what is important to our customers to deliver a better road for everyone and improve customer satisfaction.

2 Project team roles and responsibilities

2.1 Site roles and responsibilities

2.1.1 The roles, identified in **Table 2-1**, define the responsibilities associated with the construction works that the PC must establish and maintain. The responsibilities defined in the table include those relating directly to the development and implementation of the Second Iteration EMP, final management plans and the wider environmental responsibilities. The PC will be required to delegate responsibilities to onsite personnel within key areas of the site and compounds. The delegation of responsibility will be clearly identified within relevant documents and site files.

2.1.2 Individual names and contact details will need to be confirmed and inserted where applicable by Highways England (herein referred to as the Authority) and the PC once appointed and confirmed. The PC would establish a management structure that includes an organisational chart encompassing all staff responsible for delivery of environmental mitigation measures and shall include this chart within the Second Iteration EMP. The chart will set out the respective roles and responsibilities regarding the environment.

2.1.3 It is anticipated that prior to the commencement of each main phase of the construction programme, individuals would be identified to fulfil the relevant roles.

Table 2-1: Roles and responsibilities

Roles	Responsibilities
The Authority	Second Iteration EMP responsibilities: a. Assist in the production of the Second Iteration EMP/management plans (as required by Schedule 2 of the draft DCO **[TR010044/APP/3.1]** and any detailed schemes required by this First Iteration EMP (for example, protected species protection). Overall responsibilities: b. To monitor the PCs' performance against the contract including any environmental commitments and targets agreed for the Scheme.
The Principal Contractor's Project Manager (PM)	Second Iteration EMP responsibilities: c. Production of the Second Iteration EMP, prepared by the Environment Manager (EM), for the relevant phase of works. d. Ensure that all controls specified within the Second Iteration EMP and associated management plans are implemented by employees and sub-contractors. Overall environmental responsibilities: Responsible for the delivery the Scheme. Has overall responsibility for the environmental performance of the Scheme and all staff. The PM would be required to: a. Provide information on contract requirements to the EM following contract award and prior to start of works on site.

Roles	Responsibilities
	b. Ensure environmental and waste requirements are included on requisitions and in subcontracts and orders. c. Ensure that all required consents and licenses are in place in line with the relevant project phase. d. Log and monitor incidents and non-compliances. Report incidents and non-compliances to the Authority at the earliest possible opportunity. e. Ensure that the Authority is informed of all environmental complaints. f. Provide an initial point of contact for members of the public and local community who have queries regarding the works. g. Ensure employees and sub-contractors receive Induction Training (including environmental) and toolbox talks, as appropriate. h. Verify actions resulting from non-compliances and observations raised during audits are completed by the deadlines set. i. Undertake inspections alongside the EM to ensure that the environmental controls as set out within the Second Iteration EMP and management plans are in place and working effectively. j. Ensure all records are retained and readily available on site.
Principal Contractor's Environmental Manager (EM)	Second iteration EMP responsibilities: a. Preparing the Second Iteration EMP and management plans based on the First Iteration EMP and management plans. b. Undertake site inspections to monitor compliance with the environmental licenses/consents for the works and the measures within the Second Iteration EMP/Management Plans. c. Prepare any changes to the Second Iteration EMP and management plans in consultation with the PM. d. Maintaining and updating the Second Iteration EMP and management plans on an ongoing basis as required during the relevant project phase. e. Managing the delivery of the various management plans defined within the appendices of the Second Iteration EMP, using appropriate technical expertise as required. f. Managing the delivery of the monitoring required under the Second Iteration EMP and management plans, alongside relevant specialists, and reporting to relevant stakeholders at a frequency to be defined in the Second Iteration EMP. Overall responsibilities: Responsible for ensuring that the Scheme complies with all environmental legislation, consents, objectives, targets and other environmental commitments, including those arising from the ES **[TR010044/APP/6.1]** throughout the relevant project phase. The EM will be required to: a. Provide toolbox talks and environmental inductions to all staff involved in the relevant phase of the Scheme. b. Deal with queries and correspondence on environmental issues.

Roles	Responsibilities
	c. Ensure that the environmental elements of the Scheme have been created and maintained in accordance with the First Iteration EMP and Second Iteration EMP to the appropriate standard. The EM should approve this by way of sign off. d. Implement follow-up corrective actions to ensure compliance with UK regulations and legislation. e. Keep record of all activities on site, environmental problems identified, transgressions noted and a schedule of all tasks undertaken. f. Provide appropriate professional and practical advice to contractors, consultants and project team members associated with environmental and ecological issues and where appropriate resolve issues in a practical and efficient way.
Principal Contractor's Ecological Clerk of Works (ECoW)	Second Iteration EMP responsibilities: a. Review of relevant sections of the Second Iteration EMP. b. Responsible for ensuring that all ecological elements of the Second Iteration EMP are complied with. c. Updating the Landscape and Ecology Management Plan (LEMP), with the Landscape Specialist. d. Prepare ecological method statements and other applicable ecological management plans as identified by the First Iteration EMP e.g. Biodiversity Management Plan. Overall responsibilities: a. Responsible for ensuring that the Scheme complies with all ecological legislation and consents, including the DCO and those arising from the ES [**TR010044/APP/6.1]** throughout the relevant project phase. The Ecological Clerk of Works (ECoW) will be required to: a. Identify any new ecological constraints on site and appropriate mitigation measures for them in accordance with the DCO **[TR010044/APP/3.1]**. b. Undertake watching briefs during site clearance activities, to ensure that any unanticipated discoveries of notable flora and fauna, including invasive species, are appropriately dealt with. c. Approve by way of sign off, that the ecological elements of the Scheme have been created and maintained in accordance with the Second Iteration EMP to the appropriate standard. d. Monitor works during construction activities at sensitive sites including but not limited to wildlife habitats and corridors and non-statutory designated sites and locations of ancient woodland. e. Monitor and provide guidance in respect of the LEMP during the creation of ecological habitats. f. Give toolbox talks, where required, to inform all site personnel of the ecological constraints on site.

Roles	Responsibilities
Archaeological Clerk of Works (ACoW)	Second Iteration EMP responsibilities: a. Responsible for ensuring that all archaeological and heritage elements of the Second Iteration EMP are complied with. b. Liaise with and provide guidance for contractors in relation to the requirements of the Site Specific Written Schemes of Investigation. c. Prepare ecological method statements and other applicable ecological management plans as identified by the First Iteration EMP e.g. Biodiversity Management Plan. Overall responsibilities: a. Responsible for ensuring that the Scheme complies with all archaeological and heritage legislation and consents, including the DCO and those arising from the ES **[TR010044/APP/6.1]** throughout the relevant project phase. b. The Archaeological Clerk of Works (ACoW) will be required to: c. Review the Site Specific Written Schemes of Investigation prepared by the Archaeological Contractor. d. Prepare a Scope of Works for sites to be fenced off, to inspect the fencing throughout the project duration, and to monitor the removal of the fencing at the end of the project. e. Co-ordinate archaeological site works and act as coordinator in respect of access and monitoring arrangements with the Client's representative and the Curators (archaeological planning advisors to the local authorities and Historic England). f. Monitor the work undertaken by the Archaeological Contractor to ensure compliance with the Archeological Management Strategy (AMS) and the Site Specific Written Scheme of Investigations (SSWSI). g. Organise and attend site meetings (anticipated to be monthly but additional meetings may be required) to be held with the relevant Curators. h. Review interim statements and provide these to the Client's representative and the Curators. i. Manage the sign-off process with the Client's representative and the Curators and submit a completion statement before construction activity can commence. j. Give Toolbox Talks to inform all site personnel of the archaeological and historic environment constraints on site, the protection measures that are required and their obligations under the AMS to ensure that these are put in place and complied with. k. Inspect areas where any unexpected archaeological remains are located and liaise with the relevant curators to determine the requirement for appropriate mitigation measures for them in accordance with the DCO **[TR010044/APP/3.1]**.

Roles	Responsibilities
	l. Review and comment on the Post Excavation Assessment Report (PEAR) and Archaeological Research Design during the post-excavation phase.
Traffic Management Officer (PC)	Second Iteration EMP responsibilities: a. Review of relevant traffic sections of the document and the Outline Construction Traffic Management Plan **[TR010044/APP/7.4]**. b. Preparing a Traffic Management Plan (TMP) (including a Construction Workforce Travel Plan, a Site Access Plan and a Site Travel Plan) and submitting this for approval by the Authority. Overall responsibilities: The traffic management officer will ensure compliance with the contractors traffic management plan in accordance with the DCO **[TR010044/APP/3.1]**, Additional responsibilities will include: a. Ensure the Traffic Management Contractor (TMC) manages and implements the traffic management measures identified within the Outline Construction Traffic Management Plan **[TR010044/APP/7.4]**. b. Ensure compliance with all relevant health and safety (H&S) directives in liaison with the main works contractor's H&S Manager, relating to operations and live traffic. c. Management of the layout of site access and egress points for all construction sites and compounds.
Principal Contractor's Environmental Specialist(s) *(Including for example: Contamination and remediation specialist.* *Project Waste Management controller - may be member of PC's dedicated Quality and Safety Team* *Landscape Clerk of Works/Manager to supervise planting and aftercare.)*	Second Iteration EMP responsibilities: a. Review of relevant sections of the Second Iteration EMP/Management Plans. b. Responsible for ensuring that all relevant elements of the Second Iteration EMP/Management Plans are complied with. c. Preparing relevant sub-ordinate plans to the Second Iteration EMP as listed in the DCO **[TR010044/APP/3.1]**. Overall responsibilities: a. Responsible for ensuring that the Scheme complies with all relevant legislation and consents, including the DCO and those arising from the ES throughout the relevant project phase. b. Ensure compliance with draft DCO **[TR010044/APP/3.1]**. c. Provide appropriate professional and practical advice to PCs, consultants and project team members associated with environmental and ecological issues and where appropriate resolve issues in a practical and efficient way. d. Other responsibilities as necessary and appropriate.
Community Relations Manager (PC)	Second Iteration EMP responsibilities: a. Review of relevant sections of the Second Iteration EMP. Overall responsibilities:

Roles	Responsibilities
	Communications with the public, stakeholders and other interested parties, outreach and education, where appropriate. The role will include the following responsibilities: a. Responding to any concerns or complaints raised by the public in relation to the works. b. Liaising with the PM and EM on landowner and community concerns relating to the works and act as the main interface with these stakeholders, alongside any the Authority presence that is required. c. Maintain a log of complaints relating to the environment. d. Ensuring that the PM and the EM are informed of any complaints relating to the environment. e. Keeping the public informed of project progress and any construction activities that may cause inconvenience to local communities. f. Engaging with local schools and colleges to inform pupils and students about the Scheme, advise on careers within the construction industry and point out the dangers of trespassing on construction sites. g. Ensuring that the needs of groups with protected characteristics as identified within the *Equality Act 2010* (Ref 2-1) are considered during the construction process.
All Site staff	EMP responsibilities: Ensure adherence to all environmental policies, procedures and rules as set out in the Second Iteration EMP and any supporting management plans. Organise work to be carried out to the required standards within the aim of minimum risk to the environment. All site personnel to receive instructions on their responsibilities to ensure correct environmental practice in line with the Second Iteration EMP. Overall responsibilities: To receive general environmental awareness training and undertake work in accordance with all works method statements and toolbox talks. Only trained personnel are to manage particular tasks such as refuelling plant and equipment, managing the stores, water quality monitoring and supervising the segregation and collection of waste. The responsibilities of all staff on site throughout the construction of the works will include the following: a. All staff are to be appropriately trained to carry out their respective tasks. b. Adhere to legislation and where appropriate codes of practice and guidance notes relevant to their work.

3 Environmental actions and commitments

3.1 Introduction

3.1.1 The Record of Environmental Actions and Commitments (REAC) contained in **Table 3-2** to **Table 3-12**, identifies the environmental commitments proposed to address the potential environmental effects of the advanced works, the main works (including Scheme construction, operation and maintenance) and confirms the key Scheme design elements to which Highways England has committed (and as illustrated in the Environmental Masterplan on **Figure 2.4 [TR01004/APP/6.2]** of the Environmental Statement (ES)).

3.1.2 The REAC tables will be updated by the Principal Contractor (PC) when the they prepare the Second Iteration Environmental Management Plan (EMP) relevant to their scope of works and then, as required, as the Scheme progresses with each Second Iteration EMP or update prepared in accordance with the principles of the original First Iteration EMP and requiring approval from Highways England.

3.1.3 The extant version of the Second Iteration EMP at the end of construction would be developed by the PC into the Third Iteration EMP which is the main document containing essential environmental information passed to Highways England and to the bodies responsible for the future maintenance and operation of the Scheme.

3.2 Guide to the REAC tables

3.2.1 The tables do not define general legislative requirements. It is required that in addition to compliance with the measures in these tables, that all activities would comply with applicable legislation.

3.2.2 **Table 3-1** provides a summary of the scope of each column within the REAC tables.

Table 3-1: Guide to the REAC tables

Column	Explanation
Reference (Ref.)	A unique identifier defined within these REAC tables to enable simple reference to individual measures. The identifier includes a reference to the anticipated project stage for when the measure must take place.
Source reference (Source Ref.)	An identifier which is directly relevant to the action or commitment, for example a source such as a mitigation reference in the ES.
Action/commitment (including specific location and any monitoring required)	Where no source reference is given, the measure is normally one which is relevant across a range of technical areas and is a broader control measure (e.g. working hours).

Column	Explanation
Objective	The outcome which the defined action is designed to achieve.
Assumption on which the action is based	Any assumption which is relevant to the defined action – this could include absence of suitable data or that plans and strategies already in place.
Achievement criteria and reporting requirements (if applicable)	The criteria which define the successful implementation of the action, such as a document approval or an audit which confirms the action has been undertaken.
How the action is to be implemented	The contractual or other relationship between the relevant parties, which ensure that the action would be delivered.
Responsible person(s)	The person or body responsible for delivery of the action; this would often be the contractor.

3.2.3 In order to provide for future flexibility and unless otherwise stated, the REAC tables do not typically define how the action is to be implemented or achieved, other than beyond a contractual obligation, and do not consider the risk management of individual items, unless these elements are implicit within the action.

3.2.4 The REAC tables do not include a column to define the 'source of the action' (e.g. ES, Habitat Regulations Assessment (HRA), Equality Impact Assessment), since this is generally clear from the Source Reference. However, in preparing a Second Iteration EMP, the PC shall include a new column for this and include within it any confirmation of commitments agreed with stakeholders. When preparing the Second Iteration EMP, the PC shall include a new column for approval and sign off of actions in accordance with the *Design Manual for Rods and Bridges: LA 120 Environmental Management Plans* (Ref 3-1).

3.2.5 The references to guidance documents within the REAC tables are not intended to be exhaustive and in preparing the Second Iteration EMP and related topic specific plans, the PC shall have due regard to any relevant technical guidance in individual subject areas and draw upon and reference these as appropriate.

3.2.6 The REAC tables present the environmental actions and commitments for the Scheme. The PC would deliver the actions and commitments with the application of standard best practice or scheme essential mitigation measures as presented within this First Iteration EMP and/or within the applicable section of the Environmental Assessment for the Scheme **[TR010044/APP/6.1]**.

3.2.7 In the event, that the PC is able to define an alternative measure, or refine measures, which would achieve the same environmental effects at the relevant location. In each such case, the PC would secure the written approval of Highways England prior to implementing any alternative measures and in so doing, would demonstrate to Highways England that the use of the alternative measures would not lead to any materially new or materially different adverse environmental effects compared to those as presented in the Environmental Statement **[TR010044/APP/6.1]**.

Table 3-2: General provisions

Ref	Source ref	Action or commitment (including specific location if appropriate)	Is monitoring required? Yes/ No	Objective	Assumption on which the action is based	Achievement criteria and reporting requirements (if applicable	How the action is to be implemented	Responsible person(s)
G1		***Preparation of a Second Iteration Environmental Management Plan (EMP)*** The Principal Contractor (PC) must prepare and have approved by Secretary of State for Transport, a Second Iteration EMP for their works (as per the agreed scope of the contract) prior to the commencement of their works and which details the measures that shall be undertaken prior to, and during construction of, the Scheme. The construction of the authorised development must be carried out in accordance with the approved Second Iteration EMP. The Second Iteration EMP must be based on, and incorporate, the requirements of the First Iteration EMP **[TR010044/APP/6.8]** and shall include the implementation of industry standard practice and control measures for environmental impacts arising during construction. The Second Iteration EMP will incorporate (as a minimum) and adhere to the supporting management plans presented within the First Iteration EMP **[TR010044/APP/6.8]**. These plans include: Annex A – Air Quality Management Plan Annex B – Noise Management Plan Annex C – Waste Management Plan Annex D – Biodiversity Management Plan Annex E – Soil Handling and Management Plan Annex F – Water Management Plan Annex G – Energy and Resource Plan Annex H – Materials Management Plan Annex I – Contaminated Land Management Plan Annex J – Archaeological Management Plan Annex K – Construction Compound Management Plan Annex L – Landscape and Ecology Management Plan Annex M – Environmental Method Statement Annex N – Emergency Procedures and Record of any Environmental Incidents Annex O – Evaluation of Change Register Annex P – Final Environmental Investigation and Monitoring Reports	Yes (as defined per each management plan).	To ensure the EMP is appropriate to the project phase and the scope of works delivered by the Principal Contractor.	The assessment assumes that the EMP will be implemented throughout the construction of the Scheme.	Highways England approval of the EMP.	Contractual requirement between Highways England and the Principal Contractor. DCO Requirement 3.	Principal Contractor

Ref	Source ref	Action or commitment (including specific location if appropriate)	Is monitoring required? Yes/ No	Objective	Assumption on which the action is based	Achievement criteria and reporting requirements (if applicable	How the action is to be implemented	Responsible person(s)
		The approved Second Iteration EMP will be written in accordance with the PC's obligations to adhere to ISO 14001 (Environmental Management Systems) and the Considerate Constructors Scheme (CCS).						
G2		The ecological and landscaping scheme prepared by the PC must reflect the mitigation measures in the Landscape and Ecology Management Plan (LEMP) and must be based on the Environmental Masterplan as shown as Figure 2.4 of the Environmental Statement **[TR010044/APP/6.2]**.	No	To ensure habitats and screening are established in accordance with the Environmental Masterplan.	The ES assumes establishment of specific habitats and planting.	Successful delivery of habitats and landscaping provisions.	Contractual requirement between Highways England and the Principal Contractor. DCO Requirement 3 **[TR010044/APP/3.1]**. DCO Requirement 6 **[TR010044/APP/3.1]**.	Principal Contractor

Table 3-4: Air quality

Ref	Source ref	Action or commitment (including specific location if appropriate)	Is monitoring required? Yes/ No	Objective	Assumption on which the action is based	Achievement criteria and reporting requirements (if applicable	How the action is to be implemented	Responsible person(s)
ESS – AQ1	Chapter 5, Air quality **[TR010044/APP/6.1]** First Iteration EMP **[TR010044/APP/6.8]**	The Principal Contractor (PC) will develop and implement an Air Quality Management Plan (AQMP) based upon the outline AQMP in the First iteration EMP **[TR010044/APP/6.8]**. The Plan will adopt a range of industry standard good practice construction phase dust mitigation and monitoring measures, and general control measures, relating to: a. Dust management. b. Demolition and earthworks activities. c. Surfacing works. d. General and site specific construction activities and locations e. Community liaison. These measures will be applied during all works undertaken based on the level of construction dust risk at sensitive receptors.	Yes	To ensure air quality is managed appropriately across the Scheme.	Effects on sensitive receptors. Assessment assumes good practice mitigation and monitoring measures will be followed during the construction phase.	Implementation of the AQMP. Principal Contractor will undertake regular inspections of receptors to monitor dust, record inspection results, and make the log available to the relevant local authority upon request.	Contractual requirement between Highways England and the Principal Contractor. First Iteration EMP **[TR010044/APP/6.8]**. DCO Requirement 3 **[TR010044/APP/3.1]**.	Principal Contractor

Table 3-5: Cultural heritage

Ref	Source ref	Action or commitment (including specific location if appropriate)	Is monitoring required? Yes/ No	Objective	Assumption on which the action is based	Achievement criteria and reporting requirements (if applicable	How the action is to be implemented	Responsible person(s)
ESS – CH1	First Iteration EMP **[TR010044/APP/6.8]**	The PC will develop and implement an Archaeological Management Plan (AMP) based upon the measures and approaches detailed within the outline AMP contained in the First Iteration EMP for the Scheme **[TR010044/APP/6.8]**.	No	To manage the historic environment and ensure it is protected in a consistent and integrated manner across the Scheme.	Effects on sites and features of known or potential value.	Implementation of the AMP.	Contractual requirement between Highways England and the Principal Contractor First Iteration EMP **[TR010044/APP/6.8]**. DCO Requirement 3 **[TR010044/APP/3.1]**.	Principal Contractor
ESS – CH2	Archaeological Mitigation Strategy **[TR010044/APP/6.12]**	The PC will implement the measures and approaches as set out within the Archaeological Mitigation Strategy (AMS) for the Scheme. The AMS is presented within the DCO application as **[TR010044/APP/6.12]**.	No	To ensure that all archaeological works are undertaken in accordance with an approved strategy.	Effects on sites and features of known or potential value.	Implementation of the AMS.	Contractual requirement between Highways England and the Principal Contractor Archaeological Mitigation Strategy **[TR010044/APP/6.12]**. DCO Requirement 9 **[TR010044/APP/3.1]**.	Principal Contractor
ESS – CH3	Archaeological Mitigation Strategy **[TR010044/APP/6.12]**	Programme of archaeological excavation, sampling, geoarchaeological assessment and recording. Full details of the scope and extent of the required work is contained within the AMS **[TR010044/APP/6.12]**.	Yes	Record archaeological sites prior to impact by the Scheme.	Effects on sites and features of known or potential value.	Implementation of the AMS. Sign-off by Archaeological Clerk of Works, curators and report by Archaeological Contractor.	Contractual requirement between Highways England and the Principal Contractor Archaeological Mitigation Strategy **[TR010044/APP/6.12]**. DCO Requirement 9 **[TR010044/APP/3.1]**.	Principal Contractor's Archaeological Contractor Archaeological Clerk of Works
ESS – CH4	Archaeological Mitigation Strategy **[TR010044/APP/6.12]**	Methodology to deal with unexpected archaeological remains. Full details of the scope and extent of the required work is contained within the AMS **[TR010044/APP/6.12]**.	Yes	Record archaeological sites prior to impact by the Scheme.	Effects on sites and features of known or potential value.	Implementation of the AMS. Sign-off by Archaeological Clerk of Works, curators and report by Archaeological Contractor.	Contractual requirement between Highways England and the Principal Contractor. Archaeological Mitigation Strategy **[TR010044/APP/6.12]**. DCO Requirement 9 **[TR010044/APP/3.1]**.	Principal Contractor's Archaeological Contractor Archaeological Clerk of Works
ESS – CH5	Requirement 16 of the DCO **[TR010044/APP/3.1]**	Built heritage survey and recording of the Grade II listed Brook Cottages prior to demolition.	Yes	Record built heritage asset prior to impact by the Scheme.	Loss of Grade II listed heritage asset.	Implementation of the AMS. Sign-off by Archaeological Clerk	Contractual requirement between Highways England and the Principal Contractor.	Principal Contractor's Archaeological Contractor

Ref	Source ref	Action or commitment (including specific location if appropriate)	Is monitoring required? Yes/ No	Objective	Assumption on which the action is based	Achievement criteria and reporting requirements (if applicable	How the action is to be implemented	Responsible person(s)
	Archaeological Mitigation Strategy **[TR010044/APP/6.12]**	Details of the required work is addressed within the AMS **[TR010044/APP/6.12]**, as secured within Requirement 16 of the DCO **[TR010044/APP/3.1]**.				of Works, curators and report by Archaeological Contractor.	Archaeological Mitigation Strategy **[TR010044/APP/6.12]**. DCO Requirement 16 **[TR010044/APP/3.1]**.	Archaeological Clerk of Works
ESS – CH6	Requirement 16 of the DCO **[TR010044/APP/3.1]**	Highways England commits to relocating the structural elements of Brook Cottages that are capable of being reconstructed, subject to a structural survey concluding that this is feasible and agreement being reached with a willing receptor museum. This is secured within Requirement 16 of the DCO **[TR010044/APP/3.1]**.	No	To preserve (as a minimum) the historical features of interest associated with Brook Cottages.	Assumption that the structural elements of the building can be relocated and that a willing receptor museum can be found.	If reconstruction is feasible, a method statement will be approved by the Secretary of State in consultation with Historic England and the relevant local authority.	Contractual requirement between Highways England and the Principal Contractor. DCO Requirement 16 **[TR010044/APP/3.1]**.	Principal Contractor
ESS – CH7	Chapter 6 Cultural heritage **[TR010044/APP/6.1]** Archaeological Mitigation Strategy **[TR010044/APP/6.12]**	Three Grade II listed milestones and mileposts and one non-designated milestone would be impacted by the Scheme. These assets would be removed, stored and reinstated as close as possible to their original location. A Method Statement will be prepared by the Archaeological Contractor and agreed with the relevant local authorities for the removal, safekeeping and reinstatement of historic milestones. Full details of the scope and extent of the required work is contained within the AMS **[TR010044/APP/6.12]**.	Yes	Record and safeguard built heritage assets.	Assumption that the milestones / mileposts will be relocated.	Sign-off by Archaeological Clerk of Works, curators and report by Archaeological Contractor.	Contractual requirement between Highways England and the Principal Contractor. Archaeological Mitigation Strategy **[TR010044/APP/6.12]**. DCO Requirement 15 **[TR010044/APP/3.1]**.	Principal Contractor

Table 3-6: Landscape and visual

Ref	Source ref	Action or commitment (including specific location if appropriate)	Is monitoring required? Yes/ No	Objective	Assumption on which the action is based	Achievement criteria and reporting requirements (if applicable	How the action is to be implemented	Responsible person(s)
ESS – LV1	Chapter 7 Landscape and visual effects **[TR010044/APP/6.1]** First Iteration EMP **[TR010044/APP/6.8]**	The PC will develop and implement a Landscape and Ecological Management Plan (LEMP) based upon the measures and approaches detailed within the outline LEMP in the First Iteration EMP for the Scheme **[TR010044/APP/6.8]**. The information, measures and approaches contained in the LEMP will include, but are not limited to: a. Definition of the responsibilities of the Principal Contractor, the Ecological Clerk of Works (ECoW) and the Landscape Clerk of Works (LCoW). b. Definition of grassland and planting specifications (species mixes) to be established within the Scheme. c. Protection measures for retained trees and hedgerows. d. Method of implementation for planting and grassland. e. Maintenance and monitoring requirements for planting within the five-year contract period (the establishment period). f. Prescriptions for the long term management of planting.	Yes	To ensure all landscaping is undertaken in accordance with best practice and achieves its intended function.	The successful establishment of all planting and seeding areas. The LCoW will oversee planting and undertake inspections during the establishment period. Following this period, the long term management, maintenance and monitoring of the soft estate will pass to Highways England.	Sign off of the LEMP by the Secretary of State for Transport in consultation with the relevant local authorities. Implementation of the measures within the LEMP by the ECoW.	Contractual requirement between Highways England and the Principal Contractor. First Iteration EMP **[TR010044/APP/6.8]**. DCO Requirement 3 **[TR010044/APP/3.1]**. DCO Requirement 6 **[TR010044/APP/3.1]**.	Principal Contractor
ESS – LV2	Chapter 7 Landscape and visual effects **[TR010044/APP/6.1]** First Iteration EMP **[TR010044/APP/6.8]**	Maintaining well-managed and tidy construction working areas and site compounds to minimise their visual impact and appearance in the landscape, for example: a. Ensuring that materials are delivered on an ‘as and when’ basis, to minimise the potential for stockpiling and associated visual impact. b. Stockpiling of top soil and plastic wet soil no higher than 2 metres in order to reduce their visual impact. Site management within construction compounds and working areas would be undertaken in accordance with the First Iteration EMP **[TR010044/APP/6.8]**.	No	Minimise visual impacts associated with construction of the Scheme.	Impacts on visual amenity.	Layouts of construction compounds to meet the objectives contained within the First Iteration EMP **[TR010044/APP/6.8]**.	Contractual requirement between Highways England and the Principal Contractor. First Iteration EMP **[TR010044/APP/6.8]**. DCO Requirement 3 **[TR010044/APP/3.1]**.	Principal Contractor
ESS – LV3	Chapter 7 Landscape and visual effects **[TR010044/APP/6.1]** First Iteration EMP **[TR010044/APP/6.8]** Appendix 7.5 **[TR010044/APP/6.3]**	The retention and protection of trees in proximity to construction working areas, to avoid damage to existing vegetation.	No	Minimise visual impacts of the Scheme during construction.	Impacts on visual amenity.	Protective measures to meet the objectives contained within the First Iteration EMP **[TR010044/APP/6.8]** and details contained in Appendix 7.5 of the Environmental Statement **[TR010044/APP/6.3]**.	Contractual requirement between Highways England and the Principal Contractor. First Iteration EMP **[TR010044/APP/6.8]**.	Principal Contractor

Ref	Source ref	Action or commitment (including specific location if appropriate)	Is monitoring required? Yes/ No	Objective	Assumption on which the action is based	Achievement criteria and reporting requirements (if applicable	How the action is to be implemented	Responsible person(s)
ESS – LV4	Chapter 7 Landscape and visual effects **[TR010044/APP/6.1]** First Iteration EMP **[TR010044/APP/6.8]**	Finishing site offices and facilities within the main project compound (located at Wintringham) in a recessive colour to blend into the local landscape and immediate surroundings.	No	Minimise visual impacts of the Scheme during construction.	Impacts on visual amenity.	Measures to meet the objectives contained within the First Iteration EMP **[TR010044/APP/6.8]**.	Contractual requirement between Highways England and the Principal Contractor. First Iteration EMP **[TR010044/APP/6.8]**.	Principal Contractor
ESS – LV5	Chapter 7 Landscape and visual effects **[TR010044/APP/6.1]** First Iteration EMP **[TR010044/APP/6.8]**	Keeping construction lighting to the minimum luminosity necessary for safe working within construction compounds and working areas and where possible, fitting it with motion sensors to minimise the duration of potential light spill in night time views.	No	Minimise potential light spill during construction of the Scheme.	Impacts on visual amenity.	Lighting measures to meet the objectives contained within the First Iteration EMP **[TR010044/APP/6.8]**.	Contractual requirement between Highways England and the Principal Contractor. First Iteration EMP **[TR010044/APP/6.8]**.	Principal Contractor
ESS – LV6	Figure 2.4 Environmental Masterplan **[TR010044/APP/6.2]** First Iteration EMP **[TR010044/APP/6.8]** DCO Requirement 6 **[TR010044/APP/3.1]**	A detailed plan for the establishment and maintenance of planting and hedgerows within the contract period will be developed by the PC based on the principles and outline prescriptions presented in LEMP contained in the First Iteration EMP **[TR010044/APP/6.8]**. The PC will maintain and manage all landscaping within the Scheme during the five-year contract period, as secured by Requirement 6 of the DCO **[TR01004/APP/3.1]**.	Yes	To ensure all landscaping is undertaken in accordance with best practice and achieves its intended function.	Impacts on landscape character and visual amenity.	Monitoring during the establishment period would be undertaken in accordance with the measures set out within the Second Iteration EMP, the content of which would be based on the measures contained in the LEMP within the First Iteration EMP **[TR010044/APP/6.8]**.	DCO Requirement 6 **[TR010044/APP/3.1]**. First Iteration EMP **[TR010044/APP/6.8]**.	Principal Contractor
ESS – LV7	Chapter 7 Landscape and visual effects **[TR010044/APP/6.1]** First Iteration EMP **[TR010044/APP/6.8]**	During Year 15, a monitoring visit would be made by Highways England to each viewpoint identified within the landscape and visual impact assessment predicted to experience significant visual effects to ensure that the planting has established and is delivering its intended screening and integration objectives. Should the landscape planting be found not to have established as intended or be insufficient to provide the required level of screening and integration, remedial works would be undertaken as necessary.	Yes	To monitor that significant adverse visual effects associated with the Scheme.	Impacts on visual amenity.	Successful establishment of all planting at viewpoints identified in the assessment as likely to experience significant effects.	First Iteration EMP **[TR010044/APP/6.8]**.	Highways England

Table 3-7: Biodiversity

Ref	Source ref	Action or commitment (including specific location if appropriate)	Is monitoring required? Yes/ No	Objective	Assumption on which the action is based	Achievement criteria and reporting requirements (if applicable	How the action is to be implemented	Responsible person(s)
ESS – B1	**Chapter 8 Biodiversity [TR010044/APP/6.1]** First Iteration EMP **[TR010044/APP/6.8]**	The Principal Contractor will develop and implement a Biodiversity Management Plan (BMP) based upon the outline BMP in the First Iteration EMP **[TR010044/APP/6.8]**. The BMP will include, but not be limited to, the following surveys and measures: a. General responsibilities for the Principal Contractor and the ECoW (including the supervision of works). b. Pre-construction surveys for habitats and species (including licensing requirements). c. General biodiversity control and protection measures to be implemented during construction of the Scheme. d. Specific measures to be implemented during construction for protected, priority notable, and scheduled species. e. Emergency reporting details. f. Management and maintenance requirements for habitats within the contract period. g. Details of monitoring (including frequency, reporting and responsibilities). The BMP will also contain specifications for the design of mitigation measures and method statements for specific working practices, where appropriate.	Yes	To ensure legal compliance, update information on species within the Order Limits, and mitigate biodiversity effects.	Effects on terrestrial and aquatic habitats and species. Assessment assumes the identified mitigation and monitoring measures will be implemented prior to, and during, the construction phase as necessary.	Implementation of the BMP. ECoW will undertake regular inspections of the mitigation measures, supervise the works and oversee licensing matters and monitoring.	Contractual requirement between Highways England and the Principal Contractor. First Iteration EMP **[TR010044/APP/6.8]**. DCO Requirement 3 **[TR010044/APP/3.1]**. DCO Requirement 10 **[TR010044/APP/3.1]**.	Principal Contractor
ESS – B2	Biodiversity Pre-Commencement Plan **[TR010044/APP/6.13]**	The Principal Contractor will develop and implement the Biodiversity Pre-Commencement Plan **[TR010044/APP/6.13]**, which is secured through Requirement 20 of the DCO **[TR010044/APP/3.1]**.	Yes	To ensure legal compliance with biodiversity specific legislation for all pre-commencement works proposed within the Order Limits.	The implementation of preliminary works surveys and checks required to be undertaken by the Principal Contractor.	Implementation of the Biodiversity Pre-Commencement Plan. Site clearance or demolition works will not be carried out on any area until the ECoW has confirmed that there are no biodiversity constraints to undertaking the works.	Contractual requirement between Highways England and the Principal Contractor. Biodiversity Pre-Commencement Plan **[TR010044/APP/6.13]**. DCO Requirement 20 **[TR010044/APP/3.1]**.	Principal Contractor

Table 3-8: Geology and soils

Ref	Source ref	Action or commitment (including specific location if appropriate)	Is monitoring required? Yes/ No	Objective	Assumption on which the action is based	Achievement criteria and reporting requirements (if applicable	How the action is to be implemented	Responsible person(s)
ESS – GS1	Chapter 9 Geology and soils **[TR010044/APP/6.1]** First Iteration EMP **[TR010044/APP/3.1]**	The Principal Contractor will implement the requirements for soil reinstatement, monitoring, and aftercare as detailed in the outline Soil Management and Handling Plan presented in the First Iteration EMP **[TR010044/APP/6.8]**. Measures will include, but not be limited to: a. Inspections of land to ensure soil health. b. Site preparation in advance of soil stripping. c. Chemical analysis of soils in advance of soil stripping. d. Treatment of contaminated soil and non-contaminated soil. e. Soil stockpile management. f. Soil restoration. Monitoring of agricultural soil capability.	Yes	To protect and limit the impact to soils and agricultural land, ensure agricultural soil capability is reinstated and to monitor significant effects.	The assessment assumes the measures set out within the plan are adopted as best practice.	Production of the Soil Management and Handling Plan. Undertake monitoring of agricultural soil capability within the contract period.	Contractual requirement between Highways England and the Principal Contractor. DCO Requirement 3 **[TR010044/APP/3.1]**. First Iteration EMP **[TR010044/APP/3.1]**.	Principal Contractor
ESS – GS2	Chapter 9 Geology and soils **[TR010044/APP/6.1]** First Iteration EMP **[TR010044/APP/3.1]**	The Principal Contractor will implement the requirements for treatment of contaminated land as detailed in the outline Contaminated Land Management Plan presented in the First Iteration EMP **[TR010044/APP/6.8]**. Measures will include, but not be limited to: a. The actions to be taken should unexpected contaminated material be encountered. b. Temporary storage of contaminated land. c. Reuse of contaminated land where possible. d. Protective measures to ensure contamination pathways are removed, including those into ground and surface water bodies.	Yes	To limit the impact of contaminated land on uncontaminated soils and agricultural land, and to monitor the potential for ground gases (where contaminated materials have been, or are to be, disturbed).	The assessment assumes the measures set out within the plans are adopted as best practice.	Production of the Contaminated Land Management Plan. Undertaking monitoring of ground gases, where required, during construction.	Contractual requirement between Highways England and the Principal Contractor. DCO Requirement 3 **[TR010044/APP/3.1]**. DCO Requirement 8 **[TR010044/APP/3.1]**. First Iteration EMP **[TR010044/APP/6.8]**.	Principal Contractor
ESS – GS3	Chapter 9 Geology and soils **[TR010044/APP/6.1]** First Iteration EMP **[TR010044/APP/3.1]**	The Principal Contractor will implement the requirements for limiting water runoff from cuttings and borrow pits as detailed in the Outline Water Management Plan as presented in the First Iteration EMP **[TR010044/APP/6.8]**. Measures will include, but not be limited to: a. Management of construction activities with potential to cause accidental spillages/runoff. b. Management of potential impacts on controlled waters and pollution control for groundwater and surface water. c. The provision of adequate fuel/chemical storage facilities, such as bunded tanks, hardstanding and associated emergency response/spillage control procedures	Yes	To protect receiving waters by reducing the quantity and quality of water being released as a result of cuttings and borrow pits.	The assessment assumes the measures set out within the plans are adopted as best practice.	Production of the Surface Water Management Plan.	Contractual requirement between Highways England and the Principal Contractor. DCO Requirement 3 **[TR010044/APP/3.1]**. First Iteration EMP **[TR010044/APP/6.8]**.	Principal Contractor

Ref	Source ref	Action or commitment (including specific location if appropriate)	Is monitoring required? Yes/ No	Objective	Assumption on which the action is based	Achievement criteria and reporting requirements (if applicable	How the action is to be implemented	Responsible person(s)
		d. The refueling of vehicles in demarcated areas on impermeable surfaces. e. The appropriate storage and use of chemicals and temporary storage of suspected/potentially contaminative materials in local storage bund. f. The management of activities within floodplains in the area of River Great Ouse, Stone Brook, Hen Brook, and South Brook (i.e. kept to a minimum). g. Temporary land take required for construction to be located out of the floodplain as far as reasonably practicable or allowances made for floodplain control measures and contingency actions. h. The management of water removed from excavations such as cuttings and borrow pits for construction dewatering activities. i. The management of the risk of groundwater flooding through appropriate working practices (during excavations).						

Table 3-9: Materials and waste

Ref	Source ref	Action or commitment (including specific location if appropriate)	Is monitoring required? Yes/ No	Objective	Assumption on which the action is based	Achievement criteria and reporting requirements (if applicable	How the action is to be implemented	Responsible person(s)
ESS – MW1	Chapter 10 Material assets and waste **[TR010044/APP/6.1]** First Iteration EMP **[TR010044/APP/6.8]**	The Principal Contractor will implement the requirements for construction waste identification, handling, management, recovery and disposal as detailed in the outline Materials Management Plan presented in the First Iteration EMP **[TR010044/APP/6.8]**. Measures and information will include, but not be limited to: a. Those responsible for producing the plan. b. Key Performance Indicators for waste recycling and recovery. c. Best practice measures. d. Estimates of waste material quantities and types. e. Details relating to construction of the Scheme (in relation to managing and recording waste). f. Requirements for obtaining environmental permits and consents.	Yes	To manage waste arising from construction of the Scheme, monitor its performance, and achieve compliance with relevant permits and consents.	Effects associated with the generation and disposal of waste. The assessment assumes the measures set out within the plans are adopted as best practice.	Production of the Waste Management Plan and associated monitoring.	Contractual requirement between Highways England and the Principal Contractor. DCO Requirement 3 **[TR010044/APP/3.1]**. First Iteration EMP **[TR010044/APP/6.8]**.	Principal Contractor
ESS – MW2	Chapter 10 Material assets and waste **[TR010044/APP/6.1]** First Iteration EMP **[TR010044/APP/6.8]**	The Principal Contractor will implement the requirements for the identification, quantification and management of construction materials as detailed in the outline Materials Management Plan presented in the First Iteration EMP **[TR010044/APP/6.8]**. Measures and information will include, but not be limited to: a. Those responsible for producing the plan. b. Materials classification. c. Tracking and storage of materials and their movement. d. Requirement for the remediation and disposal of materials. e. Reporting requirements.	Yes	To track and monitor the movement of materials and (where necessary) test materials requiring remedial treatment.	Effects associated with the consumption of materials. The assessment assumes the measures set out within the plans are adopted as best practice.	Production of the Materials Management Plan and associated monitoring.	Contractual requirement between Highways England and the Principal Contractor. DCO Requirement 3 **[TR010044/APP/3.1]**. First Iteration EMP **[TR010044/APP/6.8]**.	Principal Contractor

Table 3-10: Noise and vibration

Ref	Source ref	Action or commitment (including specific location if appropriate)	Is monitoring required? Yes/ No	Objective	Assumption on which the action is based	Achievement criteria and reporting requirements (if applicable	How the action is to be implemented	Responsible person(s)
ESS – NV1	Chapter 11 Noise and vibration **[TR010044/APP/6.1]** First Iteration EMP **[TR010044/APP/6.8]**	The PC will develop and implement a Noise Management Plan (NMP) based upon the outline NMP in the First Iteration EMP **[TR010044/APP/6.8]**, which will detail the management and monitoring processes to be introduced across all construction sites and compounds. The Plan will adopt a range of industry standard good practice construction phase dust mitigation and monitoring measures, and general control measures, including but not limited to, the following: a. Integration of noise control measures into the preparation of all method statements for the works. b. Details and locations of all site hoardings, screens or bunds that would provide acoustic screening during construction. c. Procedures for the installation of noise insulation (if deemed to be required) or provision of temporary re-housing (if deemed required) and to ensure such measures are in place as early as reasonably practicable. d. Noise and vibration monitoring protocols including monitoring locations, stages during construction at which monitoring would be undertaken, and methods of publishing the results. e. Details of inspection and maintenance schedules to be undertaken. Processes to ensure ongoing compliance with all controls and consent for the works. f. Process for implementing corrective actions that may be required to avoid or address a potential non-compliance.	Yes (if agreed with Local Authorities)	To ensure that the effects of noise are controlled, and that the measures for controlling noise are implemented accordingly.	Effects on sensitive receptors. Assessment assumes good practice mitigation and monitoring measures will be followed during the construction phase.	If required, the Principal Contractor will carry out noise monitoring surveys during the construction period. Monitoring requirements will be agreed with the applicable local authorities.	Contractual requirement between Highways England and the Principal Contractor. First Iteration EMP **[TR010044/APP/6.8]**. DCO Requirement 3 **[TR010044/APP/3.1]**.	Principal Contractor
ESS – NV2	Chapter 11 Noise and vibration **[TR010044/APP/6.1]**	Principal Contractors to appoint a Community Relations Manager (CRM) responsible for leading engagement with affected communities. Appropriate mechanisms to communicate with local residents would be set up to highlight potential periods of disruption.	Yes	Example of application of Best Practicable Means to minimise construction impacts	n/a	Seek feedback on the engagement to ensure that best practice measures are being employed at all times.	Contractual requirement between Highways England and the Principal Contractor. DCO Requirement 3 **[TR010044/APP/3.1]** First Iteration EMP **[TR010044/APP/6.8]**	Principal Contractor
ESS – NV3	Chapter 11 Noise and vibration **[TR010044/APP/6.1]**	The Scheme will comply with the working hours as specified within Requirement 19 of the DCO **[TR010044/APP/3.1]**.	No	To ensure working hours for surface construction works are defined, but with an opportunity to vary these with the agreement of the applicable local authority.	These working hours are as set within the ES.	n/a	DCO Requirement 19 **[TR010044/APP/3.1]**	Principal Contractor

Ref	Source ref	Action or commitment (including specific location if appropriate)	Is monitoring required? Yes/ No	Objective	Assumption on which the action is based	Achievement criteria and reporting requirements (if applicable	How the action is to be implemented	Responsible person(s)
ESS – NV4	Chapter 11 Noise and vibration **[TR010044/APP/6.1]**	Monitoring would be undertaken during the Scheme construction stage to ensure that the mitigation measures and procedures set out within the Outline NMP as presented in the First Iteration EMP **[TR010044/APP/6.8]** are being appropriately implemented.	Yes	To identify if the mitigation proposed is adequate and if construction related noise exceedances require further mitigation to reduce overall impact.	The assessment assumes that monitoring will be undertaken.	If required, the Principal Contractor will carry out noise monitoring surveys during the construction period. Monitoring requirements will be agreed with the applicable local authorities.	DCO Requirement 3 **[TR010044/APP/3.1]** First Iteration EMP **[TR010044/APP/6.8]**	Principal Contractor

Table 3-11: Population and human health

Ref	Source ref	Action or commitment (including specific location if appropriate)	Is monitoring required? Yes/ No	Objective	Assumption on which the action is based	Achievement criteria and reporting requirements (if applicable	How the action is to be implemented	Responsible person(s)
ESS – PH1	Chapter 12 Population and Human Health **[TR010044/APP/6.1]** Outline Construction Traffic Management Plan **[TR010044/APP/7.4]**	The Principal Contractor will implement the traffic management measures, carriageway restrictions, carriageway closures and diversions described in the Outline Construction Traffic Management Plan **[TR010044/APP/7.4]**. In relation to accessibility: a. Should local traffic need to access private property in Croxton or Eltisley, or Whitehall Industrial Estate using the existing A428 when the road is closed, a system will be put in place which will enable local traffic access; for example, by implementing a construction vehicle service that will guide public vehicles through the construction works. b. To ensure access is retained for employees of Eltisley Manor care home (Nouvita Healthcare) working night shifts, or new patients who may require admission during night hours, the Principal Contractor will implement an appropriate system for local traffic to access the facility. c. The Principal Contractor will undertake construction works at off-peak times, where feasible, and will provide temporary access to community facilities for local traffic (if and where required).	No	To ensure the safety of road users as they approach, and travel through, sections of the existing A428 and other routes affected by roadworks. To minimise the health and safety risks to the local community. To minimise disruption to road users, local businesses, communities and community facilities.	The assessment assumes the implementation of appropriate traffic management measures during construction.	Implementation of the Outline Construction Traffic Management Plan **[TR010044/APP/7.4]**. Prior engagement and agreement of the measures with the relevant local authorities and affected parties. Clear communication will be established with the care home at an early stage to adequately inform them of any operations or traffic measures that may affect routes used for transporting residents and staff.	Contractual requirement between Highways England and the Principal Contractor. Outline Construction Traffic Management Plan **[TR010044/APP/7.4]**. DCO Requirement 11 **[TR010044/APP/3.1]**.	Principal Contractor
ESS – PH2	Chapter 12 Population and Human Health **[TR010044/APP/6.1]** Outline Construction Traffic Management Plan **[TR010044/APP/7.4]**	The Principal Contractor will implement temporary public rights of way (PRoW) diversion routes and works crossings based on the principles described in the Outline Construction Traffic Management Plan **[TR010044/APP/7.4]**. In locations where construction works are in proximity to PRoW, the Principal Contractor will fence off works areas using temporary fencing panels to segregate the site work areas from the public. Where these construction works areas sever PRoW, the Principal Contractor will consult and agree how to manage these routes with the appropriate local authority. Where practical and feasible, a local diversion route via an adjacent PRoW, or locally around the perimeter of the fenced work site, will be identified by the Principal Contractor and temporary signage erected to direct the public around these routes. If a short duration closure of a footpath is required and no local diversion can be provided, then appropriate signage will be erected by the Principal Contractor at the extent of the footpath closure, to ensure that the public are informed of the closure.	No	To maintain connectivity of existing routes used by walkers, cyclists and horse riders where possible, and protect users from construction works	The assessment assumes the implementation of appropriate measures for diversion, segregation and closure of existing routes during construction.	Implementation of the Outline Construction Traffic Management Plan **[TR010044/APP/7.4]**. Prior engagement and agreement of the measures with the relevant local authorities.	Contractual requirement between Highways England and the Principal Contractor. Outline Construction Traffic Management Plan **[TR010044/APP/7.4]**. DCO Requirement 11 **[TR010044/APP/3.1]**.	Principal Contractor

Ref	Source ref	Action or commitment (including specific location if appropriate)	Is monitoring required? Yes/ No	Objective	Assumption on which the action is based	Achievement criteria and reporting requirements (if applicable	How the action is to be implemented	Responsible person(s)
ESS – PH3	Chapter 12 Population and Human Health **[TR010044/APP/6.1]** Outline Construction Traffic Management Plan **[TR010044/APP/7.4]**	In relation to construction of the River Great Ouse viaduct, the Principal Contractor will review and implement traffic management and the phasing of the works in line with the principles contained in the Outline Construction Traffic Management Plan **[TR010044/APP/7.4]**. Works will not be carried out for more than 24 hours and the public will be notified in advance by the Principal Contractor. Works will not be continuous, although closures will largely be undertaken during weekdays in the daytime with measures put in place to ensure that the river can be reopened outside of working hours. There will be no closures of the River Great Ouse during the weekend(s) of the Bedford River Festival (typically held bi-annually in late July).	No	To minimize effects on navigation and recreational uses along the stretch of the river associated with the viaduct, avoid conflicts with events on the river, and keep the public informed of the works.	The assessment assumes the implementation of appropriate notifications and timing of works during construction.	Implementation of the Outline Construction Traffic Management Plan **[TR010044/APP/7.4]**.	Contractual agreement between Highways England and the Principal Contractor. Outline Construction Traffic Management Plan **[TR010044/APP/7.4]**. DCO Requirement 11 **[TR010044/APP/3.1]**.	Principal Contractor

Table 3-12: Road Drainage and the water environment

Ref	Source ref	Action or commitment (including specific location if appropriate)	Is monitoring required? Yes/ No	Objective	Assumption on which the action is based	Achievement criteria and reporting requirements (if applicable	How the action is to be implemented	Responsible person(s)
ESS – RD1	Chapter 13 Road drainage and the water environment **[TR010044/APP/6.1]**	The Principal Contractor will develop and implement a Water Management Plan (WMP) based upon the outline Water Management Plan in the First Iteration EMP [TR010044/APP/6.8]. The Water Management Plan will include, but not be limited to, information relating to the delivery of the following: Roles and responsibilities. a. Relevant legislation and best practice guidance. b. Controlling and minimising the risk of pollution to surface waters and groundwater by managing construction site runoff and the risk of chemical spillages. c. Controlling the storage, handling and disposal of potentially polluting substances during construction. d. Managing activities within floodplains in the area of River Great Ouse, and Hen Brook (i.e. kept to a minimum) with temporary land take required for construction to be located out of the floodplain as far as reasonably practicable or allowances made for floodplain control measures and contingency actions. Minimising pollution risks during flooding is also an important consideration; e. Managing the risk from groundwater flooding (for example in the area of the A1 underpass) through appropriate working practices (during excavations) and with adequate plans and equipment in place for de-watering to ensure safe dry working environments; f. Managing water removed from cuttings, borrow pits and other excavations. g. Managing pollution and physical impact risks when undertaking works within, over, under and adjacent to water bodies. h. Managing highway runoff to protect the water environment. i. Development and implementation of a Water Framework Directive mitigation and enhancement strategy. j. Undertaking a programme of water quality, level and flow monitoring will be undertaken pre-construction, during construction, and for a short period post-construction works.	Yes	To protect the water environment and ensure delivery of mitigation measures.	The assessment assumes the implementation of the Water Management Plan.	Implementation of the Water Management Plan.	Contractual requirement between Highways England and the Principal Contractor. First Iteration EMP **[TR010044/APP/6.8]**. DCO Requirement 3 **[TR010044/APP/3.1]**.	Principal Contractor

Table 3-13: Climate

Ref	Source ref	Action or commitment (including specific location if appropriate)	Is monitoring required? Yes/ No	Objective	Assumption on which the action is based	Achievement criteria and reporting requirements (if applicable	How the action is to be implemented	Responsible person(s)
ESS – C1	Chapter 14 Climate **[TR010044/APP/6.1]** First Iteration EMP **[TR010044/APP/6.8]**	The PC will develop and implement a management plan to reduce energy consumption and associated GHG (carbon) emissions for the duration of the construction phase. The Plan would include measures to reduce emissions during construction, such as the specification of recycled or low-carbon materials (i.e. materials that have the lowest GHG emitting life-cycle, compared with alternatives). In addition, and where practicable, measures would be implemented to manage material resource use during construction such as: a. Using materials with lower embedded greenhouse gas emissions and water consumption. b. Using sustainably sourced materials. c. Using recycled or secondary materials. The Plan would be based upon the outline Energy and Resource Management Plan as presented within the EMP **[TR010044/APP/6.8]**.	Yes	To ensure that construction related GHG emissions are understood and reduced in line with the requirements of the Energy and Resource Management Plan.	The assessment assumes the implementation of the Energy and Resource Management Plan.	Energy consumption and materials use would be recorded and reported on an ongoing basis during the construction phase of the Scheme using Highways England Carbon Reporting Tool.	Contractual requirement between Highways England and the Principal Contractor. First Iteration EMP **[TR010044/APP/6.8]**. DCO Requirement 3 **[TR010044/APP/3.1]**.	Principal Contractor

4 Consents and permissions

4.1 Consents and Agreements Position Statement

4.1.1 As part of the Development Consent Order (DCO) application, a Consents and Agreements Position Statement **[TR010044/APP/3.3]** has been submitted which sets out Highways England's intended strategy for obtaining the consents and associated agreements needed to implement the Scheme.

4.1.2 This section outlines the consents, permissions and agreements (outside of the DCO) that would be, or are likely to be, sought by either the Principal Contractor (PC) in relation to the environmental aspects of the Scheme.

Consents and permissions

4.1.3 The principal consent for the Scheme would be the DCO.

4.1.4 The DCO provides development consent for the works and enables land acquisition and temporary possession, along with many consents and powers to be dealt with at the same time. However, there may be a need to supplement the DCO with additional applications. Several additional consents and permissions that relate directly to the measures within the First Iteration EMP **[TR010044/APP/6.8]** may need to be sought separately from the DCO. These are outlined in **Table 4-1**.

4.1.5 A number of the consents included in the DCO are prescribed in *The Infrastructure Planning (Interested Parties and Miscellaneous Provisions) Regulations 2015* (Ref 4-1). As a result, under Section 150 of the *Planning Act 2008* (Ref 4-2), the relevant consenting body must agree to the inclusion (i.e. disapplication) of these consents within the DCO. Discussions between Highways England and these consenting bodies are ongoing, and Highways England's aim is that agreement for inclusion of disapplication will be provided during the examination of this application. These specific consents are identified and included in Appendix A as consent has not yet been obtained

4.1.6 The PC shall update this section within the Second Iteration EMP to cover developments through the Scheme detailed design stage and throughout the construction phase, to ensure all relevant consents and permissions are captured.

Table 4-1: Consents and permissions that may be required

Issue:	Consent/ Licence/ Agreement & Legislation	Consenting Authority	Requirement	Current position
Protected species licensing	Badgers - A licence under Section 10 of the *Protection of Badgers Act 1992* (Ref 4-3).	Natural England	Badgers have been observed within the Order Limits. It will be necessary to undertake the permanent closure and destruction of confirmed badger setts during the Scheme construction.	Discussions with Natural England have taken place on the potential impact of the Scheme and the requirement for licences post DCO consent. A Service Level Agreement is in place with Natural England Highways England is not seeking to disapply this Prescribed Consent in the draft DCO **[TR010044/APP/3.1]**.
	Bats - European Protected Species (EPS) Licence under the *The Conservation of Habitats and Species Regulations 2017* (Ref 4-4), and the *Wildlife and Countryside Act 1981* (Ref 4-5).	Natural England	For the disturbance or removal of bat roosts in the Order Limits prior to the commencement of construction.	Discussions with Natural England have taken place on the potential impact of the Scheme and the requirement for EPS Licences post DCO consent. It is anticipated that a letter of no impediment will be provided by Natural England prior to the close of the Examination. Highways England is not seeking to disapply this Prescribed Consent in the draft DCO **[TR010044/APP/3.1]**.
	Great crested newts – District Level Licensing Schemes – *The Conservation of Habitats and Species Regulations 2017* (Ref 4-4).	Natural England and NatureSpace	Applications to join District Level Licensing Schemes will be made to Natural England (who cover Cambridgeshire) and NatureSpace (who cover Bedfordshire). This is required for the translocation of Great Crested Newts in the Order Limits prior to	Discussions with Natural England and NatureSpace have taken place on the potential impact of the Scheme and the requirement for GCN district level licences post DCO consent. It is anticipated that a letter of no impediment will be provided by both Natural England and NatureSpace prior to the close of the Examination.

Issue:	Consent/ Licence/ Agreement & Legislation	Consenting Authority	Requirement	Current position
			the commencement of construction.	Highways England is not seeking to disapply this Prescribed Consent in the draft DCO **[TR010044/APP/3.1]**.
Water Abstraction	Full Water Abstraction Licence under section 24 of the *Water Resources Act 1991* (Ref 4-6).	Environment Agency	The dewatering works relating to some borrow pits and deep excavations, particularly those in the Black Cat area, are likely to involve the abstraction of more than 20 cubic metres of water a day for more than 28 consecutive days and therefore the works will require a full abstraction licence.	Discussions with the Environment Agency have taken place on the potential impact of the Scheme and the dewatering works required. Discussions are ongoing in relation to agreement to disapply Section 24 in the draft DCO **[TR010044/APP/3.1]**. Section 24 is a Prescribed Consent which Highways England is seeking to disapply in the draft DCO **[TR010044/APP/3.1]**.
	Full Water Abstraction Licence under section 24 of the *Water Resources Act 1991* (Ref 4-6).	Environment Agency	Highways England has sought to design the Scheme to avoid the need for permanent and long term abstraction of groundwater where possible. However, this may be required in relation to dewatering works at the A1 underpass and accordingly a Full Water Abstraction Licence may be required.	Discussions with the Environment Agency have taken place on the potential impact of the Scheme and the dewatering works required. Discussions are ongoing in relation to agreement to disapply Section 24 in the draft DCO **[TR010044/APP/3.1]**. Section 24 is a Prescribed Consent which Highways England is seeking to disapply in the draft DCO **[TR010044/APP/3.1]**.
	Temporary Water Abstraction Licence under section 24 of the *Water Resources Act 1991* (Ref 4-6).	Environment Agency	Construction works will involve the temporary abstraction from a watercourse or groundwater of more than 20 cubic metres of water per day for less than 28 consecutive days and therefore	Discussions with the Environment Agency have taken place on the potential impact of the Scheme and the dewatering works required. Discussions are ongoing in relation to agreement to disapply Section 24 in the draft DCO **[TR010044/APP/3.1]**.

Issue:	Consent/ Licence/ Agreement & Legislation	Consenting Authority	Requirement	Current position
			Temporary Water Abstraction Licences are required.	Section 24 is a Prescribed Consent which Highways England is seeking to disapply in the draft DCO **[TR010044/APP/3.1]**.
Water Transfer	Water Transfer Licences under Section 24 of the *Water Resources Act 1991* (Ref 4-6).	Environment Agency	Construction works will require the diversion of watercourses and dewatering of ponds. Water Transfer Licences are required from the Environment Agency for the diversion of a watercourse where more than 20 cubic metres of water a day is moved from one source to another without intervening use.	Discussions with the Environment Agency have taken place on the potential impact of the Scheme and the diversion of watercourses and dewatering works required. Discussions are ongoing in relation to agreement to disapply Section 24 in the draft Development Consent Order **[TR010044/APP/3.1]**. Section 24 is a Prescribed Consent which Highways England is seeking to disapply in the draft DCO **[TR010044/APP/3.1]**.
Water Impoundment	Water Impoundment Licence under Section 25 of the *Water Resources Act 1991* (Ref 4-6).	Environment Agency	Water Impoundment Licences are required from the Environment Agency for structures within inland waters that can change water levels and flow and construction works requiring the diversion of larger watercourses resulting in the impoundment of water.	Discussions with the Environment Agency have taken place on the potential impact of the Scheme and the works required for diversion of watercourses. Discussions are ongoing in relation to agreement to disapply Section 25 in the draft DCO **[TR010044/APP/3.1]**. Section 25 is a Prescribed Consent which Highways England is seeking to disapply in the draft DCO **[TR010044/APP/3.1]**.
Water Discharge	An environmental permit under *The Environmental Permitting (England and Wales)*	Environment Agency	A Water Activity Permit (formerly discharge consent) is required for the discharge or entry of any poisonous, noxious or polluting matter, waste matter trade or sewage effluent to an inland	Discussions with the Environment Agency have taken place on the potential impact of the Scheme and the discharge into the water environment required as a result of the Scheme. Discussions are ongoing in relation to agreement to disapply the 2016 Regulations

Issue:	Consent/ Licence/ Agreement & Legislation	Consenting Authority	Requirement	Current position
	Regulations 2016 (Ref 4-7).		freshwater, coastal waters or relevant territorial waters. It also includes disturbance of existing sediments being held back by a structure or the cutting or uprooting of a substantial amount of vegetation in any inland freshwaters or so near to any such waters that it falls into them, where it is not reasonable to take steps to remove the vegetation from these waters. Where dewatering of excavations is required the collected water will require discharge to surface water (alternatively to foul sewer) or other discharge of 'unclean' construction site runoff to a Controlled Water. A permit is required from the Environment Agency setting out agreed volumes and allowable concentrations.	(Ref 4-7) in relation to discharge in the draft DCO **[TR010044/APP/3.1]**. This is a Prescribed Consent which Highways England is seeking to disapply in the draft DCO **[TR010044/APP/3.1]**.
Flood Risk	Flood Risk Activity (Environmental) Permit under *The Environmental Permitting (England and Wales)*	Environment Agency	A Flood Risk Activity Permit is required for the permanent flood risk associated with the creation of the viaduct over River Great Ouse as main river.	This can only be done when there is a full detailed design and detailed method statements, which will not be until post-DCO stage but pre-construction. This consent is likely to be sought once detailed design work is undertaken. The Environment Agency has been consulted extensively on the Scheme proposals from a flood risk perspective and therefore they

Issue:	Consent/ Licence/ Agreement & Legislation	Consenting Authority	Requirement	Current position
	Regulations 2016 (Ref 4-7).			are aware of the works to be undertaken within the floodplain. The Environment Agency has confirmed that the soffit of the River Great Ouse viaduct is at an appropriate elevation and that floodplain compensation provisions are acceptable. Further discussions will continue prior to a permit application being made. The Environment Agency have been consulted on the form of the proposed viaduct across the River Great Ouse. However, detailed discussions regarding the Environmental Permit for the permanent and temporary works has not been undertaken. Discussions are ongoing in relation to agreement to disapply the 2016 Regulations (Ref 4-7) in relation to discharge in the draft DCO **[TR010044/APP/3.1]**. This is a Prescribed Consent which Highways England is seeking to disapply in the draft DCO **[TR010044/APP/3.1]**.
	Flood Risk Activity (Environmental) Permit under *The Environmental Permitting (England and Wales) Regulations 2016* (Ref 4-7)	Environment Agency	A Flood Risk Activity Permit is required for any temporary structures altering water levels in main rivers.	Discussions with the Environment Agency have taken place on the potential impact of the Scheme and the requirement for a working platform associated with the construction of the viaduct over the River Great Ouse. Discussions are ongoing in relation to agreement to disapply the 2016 Regulations (Ref 4-7) in relation to discharge in the draft DCO **[TR010044/APP/3.1]**.

Issue:	Consent/ Licence/ Agreement & Legislation	Consenting Authority	Requirement	Current position
				This is a Prescribed Consent which Highways England is seeking to disapply in the draft DCO **[TR010044/APP/3.1]**.
Internal Drainage Board	Approvals from the Bedfordshire and River Ivel Internal Drainage Board (IDB) under the Bedfordshire and River Ivel Internal Drainage Board Byelaws 1985 (Land Drainage Byelaw consents)	The Bedfordshire and River Ivel Internal Drainage Board	Required for Works to Rockham Ditch, South Brook and Stone Brook as these areas fall under the statutory control of the Bedfordshire and River Ivel IDB - see watercourses labelled StB1 and potentially StB2 and StB3 on **Figure 13.1** of the Environmental Statement **[TR010044/APP/6.2]**)	Discussions with the River Ivel IDB have taken place on the potential impact of the Scheme and the requirement for land drainage consents as a result of the Scheme. Discussions are ongoing in relation to an agreement to disapply these Byelaws in the draft DCO **[TR010044/APP/3.1]**. Highways England are seeking to disapply in the draft Development Consent Order **[TR010044/APP/3.1]** provisions of any byelaws made under section 66 of the *Land Drainage Act 1991* (Ref 4-8) and the provisions of any byelaws made under, or having effect as if made under, paragraph 5, 6 or 6A of Schedule 25 to the *Water Resources Act 1991* (Ref 4-6). These provisions are both Prescribed Consents.
	Approvals from the Central Bedfordshire Council Drainage Board under the Central Bedfordshire Council Land Drainage Byelaws 2016 (Land Drainage Byelaw consents)	Central Bedfordshire Council Land Drainage Byelaws	Land drainage consents are potentially required for works to Stone Brook - see StB2 and StB3 on **Figure 13.1** of the Environmental Statement **[TR010044/APP/6.2]**).This is subject to determining whether these areas fall under the statutory control of the Central	Discussions with Central Bedfordshire Council have taken place on the potential impact of the Scheme and the requirement for land drainage consents as a result of the Scheme. Discussions are ongoing in relation to an agreement to disapply these Byelaws in the draft DCO **[TR010044/APP/3.1]**. Highways England are seeking to disapply in the draft DCO **[TR010044/APP/3.1]** provisions

Issue:	Consent/ Licence/ Agreement & Legislation	Consenting Authority	Requirement	Current position
			Bedfordshire Drainage Board or the Bedfordshire and River Ivel IDB.	of any byelaws made under section 66 (powers to make byelaws) of the *Land Drainage Act 1991* (Ref 4-8) and the provisions of any byelaws made under, or having effect as if made under, paragraph 5, 6 or 6A of Schedule 25 to the *Water Resources Act 1991* (Ref 4-6). These provisions are both Prescribed Consents.
Land drainage	Land Drainage Consent under Section 23 of the *Land Drainage Act 1991* (Ref 4-8).	Internal drainage board or Lead Local Flood Authorities	Consent under the Act is required for certain works that may affect the flow in ordinary watercourses. This includes the following works: a. structures (if they encroach into the channel); b. diversions; and c. realignment.	Discussions with the LLFAs have taken place on the potential impact of the Scheme and the requirement for land drainage consents as a result of the Scheme. Discussions are ongoing in relation to agreement to disapply section 23 of the *Land Drainage Act 1991* (Ref 4-8) in relation to discharge in the draft DCO **[TR010044/APP/3.1]**. Section 23 is a Prescribed Consent which Highways England are seeking to disapply in the draft DCO **[TR010044/APP/3.1]**.
Trade Effluent	Trade Effluent Consent under the *Water Industry Act 1991* (Ref 4-9).	Local water undertaker	For the purposes of discharging trade effluent from welfare facilities.	The requirement for a Trade Effluent Consent will be discussed with the relevant local water undertaker should it be required during the construction phase. Highways England are not seeking to disapply this consent in the draft DCO **[TR010044/APP/3.1]**.

Issue:	Consent/ Licence/ Agreement & Legislation	Consenting Authority	Requirement	Current position
Noise and Vibration	Section 61 consents under the *Control of Pollution Act 1974* (Ref 4-10) if requested by the Local Authority.	Local Authority	This consent offers the applicant protection from any subsequent action by the local authority under Section 60 or Section 66 of the *Control of Pollution Act 1974* (Ref 4-10) or under the *Environmental Protection Act 1990* (Ref 4-11) to impose further controls on noise from the site.	An application for a Section 61 consent will be made directly between the contractor and the local authority should it be considered necessary during the construction phase. Highways England are not seeking to disapply this consent in the draft DCO **[TR010044/APP/3.1]**.
Material assets and waste	*Control of Asbestos Regulations 2012* (Ref 4-12).	HSE	Required for any work with asbestos.	Given the age of the buildings to be demolished it is possible that asbestos will be encountered, as such a licence may be needed. If required, a licence will be sought by the contractor prior to work taking place. Highways England are not seeking to disapply this requirement in the draft DCO **[TR010044/APP/3.1]**.
	Waste exemptions for waste operations such as U1 (use of waste in construction) and T15 (treating waste aerosol cans) (if exemption limits can be met) *Pollution Prevention and Control Act 1999* (Ref 4-13), and the	Environment Agency	A waste exemption may be required for the use, storage, treatment or disposal of limited quantities and types of material during construction of the Scheme. This will be dependent on the nature of the activities taking place during the construction phase.	The Environment Agency will be informed of Highways England's intention to seek such exemptions prior to the start of construction activities in the location where these exemptions are required. Highways England are not seeking to disapply this in the draft DCO **[TR010044/APP/3.1]**.

Issue:	Consent/ Licence/ Agreement & Legislation	Consenting Authority	Requirement	Current position
	Environmental Permitting (England and Wales) Regulations 2016 (Ref 4-7).			
	Environmental Permit for waste operations (*Pollution Prevention and Control Act 1999* (Ref 4-13), and *The Environmental Permitting (England and Wales) Regulations 2016* (Ref 4-7)).	Environment Agency	An Environmental Permit may be required if the borrow pits cannot be restored under the CL:AIRE Definition of Waste: Development industry Code of Practice (DoWCoP)	This will be discussed with the Environment Agency post DCO consent. It is currently envisaged that the borrow pits will be restored using excavated material arising, that passes re-use acceptability criteria (based on findings of quantitative risk assessment), from the Scheme and the area being used for the borrow pits would be reinstated with the intention of returning the borrow pits to agricultural standards. It is therefore anticipated that this permit will not be required. However, this will be kept under review during the detailed design phase in consultation with the Environment Agency. Highways England are not seeking to disapply this in the draft DCO **[TR010044/APP/3.1]**.
	Pollution Prevention and Control Act 1999 (Ref 4-13), and *The Environmental Permitting (England and Wales) Regulations 2016* (Ref 4-7).	Environment Agency	A mobile plant permit for crushing operations or site permits will be required if a subcontractor without a mobile plant permit is used.	Post DCO consent discussions will take place with the Environment Agency in advance of construction works requiring crushing and mobile plant permits to determine the need for these permits. Highways England are not seeking to disapply this in the draft DCO **[TR010044/APP/3.1]**.

Issue:	Consent/ Licence/ Agreement & Legislation	Consenting Authority	Requirement	Current position
	CL:AIRE Materials Management Plan *CL:AIRE (2011) Definition of Waste: Development Industry Code of Practice (v.2) (DoWCoP)* (Ref 4-14)	Environment Agency	It is considered that the majority of soil and other materials excavated during the works would be re-used within the Order Limits following guidance in CL:AIRE (2011) DoWCoP.	Post DCO consent, agreement will be sought from the Environment Agency that they are satisfied that the DoWCoP route is acceptable for the earthworks proposed at the site and that the correct procedures have been followed. Highways England are not seeking to disapply this in the draft DCO **[TR010044/APP/3.1]**.
	Minerals Resource Assessment	Local Authority	An evaluation of the quantity, quality and value of the mineral.	A Mineral Safeguarding Assessment has been produced which demonstrates compliance with the minerals safeguarding policy.
Building Demolition	Local Authority (section 80 notice under the *Building Act 1984* (Ref 4-15) and Building Regulation compliance)	Local Authority Notice	For the demolition of buildings, written notice is required to be submitted to the Local Authority (and if applicable, an occupier of any adjacent building, public gas supplier and public electricity supplier) setting out the building and the related demolition works intended to be carried out.	Discussions with the Local Authorities where demolition is required as a result of the Scheme have taken place. Notice of demolition will be given post DCO consent once precise details in relation to the methodology for demolition and timing of the demolition works proposed are known. Highways England are not seeking to disapply this in the draft DCO **[TR010044/APP/3.1]**.
Consent / Licence for the felling of trees.	Felling Licence – *Forestry Act 1967* (Ref 4-16)	Local Authority / Forestry Commission	Powers for the removal of trees for the construction of the scheme including trees protected by Tree Protection Orders are sought within the DCO. However, trees that are felled for purposes other than construction e.g. ecological enhancement may require	An application / prior notification can be made 2-3 months prior to works being carried out and there is currently insufficient certainty on the quantum of trees to be felled and whether this consent would be required due to the stage of design development. Therefore, discussions will take place with the Forestry Commission post

Issue:	Consent/ Licence/ Agreement & Legislation	Consenting Authority	Requirement	Current position
			approval from the Forestry Commission under a Felling Licence. This involves notifying the Forestry Commission in advance of felling additional trees. Certain tree felling can be carried out under an exemption however limitations apply to area of size and so a felling licence may be required.	consent, once the precise requirements for a Felling Licence have been established. Highways England are not seeking to disapply this in the draft DCO **[TR010044/APP/3.1]**.

5 Environmental asset data and as built drawings

5.1 Highways England Environmental Information System

5.1.1 The Highways England Environmental Information System (EnvIS) consists of specific environmental data supplied by service providers, Highways England and other bodies which is collated and displayed in the Highways Agency Geographic Information System (HAGIS). This data is used to assist in managing the environment, within and surrounding the strategic road network, and in the review and reporting of the environmental performance of both service providers and Highways England.

5.1.2 The aim of EnvIS is to assist Highways England and service providers, in designing and managing the strategic road network in an accurate, consistent and environmentally sound manner. Specifically, it aims to achieve the following key strategic and operational objectives:

a. Enable consistent and accurate recording and retrieving of specific environmental data about the strategic road network.

b. Assist in the review and reporting of environmental performance of both Highways England and service providers.

c. Improve understanding of the environmental issues and opportunities that must be considered at different stages of trunk road and motorway management.

d. In line with ensuring a value for money approach, assist in the prioritisation of environmental management actions based on an understanding of the condition of the Element and environmental objectives.

e. Assist in the handover of environmental data from designers to network management agents (and vice versa) and the transfer of environmental data from an outgoing network management agent to its successor.

f. Assist designers and network management agents in the collection of environmental data and use this information to develop specific environmental management programmes and strategies, including Environmental Management Plans (EMPs).

5.2 Collection and submission of EnvIS data

5.2.1 Highways England's *Asset Data Management Manual Part 2 – Requirements and Additional Information* (Ref 5-1) states that "environmental data will be collected and amended over time in a cycle of continual improvement" and "achieving this continual improvement requires adherence to regular and specific data submission milestones". In the context of major projects, these milestones are identified as the First Iteration EMP stage and Third Iteration EMP stage.

5.2.2 At First Iteration EMP, species data and cultural heritage data is only required if survey work has identified previously unknown assets.

5.2.3 This section should be updated by the PC in advance of the Third Iteration EMP, which will not be signed off by Highways England without confirmation that environmental data has been submitted and fully validated.

6 Details of maintenance and EMP monitoring activities

6.1.1 This section lists systems of recording and inspections that will be required to maintain an audit trail of the environmental obligations of the Scheme. This will be managed through the Quality and Safety Management Systems (QMS) and the Environmental Management System (EMS) of the PC, meeting the *ISO14001:2015* (Ref 6-1) standards.

6.1.2 The system will include methods for monitoring, recording and implementing environmental management on site, and for responding to any noted areas of non-compliance. This will ensure that a high standard of environmental control is maintained through the construction programme of the Scheme (including advanced work and any snagging completed by the PC in advance of handover of the Scheme to Highways England) through the corrective action system managed by the PC.

6.2 Environmental records inspections

6.2.1 The PC's Project Quality Administrator will ensure there is a central filing system in place for any checklists, reports and monitoring consistent with the Scheme QMS and EMS. Records of compliance with the requirements of the EMP, derived from audits and other inspections, will be held at the PC's site office. These will be available for inspection by representatives of any internal or external audit team and the Environment Agency (EA) in their statutory role.

6.3 Inspection check list

6.3.1 The PC as site owner will ensure environmental mitigation and staff responsibilities are made clear to Site Managers, sub contracted staff and Site Supervisors. This will be managed through site inductions and specialist training as required. The PC shall make key staff aware of their responsibilities for undertaking routine checks of the site and equipment. It will be essential that the PC has processes and protocols in place for environmental aspects to be checked. The PC will insert their standard inspection forms and checklists that are associated with their internal EMS into the Second Iteration EMP Appendices for information.

6.3.2 On completion of inspections and checks these will be logged and corrective actions implemented by the delegated Site Manager in discussion with the PC. The log will be reviewed as part of Highways England's checking and audit role.

6.4 Procedures to monitor compliance

6.4.1 An overall Project Record will be required for formal records associated with implementation of all iterations of the EMP. This should be managed and controlled within a standard Project Control Framework (PCF) project filing system.

Administration

6.4.2 The PC will be responsible for maintaining site based environmental records including coordination of environmental site checks/inspection records, monitoring (sampling, recording and subsequent actions), consents, permits, and waste transfer notes. The environmental records are to be scanned and filed electronically or filed in a hard copy of the live Second Iteration EMP (subject to the PC internal filing systems). In the case of overlap with Health, Safety, Environment and Quality (HSEQ) files, these will be cross referenced within the updated Second Iteration EMP back to HSEQ files held by the PC for any formal auditors to track and monitor compliance. This will be most likely in the case of handling and disposal of hazardous or contaminated waste and any chemicals and specialist materials subject to the *Control of Substances Hazardous to Health Regulations 2002* (Ref 6.2) (herein referred to as the COSHH regulations).

Quality Management - Environmental Audit

6.4.3 As part of Quality, Environmental and Safety management systems it will be necessary for an audit to record environmental compliance. The Highways England Project Manager will instigate regular audits to report on compliance with the contract specification, environmental best practice and site-specific method statements. This will include the review of the monitoring, recording and reporting procedures being maintained by the PC throughout the scheme.

6.4.4 For completeness, an auditor can only review and take account of the environmental information available at the time of the audit. The outcome of an audit is to identify environmental progress of the Scheme and to issue a formal record in the form of an audit report. Any issues will be raised and dealt with at the time or a Corrective Action Request will be made for actions to be undertaken within a reasonable and timely manner.

Environmental Management Systems

6.4.5 EMS requirements will need to be maintained throughout the Scheme. Contractors are required to be accredited or seeking to be accredited under *ISO14001:2015* (Ref 6-1) as this indicates an understanding and implementation of an EMS for recording, monitoring and managing a project.

6.4.6 The level of environmental management will be monitored to assess compliance with the contract and environmental standards through inspections, and audits. Subject to the contract arrangements, the responsibility for maintaining correspondence and day to day records will rest with the individual organisations and their internal systems. This includes original copies of correspondence and record copies of issued documentation together with records of subsequent changes. Copies are to be kept on site and circulated to appropriate personnel for action or information only.

Control Documents

6.4.7 All the PC Risk Assessments, Method Statements and COSHH forms must consider environmental impacts and sensitivities in addition to health and safety concerns.

6.4.8 This section will be updated prior to construction by the PC to additionally include:

a. Full details of monitoring and reviewing compliance with the Second Iteration EMP, for example daily / weekly / monthly inspection / audit reports.

b. Assessment criteria to identify success.

c. Procedures for rectification of breaching or failings of the Second Iteration EMP measures.

7 Induction, training and briefing procedures for staff

7.1.1 **Table 7-1** identifies an indicative programme of training on environmental issues relevant to the scheme that have been identified for delivery prior to and during the construction stage. On commencement of site mobilisation, the PC will be the site owner and responsible for site inductions and training of all personnel on the site, whether visitors, full time staff or subcontractors

7.1.2 All individuals working on or visiting the site will be required to attend the PC site-specific induction. Those participating in or near to specific activities that have an environmental impact will be required to attend additional training or toolbox talks, led by the PC or specialists, on ecology, pollution control, waste management and emergency procedures for minor and major incidents.

7.1.3 The list detailed in **Table 7-1** below is not exhaustive and the PC or their Environmental Manager onsite must highlight requirements for additional training, as the project progresses, to improve and add value to the overall site environmental awareness and compliance. Additional training requirements or induction issues would be identified from the regular site environmental check reports, or site feedback on any noted non-compliance. It is a requirement for the site to maintain the standard of environmental management required by the Environmental Management System and minimise risks that could negatively impact on the environment.

Table 7-1: Indicative list of induction and toolbox talks training required for the scheme

Topic	Personnel	Delivery	Delivery Format
Competent resources (staff)	All	By lead staff resource or employer id sub-contractor prior to commencement of activities.	Supply of specific certificates, for example Construction Skills Certification Scheme (CSCS) Project Cards, training confirmation.
Reporting of environmental observations and suggestions.	All	Site induction	Presentation and environmental reporting cards to be supplied. Posters with site reporting and environment contact numbers.
Spill kit use.	All	Site induction/Toolbox talks	Toolbox talks and Deployment Training Session.
Refuelling / mechanical repairs and maintenance (off and on site)	All	Site induction	The Principal Contractor Site Induction Pack and PowerPoint Presentation (if applicable).

Topic	Personnel	Delivery	Delivery Format
Tree root protection areas (RPAs)	All staff	Site induction	The Principal Contractor Site Induction Pack and PowerPoint Presentation (if applicable).
Waste from Welfare units and offices – Sewage	All staff	Site induction	The Principal Contractor Site Induction Pack and PowerPoint Presentation (if applicable).
Chemical handling and storage	Stores manager and any persons with access or contact	Site induction	The Principal Contractor Site Induction Pack and PowerPoint Presentation (if applicable).
Ecological sensitivities	All	Site induction. Prior to works close to sensitive areas.	Toolbox talks where relevant and daily site briefings.
Presenting nuisance (noise, vibration, dust and odours)	Any specialist installations (for example breaking out concrete, existing pavement) machine drivers and banks-men.	Site induction. Prior to works close to sensitive areas.	Toolbox talks where relevant and daily site briefings.

7.2 Environmental competencies

7.2.1 The PC shall ensure all personnel conducting environmental tasks are suitably qualified or experienced for the roles and responsibilities that they are employed to undertake.

7.2.2 The PC will monitor and record that all staff have attended the relevant environmental induction or training as listed above (including updated or new training) prior to undertaking any activities on site.

7.3 Training and site induction

7.3.1 All site personnel and visitors are to receive Site Safety induction and Environmental Awareness training from the PC before commencing activities on site. The list below is not exclusive but environmental training at Induction will at least include the following:

a. Company/Project Environmental Policy.

b. Site environment.

c. Fuel containment.

d. Earthworks and Excavations (Risks of exposing contamination).

e. Pollution protocol and measures for example use of spill kits.
f. Defined Materials Storage area (excavated and imported).
g. Defined waste areas - Domestic and construction materials.
h. Wheel wash – road sweeping.
i. Dust and emissions control.
j. Noise control.
k. Vibration control.
l. Site traffic protocols and routes in the form of a Traffic Management Plan - haul routes, staff travel to site plan.
m. Warning signs.
n. Site Inspection and monitoring forms.
o. Material procurement.
p. Toolbox talks where relevant to specific works.
q. Communication Systems on site – dealing with the public, incident and near miss reporting inclusive of environment.
r. Site organisation, key personnel responsibilities and contact details;
s. Emergency Response Plan(s) for addressing Safety and Environmental issues.
t. Contamination risk management.
u. Update and maintain site specific toolbox talks or advisory sheets relevant to the Scheme.

7.4 Toolbox talks and induction supporting materials

7.4.1 Toolbox talks will be posted within common use areas such as welfare units and office reception areas. Key environmental issues linked to the programme will be targeted on the notice board as an aide memoir to all staff on site for example seasonal environmental constraints such as bird nesting seasons.

8 References

8.1 References used in the First Iteration EMP

8.1.1 The following references have been used in Sections 1 – 7 of the First Iteration EMP **[TR010044/APP/6.8]**.

8.1.2 References used in Annexes A – P of the First Iteration EMP **[TR010044/APP/6.8]** are contained within each Annex.

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8.2 Glossary

8.2.1 The following terms, acronyms and abbreviations have been used in Sections 1 – 7, and Annexes A – P, of the First Iteration EMP **[TR010044/APP/6.8]**.

Term	Acronym or Abbreviation	Definition
A		
Above Ordnance Datum	AOD	Above the mean sea level at Newlyn in Cornwall calculated between 1915 and 1921, taken as a reference point for the height data on Ordnance Survey maps.
Access		The means by which to approach or enter land, property and assets.
Accommodation works		Works undertaken to accommodate the needs of land owners affected by a development project, such as the provision of new means of access, fencing and walls.
Aggregate		Granular material (for example sand and gravel or crushed rock) that can be used for building and/or civil engineering purposes (for example for concrete production).
Agricultural handback		The returning of earthwork slopes to full agricultural use.
Agricultural Land Classification	ALC	The system devised and introduced by the Ministry of Agriculture, Fisheries and Food to classify agricultural land according to the extent to which its physical or chemical characteristics impose long-term limitations on agricultural use. Land is graded between 1 (excellent quality) to 5 (very poor quality), with grade 3 subdivided into agricultural subgrades 3a and 3b.
Agricultural land holding		Land and associated infrastructure for the purpose of agricultural production.
Air quality action plan		A plan that must be compiled by a local authority if they declare an air quality management area.
Air Quality Dispersion Modelling System	ADMS	An advanced dispersion model used to model the air quality impact of projects.
Air quality exceedance		Where pollutant concentrations exceed an air quality standard.

Term	Acronym or Abbreviation	Definition
Air quality limit value		A maximum pollutant concentration to be achieved in the atmosphere, either without exception or with a permitted number of exceedances. Limit values are defined in European Union Directives and implemented in United Kingdom legislation.
Air Quality Management Area	AQMA	An area declared by a local authority which has been determined will exceed the relevant air quality strategy objective.
Air Quality Management Plan	AQMP	A plan created by a local authority to improve air quality.
Air quality objective		Objectives are policy targets generally expressed as a maximum ambient pollutant concentration to be achieved. The objectives are set out in the UK Government's Air Quality Strategy for the key air pollutants.
Air quality threshold		Generic term to represent the relevant pollutant averaging period and concentration value described by the air quality strategy objectives or EU limit values.
Alluvial deposits		Natural materials deposited within and adjacent to rivers.
Ambient noise		Ambient noise is the total sound in a given situation at a given time usually composed of sound from many sources, near and far.
Amenity		The benefits of enjoyment and well-being which are gained from a resource in line with its intended function. Amenity may be affected by a combination of factors such as: sound, noise and vibration; dust/air quality; traffic/congestion; and visual impacts.
Ancient woodland		Any area that has been continually wooded since at least 1600 AD and have developed irreplaceable, complex ecosystems.
Anno Domini	AD	The term used to describe a division of time that falls within the Christian era.
Annual Average Daily Traffic	AADT	The total volume of vehicle traffic on a road flowing past a certain point over a year, divided by 365 days.

Term	Acronym or Abbreviation	Definition
Annual Average Weekday Traffic	AAWT	The average 24-hour traffic volume occurring on weekdays throughout a full year.
Annual Exceedance Probability	AEP	Flood frequency is expressed in terms of an annual exceedance probability, which is the inverse of the annual maximum return period. For example, the 100-year flood (a flood likely to occur once every 100 years) can be expressed as the 1% AEP flood, which has a 1% chance of being exceeded in any year.
Arboricultural impact assessment		An assessment which identifies the effects of a development project on trees.
Archaeological Clerk of Works	ACoW	An individual that supports compliance with legislation and planning conditions or requirements, and also provides advice and guidance throughout construction.
Archaeological Contractor		The contractor assigned to undertake archaeological works.
Archeological Mitigation Strategy	AMS	A document which contains detailed descriptions of how archaeological mitigation should be implemented.
Aquifer		An underground layer of water-bearing permeable rock, rock fractures or unconsolidated materials (gravel, sand or silt).
Area of Outstanding Natural Beauty	AONB	Land protected by the Countryside and Rights of Way Act 2000 . It protects the land to conserve and enhance its natural beauty.
Arisings		Construction, demolition, excavation and other arisings generated from within a project boundary, during both construction, and operation and maintenance phases.
A-Road		A type of road prefixed with the letter 'A'. These are the busiest and most direct main roads, apart from motorways, and can be of different standard.
Arborist		An arborist is a professional in the practice of arboriculture, which is the cultivation, management, and study of individual trees, shrubs, vines, and other perennial woody plants in dendrology and horticulture.

Term	Acronym or Abbreviation	Definition
Assemblage		A group of species found in the same location.
At-grade		On the same level. For example, when a road is on the current ground level.
Attenuation barrier		See noise barrier.
(The) Authority		The Authority is Highways England. The Authority would assist the PC in the preparation the Second Iteration EMP and other Management Plans defined as being required within this First Iteration EMP, detailed method statements required by the First Iteration EMP; and variations to these and other matters as stated within this First Iteration EMP. The Authority would also prepare the Third Iteration EMP and other Management Plans defined as being required.
Average Score Per Taxa	ASPT	The BMWP score divided by the number of scoring taxa in the sample. See BMWP.
Avoidance		The first stage in the mitigation hierarchy in which measures are assessed in advance of minimisation of impacts, and which are certain.
A-weighting		In addition to its non-linear amplitude response, the human ear has a non-linear frequency response; it is less sensitive at low and high frequencies and most sensitive in the mid-range frequencies.
B		
Barrow		A type of burial mound.
Baseline conditions		The environment as it appears (or would appear) immediately prior to the implementation of the project together with any known or foreseeable future changes that will take place before completion of the project.
Base year (traffic data)		The outputs of the traffic model coinciding with the year the traffic data was collected.
Basic Noise Level	BNL	A measure of source noise.
Bedford Borough Council		The local authority within whose jurisdiction part of the Scheme would be implemented.

Term	Acronym or Abbreviation	Definition
Bedrock		Rock that underlies loose deposits such as soil or alluvium.
Below ground level		Term used to differentiate below ground from above ground.
Best and most versatile land	BMV	Land defined as grades 1, 2 and 3a of the Agricultural Land Classification. This land is considered the most flexible, productive and efficient and is most capable of delivering crops for food and non-food uses.
Biochemical Oxygen Demand	BOD	The amount of dissolved oxygen needed (i.e. demanded) by aerobic biological organisms to break down organic material present in a given water sample at certain temperature over a specific time period.
Biodiversity		The variability among living organisms from all sources, including terrestrial, marine and other aquatic ecosystems and the ecological complexes of which they are part of. This includes diversity within species, between species and of ecosystems.
Biodiversity Management Plan	BMP	Plan produced in EMP series to identify biodiversity mitigation and monitoring requirements during construction and operation.
Biodiversity Net Gain	BNG	An approach that aims to leave biodiversity within the natural environment in a measurably better state than its condition prior to implementation of a project.
Borehole		A hole bored into the ground, usually as part of investigations, typically to test the depth and quality of soil, rock and groundwater. A borehole can also be used to dewater the ground.
Borrow Pit		An excavated area where material has been dug for use as fill at another location.
Bottleneck		A junction or section of road that has lower traffic capacity that the road either side, which causes congestion.

Term	Acronym or Abbreviation	Definition
Bridleway		A highway over which the public have the following, but no other, rights of way, that is to say, a right of way on foot and a right of way on horseback or leading a horse.
British Geological Survey	BGS	A body which aims to advance geoscientific knowledge of the United Kingdom landmass and its continental shelf by means of systematic surveying, monitoring and research
British Standard	BS	Standard produced by the British Standards Institution.
British Standards Institution		A group which produces British Standards across industry sectors and which is formally designated as the National Standards Body for the UK.
B-road		Numbered distributor roads that have lower traffic densities than trunk roads or A-roads.
Buffer		Specified area or distance surrounding a site or feature of interest.
Built heritage		A structure or building of historic value. These structures are visible above ground level.
Bund		An embankment which acts as a visual or noise screen, or acts as a barrier to control the spillage of fluids.
Buried archaeology (or buried heritage)		An archaeological asset beneath ground level, which may include earthworks.
Businesses		Land and buildings for the purpose of commercial/industrial enterprise.
Bypass		The diversion of a major road to carry traffic around a built up area, constructed to improve the journey of through traffic and/or improve the environmental conditions along the original route.
Byway		A track, often rural, which is too small to be called a road but which may be open to use by all vehicular traffic or have restrictions on use by non-mechanically propelled vehicles.

Term	Acronym or Abbreviation	Definition
C		
Calculation of Road Traffic Noise	CRTN	A technical memorandum that describes the procedures for calculating noise from road traffic.
Camber		The sloped surface of the carriageway, which is designed to allow rainwater to run off easily.
Cambridgeshire County Council		The county authority within whose jurisdiction part of the Scheme would be implemented.
Canals and Rivers Trust		Organisation responsible for canals, rivers, docks and reservoirs in England and Wales.
Carbon budgets		UK greenhouse gas targets over defined periods of time
Carbon footprint		The total greenhouse gas emissions associated with a particular policy or development.
Carbon monoxide		A pollutant gas generated by combustion sources. At very high concentrations it can be a dangerous asphyxiant.
Carriageway		The width of a highway that can be used by motorised vehicles and non-motorised users, formed by a number of lanes.
Case for the Scheme		A document prepared to accompany an application for a Development Consent Order.
Catchment		A drainage/basin area within which precipitation drains into a river system and eventually into the sea.
Celsius	°C	A scale of temperature
Central Bedfordshire Council		The local authority within whose jurisdiction the Scheme would be implemented.
Chainage		The distance of any point along a road, measured along the road centreline from a chosen origin or start point.
Chartered Environmentalist		A professional qualification obtained by knowledgeable, experienced, competent and committed environmental professionals.

Term	Acronym or Abbreviation	Definition
Chartered Institute of Ecology and Environmental Management	CIEEM	The leading professional membership body representing and supporting ecologists and environmental managers in the UK, Ireland and abroad.
Chemical Oxygen Demand	COD	An indicative measure of the amount of oxygen that can be consumed by reactions in a measured solution.
Circa		Meaning approximately, often used in a historic context in reference to a date.
Contaminated Land: Applications in Real Environments	CL:AIRE	An independent not-for-profit organisation established in 1999 to stimulate the regeneration of contaminated land in the UK by raising awareness of, and confidence in, practical and sustainable remediation technologies.
Clay		An inorganic component of soil derived from the weathering of rock and comprising particles less than 0.002mm in equivalent diameter.
Climate		Long-term weather conditions prevailing over a region.
Climate change		This refers to a change in the state of the climate, which can be identified by changes in average climate characteristics which persist for an extended period, typically decades or longer.
Climate resilience		The ability to anticipate, prepare for, and respond to climatic events, trends or disturbances.
Code of Construction Practice	CoCP	Code of practice used to derive targets and monitor progress relating to the wider community.
Community		A group of people living in the same place or having a particular characteristic in common.
Community facilities		Facilities designed for the use and benefit to the local population, for example village greens, village halls, and healthcare and education facilities.
Community Relations Manager	CRM	An appointed person responsible for leading engagement with affected communities.
Compensation (environmental)		Offsetting measures applied where nothing can be done to reduce an environmental impact or effect.

Term	Acronym or Abbreviation	Definition
Compulsory acquisition		The acquisition of land (or rights over land) without the owner's consent, but in return for compensation.
Congestion		A situation where the volume of traffic is too great for the road, causing vehicles to slow down or stop, often caused by bottlenecks, traffic incidents and junction design.
Connectivity		A measure of the availability of the habitats needed for a particular species to move through a given area.
Conservation (ecology)		A series of measures required to maintain or restore the natural habitats and the populations of species of wild fauna and flora at a favourable status.
Conservation area		An area designated under section 69 of the Planning (Listed Buildings and Conservation Areas) Act 1990 as being of special architectural or historic interest and with a character or appearance which is desirable to preserve or enhance.
Conservation status		The sum of the influences acting on a natural habitat and its typical species that can affect its long-term natural.
Construction and Demolition Waste	CDW	Consists of unwanted material produced directly or indirectly as a result of the construction phase.
Construction compound		Construction compounds generally act as the points of entry to the worksites from the public highway. They may also be used for major stockpiling of materials such as topsoil, be used to facilitate transfer of materials and accommodate offices and welfare facilities.
Construction Design and Management Regulations 2015	CDM	The Construction (Design and Management) Regulations (CDM 2015) are the main set of regulations for managing the health, safety and welfare of construction projects.
Construction materials		Primary, recycled / secondary and renewable sources of materials required for constructing a project.

Term	Acronym or Abbreviation	Definition
Construction noise assessment		An assessment which compares predicted noise levels from construction tasks to ambient noise levels at nearby noise sensitive receptors.
Construction plant		Portable construction machinery and equipment.
Construction Traffic Management Plan		A plan which identifies clear controls on routes, vehicle types, vehicle frequency, vehicle quality and hours of site operation.
Construction Skills Certification Scheme	CSCS	An education programme for construction workers and site visitors regarding basic construction health and safety.
Construction working area		The construction working areas are where the construction of the Scheme will take place. They can be temporary in the case of construction compounds or permanent, in the case of the Scheme.
Construction vibration assessment		An assessment of magnitude of predicted vibration from construction activities.
Contaminated Land: Applications in Real Environments	CL:AIRE	A respected independent not-for-profit organization established in 1999 to stimulate the regeneration of contaminated land in the UK by raising awareness of, and confidence in, practical and sustainable remediation technologies
Contractor		A general term used to describe an individual or company appointed by a developer to construct or manage a project at a certain price or rate.
Control of Substances Hazardous to Health Regulations	COSHH	COSHH is a set of regulations put in place to protect workers from ill health when working with specific substances and materials.
Controlled waters		Rivers, streams, estuaries, lakes, canals, ditches, ponds and groundwater as far out as the UK territorial limit. The statutory definition is provided in section 104 (1) of the Water Resources Act 1991 and section 30A (d) of the Control of Pollution Act 1974.
County Wildlife Site	CWS	A conservation designation in the United Kingdom, which despite conferring no statutory protection onto a site, does affirm a site's importance and value for wildlife in its county context.

Term	Acronym or Abbreviation	Definition
Cultural heritage resource		A building, monument, site, place, area or landscape identified as having a degree of significance meriting consideration in planning decisions, because of its heritage interest.
Culvert		A tunnel (pipe or box shaped) that carries a stream or open drain under a road or railway.
Curators (Archaeology)		Archaeological planning advisors to the local authorities and Historic England
Cut-fill balance		Where the amount of material obtained from earthwork cuttings broadly matches the amount of fill material required to form embankments, thereby minimising the amount of material needed to be imported into, or exported from, a construction site.
Cutting (earthwork)		Excavation of earth material to lower the ground level on which a road would be positioned, in order to help to reduce noise and/or visual impact.
Cycleway		A road, route or path intended for use by people on bicycles.
D		
Decibel	dB	The scale used to measure noise is the decibel scale which extends from 0 to 140 decibels, corresponding to the intensity of the sound pressure level.
Definitive Map		A record of Public Rights of Way in England and Wales, maintained by local authorities.
Department for Communities and Local Government	DCLG	A former government department (now the Ministry of Housing, Communities & Local Government).
Department for Environment, Foods & Rural Affairs	Defra	The Government department responsible for policy and regulations on environmental, food and rural issues. The department's priorities are to grow the rural economy, improve the environment and safeguard animal and plant health.
Department for Transport	DfT	The national government body responsible for transport in Britain, and therefore in overall control of the road network. It is mainly responsible for policy decisions, and its responsibilities are carried out by a range of agencies and local authorities.

Term	Acronym or Abbreviation	Definition
Department for Transport's Transport Analysis Framework	TAG	A framework for options appraisal used by Highways England.
Deposition (dust)		The vertical passage of a substance (for example dust) to a surface or the ground.
Deposition (sediment)		The laying down of part, or all, of the sediment load of a stream on the bed, banks or floodplain which forms various sediment features such as bars, berms and floodplain deposits.
Designated habitats		Internationally, nationally and locally designated sites of ecological conservation importance on protected species and on habitats and other species identified as being of principal importance for the conservation of biodiversity.
Design Manual for Roads and Bridges	DMRB	The Design Manual for Roads and Bridges contains information about current standards relating to the design, assessment and operation of motorway and all-purpose trunk roads in the United Kingdom.
Design-development		The process in which technical specialists (for example engineers and environmentalists) refine the design for the various elements of a development project.
De-trunked		The transfer of trunk roads from Highways England's responsibility to the local highway authority
Development Consent Order	DCO	The consent for a Nationally Significant Infrastructure Project required under the Planning Act 2008.
Discharge consent		A consent or permit to discharge effluent that could harm the environment.
Displacement		Loss of local economic activity as a direct consequence of a proposed development.
Disposal		Any operation which is not recovery, even where the operation has as a secondary consequence the reclamation of substances or energy.
Dissolved Oxygen	DO	The amount of gaseous oxygen dissolved in water.

Term	Acronym or Abbreviation	Definition
Diverge		The point where two streams of traffic split and go in different directions.
Diversion route		A set of approved routes to follow in the case of closure of motorways and/or major A-roads.
Diverted footpath		An approved route to follow in the case of closure, or alteration to, a public right of way.
Definition of Waste: Development industry Code of Practice	DoWCoP	A document prepared by CL:AIRE that sets out good practice for the development industry to use when: a. Assessing on a site specific basis whether excavated materials are classified as waste or not b. Determining on a site specific basis when treated excavated waste can cease to be waste for a particular use It describes an auditable system to demonstrate that this CoP has been adhered to
Drift geology		Materials of glacial origin including sediments and large rocks derived from erosion, transportation and deposition by glaciers.
Dumbbell junction		A type of grade-separated junction which takes the form of a roundabout either side of a major road.
Dust		All airborne particulate matter.
E		
Earth bund		A bund constructed to provide noise or landscape mitigation.
Earthworks		The removal or placement of soils and rocks such as in cuttings, embankments and environmental mitigation, including the in-situ improvement of soils/rocks to achieve the desired properties.
East Coast Main Line	ECML	A 393-mile long major railway between London and Edinburgh via Peterborough, Doncaster, York, Darlington, Durham and Newcastle.
Ecological feature		Habitats, species or ecosystems.

Term	Acronym or Abbreviation	Definition
Ecological potential		Surface waters identified as heavily modified water bodies or artificial water bodies must achieve 'good ecological potential' (good potential is a recognition that changes to morphology could make Good Ecological Status very difficult to achieve).
Ecological status		The state of a water body, derived from a number of factors, including: the abundance of aquatic flora and fauna, nutrient availability, salinity, temperature and chemical pollution levels.
Electric vehicles		A vehicle which uses one or more electric motors for propulsion.
Elements		Parts of environmental factors. For example, listed buildings are part of cultural heritage.
Embankment		Artificially raised ground, commonly made of earth material, such as stone, on which the carriageway is laid.
Embedded mitigation		Design measures which are integrated into a project for the purpose of minimising environmental effects.
Enabling works		Enabling works are preparations to make a building site ready for construction. It covers activities from site preparation, creation of access routes, and the installation of facilities like security fencing, ramps, and placing of signs.
Enclosure		Enclosure (sometimes inclosure) was the legal process in England of consolidating (enclosing) small landholdings into larger farms.
Envirocheck		A provider of environmental data, reports and risk solutions for use in site-based assessments.
Environment Agency	EA	Government agency established to protect and improve the environment and contribute to sustainable development in England. Responsibilities include: water quality and resources, flooding and coastal risk management and contaminated land.
Environmental assessment		A process by which information about environmental effects is collected, assessed and used to inform decision-making.

Term	Acronym or Abbreviation	Definition
Environmental (or Ecological) Clerk of Works	ECoW	An individual that supports compliance with legislation and planning conditions or requirements, and also provides advice and guidance throughout construction.
Environmental factors		Population and human health; biodiversity; land, soil, water, air and climate; material assets, cultural heritage, and landscape; and the interaction between these factors.
Environmental Health Officer	EHO	A local authority officer with responsibilities for protecting public health through the administration and enforcement of environmental health legislation. Can also be referred to as an Environmental Protection Officer.
Environmental Information System	EnvIS	The Highways England Environmental Information System.
Environmental Impact Assessment	EIA	The statutory process through which the likely significant effects of a development project on the environment are identified and assessed.
Environmental Impact Assessment Directive	EIA Directive	Directive 2014/52/EU of the European Parliament and of the Council of 16 April 2014, amending Directive 2011/92/EU on the assessment of the effects of certain public and private projects on the environment.
Environmental Impact Assessment Regulations	EIA Regulations	The Infrastructure Planning (Environmental Impact Assessment) Regulations 2017.
Environmental Manager	EM	Person managing the environmental actions prescribed in the Environmental Management Plan.
Environmental Management Plan	EMP	A document (or set of documents) that set out the mitigation needed to manage environmental effects associated with a project during its construction and operational phases.
Environmental Masterplan		Plan which illustrates the mitigation measures integrated into the design of the Scheme.
Environmental Noise Directive	END	The Assessment and Management of Noise Directive 2002/49/EC.
Environmental Quality Standard	EQS	The maximum permissible concentration of a potentially hazardous chemical.

Term	Acronym or Abbreviation	Definition
Environmental Statement	ES	A statutory document which reports the EIA process, produced in accordance with the EIA Directive as transposed into UK law by the EIA Regulations.
Erosion		The removal of sediment or bedrock from the bed or banks of a channel by flowing water occurring mostly during high flows and flood events. Forms various river features such as scour holes and steep outer banks.
Essential mitigation		Mitigation critical for the delivery of a project which can be acquired through statutory powers.
European Economic Area	EEA	The European Economic Area (EEA) was established via the EEA Agreement, an international agreement which allows for the extension of the EU's single market to non-EU member parties.
European Protected Species	EPS	Species of plants and animals (not birds) which are protected by European law. An EPS license is required if any of these species are likely to be disturbed.
European site		Habitats Directive or Birds Directive sites including: • Special Protection Areas (SPAs), and potential SPAs (pSPAs); • Special Areas of Conservation (SACs), and candidate or possible SACs (cSACs or pSACs); and • Ramsar sites.
European Union	EU	An economic and political union of 28 countries which operates an internal (or single) market which allows the free movement of goods, capital, services and people between member states.
Evaluation		The determination of the significance of effects. Evaluation involves making judgements as to the value of the receptor/resource that is being affected and the consequences of the effect on the receptor/resource based on the magnitude of the impact.

Term	Acronym or Abbreviation	Definition
Examining Authority	ExA	A panel of inspectors appointed by the Secretary of State who are responsible for examining Development Consent Order applications for nationally significant infrastructure projects.
Excavated material		Largely natural soil and rock material that is removed from the ground during construction.
Extreme weather		A weather event which is significantly different from the average or usual weather pattern.
F		
Façade noise level		Sound level that is determined 1 metre (m) in front of a window or door in a façade.
Farm Viability Assessment		An assessment which establishes the current operational and economic conditions of agricultural businesses and how a project could affect their future viability.
Favourable conservation status		For a natural habitat, it occurs when: a. its natural range and areas it covers within that range are stable or increasing; b. the specific structure and functions which are necessary for its long-term maintenance exist and are likely to continue to exist for the foreseeable future; and c. the conservation status of its typical species is favourable. For a species, it occurs when: a. the population dynamics data on the species concerned indicate that it is maintaining itself on a long-term basis as a viable component of its natural habitats; b. the natural range of the species is neither being reduced nor is likely to be reduced for the foreseeable future; and c. there is, and will probably continue to be, a sufficiently large habitat to maintain its populations on a long-term basis.
Features		Particularly prominent, eye-catching elements or characteristic components such as tree clumps, church towers, or wooded skylines.
Fieldscape		A landscape made up of fields.

Term	Acronym or Abbreviation	Definition
Fill		Material used to artificially raise the existing ground levels.
Find spot		A term used to describe the location at which an archaeological find was discovered.
First Iteration Environmental Management Plan		The first iteration of the Environmental Management Plan produced during the design stage for the preferred option.
Flood Risk Assessment	FRA	The process of assessing potential flood risk to a site and identifying whether there are any flooding or surface water management issues that may warrant further consideration or may affect the feasibility of a project.
Flood Zone 1		Land outside the floodplain where there is little or no risk of flooding.
Flood Zone 2		The area of the floodplain where there is a low to medium flood risk.
Flood Zone 3		The area of the floodplain where there is a high risk of flooding.
Floodplain		Land adjacent to a watercourse over which water flows or would flow in times of flood, but for defences in place.
Fluvial		A term that relates to rivers and streams and the processes that occur within them.
Formation (geological)		A group of related rock strata with some common properties.
Fragmentation (ecological)		The breaking up of a habitat, ecosystem or land use types into smaller parcels.
Free-field sound level		The sound level which is measured or calculated, in the open, without any reflections from nearby surfaces except the ground.
Free-flow link		A section of road on a junction that links two roads and enables traffic to move without stopping.

Term	Acronym or Abbreviation	Definition
Fugitive Dust		Visible emissions of dust that does not come from a definable point source, for example a smoke stack. Typical examples would include stored piles of soil, dry bare earth on construction sites or haul roads etc.
Future baseline		The likely evolution of the current state of the environment without implementation of the project.
Future year		A year between the opening year and the fifteenth year of operation of a project.
G		
Geology		The physical structure, substance and history of the earth (rocks and minerals).
Geomorphology		The structure, origin, and development of the topographical features of the earth's surface.
Geophysical survey		A process involving ground-based physical sensing techniques to determine the presence or absence of anomalies likely to be caused by archaeological features, structures or deposits.
Glacial deposit		Natural materials laid down during the ice ages (Quaternary period).
Grade-separated		A type of junction where the major route (or routes) through the junction do not stop and do not cross any other road on the level. Movements to other roads are made using slip roads and bridges.
Great Crested Newt	GCN	A newt in the family Salamandridae, found across Europe and parts of Asia, which are protected under the Conservation of Habitats and Species Regulations 2017.
Greenhouse gases	GHG	Atmospheric gases that absorb and emit infrared radiation emitted by the Earth's surface, the atmosphere and clouds.
Green Infrastructure Network Area		An interconnected network of open, greenspaces that provide a range of ecosystem functions.

Term	Acronym or Abbreviation	Definition
Ground investigation		An intrusive investigation undertaken to collect information relating to the ground conditions, normally for geotechnical or land contamination purposes.
Ground-borne vibration		Vibration generated by an event such as the pass-by vehicles in a tunnel, propagated through the ground or structure (i.e. not the air) into a receiving building.
Groundwater		Water found underground in porous geological strata and soils.
Groundwater body		A distinct volume of groundwater within an aquifer or aquifers
Groundwater source protection zone		Areas defined by the Environment Agency which show the risk from contamination/pollution to groundwater that is extracted for drinking water.
H		
Habitat		The place or type of site where an organism or population naturally occurs. Often used in the wider sense referring to major assemblages of plants and animals found together.
Habitat of principal importance	HPI	Habitats in England identified as requiring action in the UK Biodiversity Action Plan and which are regarded as having biodiversity conservation priorities.
Habitats Regulations Assessment	HRA	An assessment of projects (or plans) potentially affecting European Sites in the UK, required under the Habitats Directive and Regulations. Also known as an assessment of implications on European Sites.
Hard shoulder		An auxiliary lane on the left of the carriageway which is set aside for stopped vehicles and emergency services, to ensure the main running lanes remain free from obstruction.
Hardcore		Material used for infill, for example broken bricks, stone or concrete, which are hard, inert and don't readily deteriorate or absorb water. Often used to raise land levels and serve as a solid base for building.

Term	Acronym or Abbreviation	Definition
Haul road		A temporary road provided within a contractor's site area to allow for the movement of construction material, construction machinery and/or construction labour around the site.
Hazardous waste		Any waste that displays one or more of the hazardous properties listed in Annex III of the Waste Directive.
Headwaters		The source of a river.
Health determinants		Personal, social, economic and environmental factors which determine the health status of individuals and communities.
Health, Safety, Environment and Quality	HSEQ	A type of management system.
Heavy Duty Vehicle	HDV	See Heavy Goods Vehicle.
Heavy Goods Vehicle	HGV	A commercial carrier vehicle with a gross vehicle weight of more than 3.5 tonnes.
Hectare	ha	A metric unit of measurement, equal to 2.471 acres or 10,000 square metres.
Heritage asset		A building, monument, site, place, area or landscape of historic value.
Highways England		The government agency responsible for the operation, maintenance and improvement of England's trunk roads and motorways.
Highways England Drainage Data Management System		Management system used to store technical information about the location and condition of drainage infrastructure on the network.
Highways England Water Risk Assessment Tool	HEWRAT	A tool which determines whether the catchments in which they operate are particularly exposed to water risk, as well as to better understand the nature of risk in specific catchments.
Historic		Associated with past human activity.

Term	Acronym or Abbreviation	Definition
Historic England		Executive non-departmental public body created under section 32 of the National Heritage Act 1983 to: a. secure the preservation of ancient monuments and historic buildings situated in England; b. promote the preservation and enhancement of the character and appearance of conservation areas situated in England; and c. promote the public's enjoyment of, and advance their knowledge of, ancient monuments and historic buildings situated in England and their preservation.
Historic England Good Practice Advice	GPA	Historic England guidance which assists in establishing the significance of heritage assets and their setting.
Historic Environmental Record	HER	A record of all known archaeological finds and features and historic buildings and historic /landscape features, relating to all periods from the earliest human activity to the present day; maintained by each County and Unitary Authority in the United Kingdom.
Hoarding		A temporary fence erected around a construction site in order to visually screen and/or contain activities.
Hot rolled asphalt		A common type of road surfacing comprising a dense mixture of mineral aggregate, sand and bitumen.
Human health		A state of complete physical, mental, and social well-being and not merely the absence of disease or infirmity
Health outcome		The health status of an individual, group or population, attributable to a planned intervention.
Health profile		Statistical picture of the baseline health conditions and trends within an area.
Huntingdonshire District Council		The local authority within whose jurisdiction part of the Scheme would be implemented.

Term	Acronym or Abbreviation	Definition
Hydrology		The scientific study of the movement, distribution, and quality of water on Earth and other planets, including the water cycle, water resources and environmental watershed sustainability.
Hydrogeology		The nature, distribution and movement of groundwater in soils and rocks, including in aquifers.
Hydromorphology		The physical characteristics of the shape, boundaries and content of a water body.
I		
Impact		Change that is caused by an action; for example, land clearing (action) during construction which results in habitat loss (impact).
Important hedgerow		A hedgerow that is at least 30 years old and which meets certain criteria relating to its particular archaeological, historical, wildlife and landscape value.
Inert waste		Waste: a. that does not undergo any significant physical, chemical or b. biological transformations; that does not dissolve, burn or otherwise physically or c. chemically react, biodegrade or adversely affect other matter with which it comes into contact in a way likely to give rise to environmental pollution or harm to human health; and d. where its total leachability and pollutant content and the ecotoxicity of its leachate are insignificant and, in particular, do not endanger the quality of any surface water or groundwater.
In-situ preservation (cultural heritage)		Preserving archaeological remains in their original position.
Integrity (ecological)		The coherence of a site's ecological structure and function, across its whole area, that enables it to sustain the habitat, complex of habitats and/or the levels of populations of the species for which it [is or] was classified.

Term	Acronym or Abbreviation	Definition
Interchange		A term used to describe a grade separated junction that provides free flow from one mainline to another.
Internal Drainage Board	IDB	A type of operating authority which is established in areas of special drainage need in England and Wales with permissive powers to undertake work to secure clean water drainage and water level management within drainage districts.
Intervention		Types or groups of highways works, for example online options, designed to meet a series of project objectives.
Invasive species		Non-native UK plants that are invasive, for example Japanese Knotweed.
Island		A raised area designed to deflect or divide traffic, or to make it easier for pedestrians to cross the road.
J		
Junction		A place where two roads meet, regardless of design or layout.
K		
Kilometre	km	A unit of measurement.
L		
LA10		The A-weighted sound level, in dB, that is exceeded 10% of the measurement period.
LA10,18hr		The noise level, in dB, that is exceeded 10% of the time between 0600 and 2400.
LAeq		The equivalent continuous sound level (LAeq) is the level of a notional steady sound, which at a given position and over a defined period of time, would have the same A-weighted acoustic energy as the fluctuating noise.
LAmax		The maximum A-weighted level measured during a given time period.

Term	Acronym or Abbreviation	Definition
Lnight		A facade noise index derived from the LA10,18hr using the TRL conversion method PR/SE/451/02
Lnight,outside		For the purpose of night-time noise assessment, the Lnight,outside is the equivalent continuous sound level LAeq,8hr for the period 23:00 to 07:00 hours assessed outside a dwelling and is free-field.
Landfill capacity		The known, forecast or estimated remaining landfill void space, either regionally or nationally.
Landscape and Ecology Management Plan		A site-specific document(s) containing processes and instructions to manage the planting and landscaping maintenance a site and its operations for the area within the Order Limits.
Landscape character		A distinct, recognisable and consistent pattern of elements in the landscape that makes one landscape different from another, rather than better or worse.
Landscape character area	LCA	Areas of landscape that have a broadly consistent pattern of topography, land use and vegetation cover.
Landscape character assessment		Process of identifying and describing variation in character of the landscape - the unique combination of elements and features that make landscapes distinctive - to assist in managing change in the landscape.
Landscape character type		Distinct types of relatively homogeneous landscape, generic in nature but which share broadly similar combinations of geology, topography, drainage patterns, vegetation and historical land use and settlement pattern, and perceptual and aesthetics attributes.
Landscape elements		Individual parts of the landscape include physical influences (geology, soils, landform, drainage, and water bodies); land cover (different types of vegetation, patterns, and types of tree cover); and human influences (land use and management, character of settlements of buildings, and pattern and type of fields and enclosure).
Landscape quality (or condition)		Measure of the physical state of the landscape based on judgements, which can include typical character represented in individual areas, integrity

Term	Acronym or Abbreviation	Definition
		of the landscape, and condition of individual elements.
Landscape receptor		Defined aspect of the landscape resource that potentially could be affected by the project.
Landscape resource		Natural and physical attribute, for example soils and vegetation.
Landscape sensitivity		Applied to specific landscape receptors, combining judgements of the susceptibility of the receptor to the specific type of change proposed and the value related to the receptor.
Landtake		The extent of land required temporarily or permanently to construct and operate a project.
Lane		A section of carriageway marked out for the use of traffic, and typically intended for use in one direction.
Lay-by		A small paved area at the side of the road which allows vehicles to pull off the lane and park.
Laydown area		An area used for the temporary storage of construction equipment and supplies.
Landscape Clerk of Works	LCoW	An individual that supports compliance with legislation and planning conditions or requirements, and also provides advice and guidance throughout construction.
Lead Local Flood Authority	LLFA	Authority responsible for developing, maintaining and applying a strategy for local flood risk management in their areas and for maintaining a register of flood risk assets.
Light goods vehicle		A motor vehicle used to carry goods with a total mass of up to 3.5 tonnes.
Limits of deviation	LoD	The maximum lateral and vertical extents within which a highway project can be built.
Link		A section of road between two junctions.
Listed building		A building of special architectural or historic interest. Listed buildings are graded I, II* or II, with

Term	Acronym or Abbreviation	Definition
		Grade I being the highest. Listing includes the interior as well as the exterior of the building.
Local Air Quality Management	LAQM	A key part in the UK Government's and the Devolved Administrations' strategies to achieve the air quality objectives.
Local Area Model	LAM	Traffic model which is used to test the impact of the Scheme on the local road network.
Local authority (also local planning authority)		The body officially responsible for all the public services and facilities in a particular area, and which is empowered by law to exercise planning functions.
Local Biodiversity Action Plan	LBAP	A plan that identifies threatened species and habitats and seeks to protect and restore biological systems.
Local Geological Site	LGS	Non-statutory geological sites considered worthy of protection for their earth science or landscape importance. Formerly known as Regionally Important Geological Sites.
Local Nature Reserve	LNR	A statutory designation made under Section 21 of the National Parks and Access to the Countryside Act 1949 by principal local authorities.
Local Wildlife Site	LWS	Non-statutory sites of nature conservation value that have been designated 'locally'. These sites are referred to differently between counties with common terms including site of importance for nature conservation, county wildlife site, site of biological importance, site of local importance and sites of metropolitan importance.
Long-term (noise)		Noise change based on the +15 year assessment (for example Do-minimum opening year scenario (DMOY) against Do-minimum future year scenario (DMFY) and DMOY against Do-something future year scenario (DSFY)).
Lowest Observable Adverse Effect Level	LOAEL	Level above which adverse effects on health and quality of life can be detected.
Low-noise surfacing		See thin surface course system.
M		

Term	Acronym or Abbreviation	Definition
Macroinvertebrate		Organisms without backbones which are visible to the eye without the aid of a microscope.
Macrophyte		A plant (especially a marine plant) large enough to be visible to the naked eye.
Made ground		Land where natural and undisturbed soils have largely been replaced by man-made or artificial materials. It may be composed of a variety of materials including imported natural soils and rocks with or without residues of industrial processes (such as ash) or demolition material (such as crushed brick or concrete).
Magnitude		The size of something.
Mainline		The carriageway carrying the main flow of traffic, generally traffic passing straight through a junction or interchange.
Main construction compounds		Construction compounds that contain features, apparatus and provisions including office and welfare facilities, batching plants, waste management facilities, materials testing laboratory facilities, and CCTV traffic control facilities.
Main River		A river maintained directly by the Environment Agency. They are generally larger arterial watercourses.
Maintenance		Activities which do not change the nature of the asset.
(The) Maintenance Authority		The maintenance authority is a body tasked with the maintenance of the Scheme once operational. Once the Scheme is complete in its entirety, this would be The Authority 9Highways England), in relation to the trunked sections of the Scheme. Prior to full completion this would be the Principal Contractor.
Materials Management Plan	MMP	A mechanism by which those who are developing a site can comply with Environment Agency regulations for excavated ground materials.
Merge		The point where two different traffic flows come together and continue as one.

Term	Acronym or Abbreviation	Definition
Method Statement		A statement which sets out in detail the method which will be used for a particular activity.
Metre	M	A unit of measurement.
Microgram	Mg	One millionth of a gram.
Micron	µm	One millionth of a metre.
Mineral safeguarding areas		Areas defined by mineral planning authorities with known mineral resources that are of identified economic or conservation value.
Mineral site		Operational sites or sites identified within strategic planning documents for the extraction of minerals.
Mitigation		Measures intended to avoid, reduce and, where possible, remedy significant adverse environmental effects.
Monitoring		An assessment of the performance of the project, including mitigation measures. This determines if effects occur as predicted or if operations remain within acceptable limits, and if mitigation measures are as effective as predicted.
Movement (traffic)		A movement is one of the turns or changes in direction that a junction allows.
Multi-Agency Geographic Information Service	MAGIC	A website which provides geographic information about the natural environment.
N		
National Cycle Network	NCN	A national cycling route network of the United Kingdom, which was established to encourage cycling throughout Britain, as well as for the purposes of bicycle touring.
National Heritage List for England	NHLE	A database of designated heritage assets.
National Planning Policy Framework	NPPF	A planning framework which sets out the Government's planning policies for England and how these are expected to be applied.
National speed limit		The default speed limit which applies to roads without any posted limit, this being 60mph on single

Term	Acronym or Abbreviation	Definition
		carriageway roads and 70mph on dual carriageways and motorways.
National Vegetation Classification	NVC	A comprehensive classification and description of the plant communities of Britain, administered by the Joint Nature Conservation Committee.
Nationally Significant Infrastructure Project	NSIP	A type of project listed in the Planning Act 2008, which must be consented by a Development Consent Order.
Natura 2000		A network of core breeding and resting sites for rare and threatened species, and some rare natural habitat types which are protected in their own right.
Natural England		Executive non-departmental public body constituted under the Natural Environment and Rural Communities Act 2006 (section 2(1)) to ensure that the natural environment is conserved, enhanced and managed for the benefit of present and future generations, thereby contributing to sustainable development.
Nitrogen dioxide	NO2	A gas produced when fuels are burned and is often present in motor vehicle and boiler exhaust fumes. It is an irritant to the respiratory system.
Nitrogen oxides	NOx	A group of chemical compounds consisting only of nitrogen and oxygen which may be interconverted in the atmosphere. The principal oxides of nitrogen are nitric oxide and nitrogen dioxide.
Noise		Unwanted sound.
Noise barrier		Fence placed between a road and a noise sensitive receptor to reduce noise levels. Includes all elements of the fence (posts and fixings, as well as panels).
Noise Important Area	NIA	Areas identified with respect to noise from major roads and from roads within agglomerations where 'the 1% of the population that are affected by the highest noise levels from major roads' are located according to the results of the strategic noise mapping.
Noise Insulation Regulations	NIR	Noise Insulation Regulations 1975 made under Part II of the Land Compensation Act 1973.

Term	Acronym or Abbreviation	Definition
Noise mapping		The production of computer software generated maps showing how the predicted levels of outdoor noise vary with location.
Noise monitoring		The measurement of noise levels.
Noise Sensitive Receptor		Receptors which are potentially sensitive to noise. These comprise mainly residential buildings, but also include educational buildings, hospitals and places of worship.
Non-hazardous waste		Waste that is neither classified as inert nor hazardous.
O		
Offline		Highway development on land under non-highway use, for example a new dual carriageway constructed on agricultural land.
Operational		The functioning of a project on completion of construction.
Order Limits		The extent of the area within which the Scheme may be carried out.
Ordinary Watercourse		Ordinary watercourses include every river, stream, ditch, drain, cut, dyke, sluice, sewer (other than a public sewer) and passage through which water flows and which does not form part of a main river.
Ordnance Survey		The national mapping agency for the UK.
Overbridge		A bridge crossing over a transport corridor (e.g. a highway).
P		
Parapet		A parapet is a barrier which is an extension of the wall at the edge of a roof, terrace, balcony, walkway or other structure.
Particulate matter	PM10 or PM2.5	Discrete particles in ambient air, with diameters ranging between nanometres (billionths of a metre) to micrometres (millionths of a metre).

Term	Acronym or Abbreviation	Definition
Pathways		The routes by which pollutants are transmitted through air, water, soils, plants and organisms to their receptors.
Personal Protective Equipment	PPE	Protective clothing, helmets, goggles, or other garments or equipment designed to protect the wearer's body from injury or infection.
Phase 1 habitat survey		A habitat classification and field survey technique to record semi-natural vegetation and other wildlife habitats.
Planning Practice Guidance	PPG	A series of guidance documents which support the content of the National Planning Policy Framework.
Plans and programmes		Documents which are: a. subject to preparation and/or adoption by an authority at national, regional or local level or which are prepared by an authority for adoption, through a legislative procedure by Parliament or Government; and b. required by legislative, regulatory or administrative provisions.
Pollutant concentrations		Concentrations of pollutants normally reported as micrograms per cubic metre of air (µg/m3).
Pollution Climate Mapping	PCM	A collection of models designed to fulfil part of the UK's EU Directive (2008/50/EC) requirements to report on the concentrations of particular pollutants in the atmosphere.
Pollution prevention guidance		A series of guidance notes produced by the Environment Agency to advise industry and the public on legal responsibilities and good environmental practice.
Post Excavation Assessment Report	PEAR	A report completed after an archaeological excavation which details the work that was carried out and the outcomes which have been recorded.
Potential Local Wildlife Site	pLWS	An area being considered against defined nature conservation value criteria. This criteria takes into account the most important, distinctive and threatened species and habitats. If considered suitable pLWS are confirmed as LWS. See Local Wildlife Site.

Term	Acronym or Abbreviation	Definition
Priority habitats (and species)		Species and habitats defined as: a. listed as a national priority for conservation (such as those listed as habitats and species of principal importance for the conservation of biodiversity); b. listed as a local priority for conservation, for example in the relevant local Biodiversity Action Plan; c. Red Listed using International Union for the Conservation of Nature criteria or, where a more recent assessment of the taxonomic group has not yet been undertaken, listed in a Red Data Book; d. listed as Near Threatened or Amber Listed; e. listed as a Nationally Rare or Nationally Scarce species or listed as a Nationally Notable species where a more recent assessment of the taxonomic group has not yet been undertaken; and/or f. endemic to a country or geographic location.
Principal Aquifer		Aquifers previously designated as major aquifer
Principal Contractor	PC	Contractor appointed to coordinate the construction phase of a project where it involves more than one contractor
Private Means of Access	PMA	A term used to describe a type of route which is used to connect premises such as homes, businesses and community facilities to the public highway network.
Private property		Land, buildings and infrastructure for the purpose of residential use.
Private Water Supply		A private water supply which is not provided by a water company.
Programme of investigation		Phases of: excavation or other recording; assessment; analysis; and dissemination of results.
Public right of way	PRoW	A highway where the public has the right to pass. It can be a footpath (used for walking), a bridleway (used for walking, riding a horse and cycling), or a byway that is open to all traffic (including motor vehicles).

Term	Acronym or Abbreviation	Definition
Q		
Quality Management System	QMS	A set of internal rules that are defined by a collection of policies, processes, documented procedures and records.
R		
Reach		A stretch of a river used in the assessment of river water quality.
Recovery (waste)		Any operation, the principal result of which is waste serving a useful purpose by replacing other materials which would otherwise have been used to fulfil a particular function, or waste being prepared to fulfil that function, in the plant or in the wider economy.
Recycling		Any recovery operation by which waste materials are reprocessed into products, materials or substances whether for the original or other purposes.
Register of Environmental Actions and Commitments	REAC	A register of environmental actions and commitments which is based on mitigation as defined in the Environmental Statement.
Remediation (contaminated land)		The process of removing a pollution linkage (i.e. by removing one or more of the elements in a source-pathway-receptor linkage) in contaminated land in order to render an acceptable risk. Usually this involves a degree of removal of contaminants and/ or blockage of pathways.
Resilience		The capacity of a project (or lack thereof) to withstand the adverse effects of climate change.
Resource		A defined but generally collective environmental feature usually associated with soil, water, air, climatic factors, landscape, material assets, including the architectural and archaeological heritage that has potential to be affected by a project.
Restoration (ecological)		The re-establishment of a damaged or degraded system or habitat to a level similar to its original condition.

Term	Acronym or Abbreviation	Definition
Re-use		Any operation by which products or components that are not waste are used again for the same purpose for which they were conceived.
Riparian		Relating to or situated on the banks of a river.
Risk assessment		An assessment of the probability of a hazard occurring that could result in an impact.
River Basin Management Plan	RBMP	A regional plan that sets out how organisations, stakeholders and communities will work together to improve the water environment and fulfil the requirements of the Water Framework Directive.
River Macrophyte Nutrient Index	RMNI	A measure of which plants grow in a river, using a scale from 1 – 10. High scores are associated with species that dominate under enriched conditions.
Road Investment Strategy	RIS1	A document which sets out a long-term vision for England's motorways and major roads, outlining how smooth, smart and sustainable roads will be achieved through investment over a five year period (2015 - 2020).
Road Investment Strategy 2	RIS2	A document which sets a long-term strategic vision for the network. With that vision in mind, it then: specifies the performance standards Highways England must meet; lists planned enhancement schemes we expect to be built; and states the funding that we will make available during the second Road Period (RP2), covering the financial years 2020/21 to 2024/25.
Root Protection Area	RPA	The minimum area around a tree deemed to contain sufficient roots and rooting volume to maintain the tree's viability, and where the protection of the roots and soil structure is treated as a priority.
Roundabout		A circular, one-way junction at which other roads meet and terminate.
Runoff		The flow of water over the ground surface.
Routine runoff		The normal runoff from roads including any contaminants washed off the surface in rainfall events which can result in either acute or chronic impacts.

Term	Acronym or Abbreviation	Definition
S		
Sand		Soil particles from 0.06mm-2.0mm in equivalent diameter. Fine sand particles are from 0.06mm-0.2mm; medium sand from 0.2mm-0.6mm; and coarse sand from 0.6mm-2.0mm.
Satellite construction compounds		Construction compounds that would generally be located adjacent to specific works, for example bridge structures, and be in operation for a limited duration.
Scheduled Monument	SWMP	Nationally significant heritage assets protected by the 1979 Ancient Monuments and Archaeological Areas Act.
Secondary aquifer		There are two types of secondary aquifer designations: a. Secondary A: permeable layers capable of supporting water supplies at a local rather than strategic scale, and in some cases forming an important source of base flow to rivers. These are generally aquifers formerly classified as minor aquifers; and b. Secondary B: predominantly lower permeability layers which may store and yield limited amounts of groundwater due to localised features such as fissures, thin permeable horizons and weathering. These are generally the water-bearing parts of the former non-aquifers.
Second Iteration Environmental Management Plan		The second iteration of the Environmental Management Plan, which is refined for the construction stage of the consented project, and prepared in advance of construction.
Secretary of State		The cabinet minister who (among other things) acts as decision-maker on all national infrastructure applications for development consent.
Sediment		Organic and inorganic material that has precipitated from water to accumulate on the floor of a water body, watercourse or trap.
Severance (walkers, cyclists and horse riders)		The extent to which members of communities are able (or not able) to move around their community and access services/facilities.

Term	Acronym or Abbreviation	Definition
Sewage Treatment Works	STW	Sewage treatment is the process of removing contaminants from municipal wastewater, containing mainly household sewage plus some industrial wastewater.
Side road network		The network of minor roads which connect to busier or more important road.
Silt		Soil particles from 0.002mm to less than 0.06mm in equivalent diameter.
Site investigation		An exploratory site investigation, including field reconnaissance, field and laboratory work, designed to prove the basis of the conceptual site model, as established within the preliminary risk assessment / desk study.
Site of Biological Importance	SBI	A non-statutory designation used by some local planning authorities to protect locally valued sites of biological diversity described as local wildlife sites by the UK Government.
Site of Importance for Nature Conservation	SINC	Sites designated by local authorities for the purpose of conserving wildlife.
Site of Special Scientific Interest	SSSI	Area of land notified by Natural England under section 28 of the Wildlife and Countryside Act 1981 as being of special interest due to its flora, fauna or geological or physiological features.
Site Waste Management Plan		A plan that is used to outline how a construction project would avoid, minimise or mitigate effects on waste production and handling on the environment and surrounding area.
Site-won		Material derived from a construction site rather than being imported.
Slip road		A connector road within a junction between a mainline carriageway and the local highway network, or vice versa, which meets the local highway network at-grade.
Soakaway		A special pit or depression in the land surface that allows water to drain into the ground.

Term	Acronym or Abbreviation	Definition
Soil		An assemblage of mineral particles and/or organic matter which includes variable amounts of water and air (and sometimes other gases).
Soil compaction		The removal of pore spaces within soil structures and drainage channels between soil structures. This inhibits root penetration and the movement of air and water in soil.
Soil erosion		The detachment and movement of soil by the action of water and/or wind.
Soil resource		The textures, structures and volume of different qualities of topsoil and subsoil that have a potential for beneficial reuse.
South Cambridgeshire District Council		The local authority within whose jurisdiction part of the Scheme would be implemented.
Special Area of Conservation	SAC	Sites designated under EU legislation for the protection of habitats and species considered to be of European interest.
Stable Non-Reactive Hazardous Waste	SNRHW	A type of waste that can potentially include a range of monolithic solid waste (these being wastes in large blocky form) or granular solid wastes produced by treatment plants.
Stakeholder		An organisation or individual with a particular interest in a project.
Standard mitigation		Measures comprising standard techniques and activities which are implemented during the construction of a project to protect the environment and/or mitigate adverse effects, for example the covering of exposed materials to reduce dust emissions.
Statutory undertaker		Companies and agencies with legal rights to carry out certain types of development and/or highways works.
Strategic employment site		Large scale sites/land allocated in local planning policy for the provision of employment land use.
Strategic road network		The network of motorways and trunk roads in England.

Term	Acronym or Abbreviation	Definition
Sterilise		Substantially constrain / prevent existing and potential future use and extraction of materials.
Subsoil		Weathered soil layer extending between the natural topsoil and the unweathered basal layer (geological parent material) below, or similar material on which topsoil can be spread. Subsoil has lower organic matter and plant nutrient content than topsoil. In most cases topsoil requires a subsoil to perform one or a number of natural soil functions.
Superficial deposit		A geological deposit that was laid down during the Quaternary period. Such deposits were largely formed by river, marine or glacial processes but can also include wind-blown deposits known as loess.
Surface water (or surface water body)		Waters including rivers, lakes, loughs, reservoirs, canals, streams, ditches, coastal waters and estuaries.
Sustainable drainage systems	SuDS	Measures designed to control surface runoff close to its source, including management practices and control measures such as storage tanks, basins, swales, ponds and lakes. Sustainable drainage systems allow a gradual release of water and thereby reduce the potential for downstream flooding.
Sustrans		A UK charity which aims to make it easier for people to walk and cycle, and which promotes the National Cycle Network.
Swale		A low or hollow place, especially a marshy depression between ridges.
T		
The Scheme		The A428 Black Cat to Caxton Gibbet improvements.
Thin surface course system		A generic term used to describe a type of road surfacing which has a high stone content, laid at a thickness of less than 50mm. It is applied to reduce the noise resulting from the interaction of vehicle tyres with the road. Also known as low-noise surfacing.

Term	Acronym or Abbreviation	Definition
Third Iteration Environmental Management Plan		The third iteration of the Environmental Management Plan is refined at the end of the construction stage to support future management and operation of the consented project.
Till		Unsorted glacial sediment deposited directly by a glacier.
Toolbox Talks		A talk carried out to construction site staff which provides details of actions which need to be taken on site.
T-junction		A simple three-way junction, where one road ends on another.
Topsoil		Natural topsoil or manufactured topsoil, usually covering the top 25cm in which plants can grow healthily.
Total suspended solids		The dry-weight of suspended particles, that are not dissolved, in a sample of water that can be trapped by a filter that is analysed using a filtration apparatus.
Trackout		The transportation of dust and dirt from construction sites onto the road network.

Term	Acronym or Abbreviation	Definition
Traffic Management Contractor	TMC	The contractor responsible for traffic management.
Traffic Management Plan	TMP	A plan which identifies clear controls on routes, vehicle types, vehicle frequency, vehicle quality and hours of site operation.
Traffic Management Officer		Ensures compliance with the contractors traffic management plan in accordance with the DCO **[TR010044/APP/3.1].**
Translocation		The transporting and release of species or habitats from one location to another. For example, if an area of land is required permanently for a new development, species can be moved from that site to a suitable alternative location.
Tree Preservation Order	TPO	An order made by a local planning authority, under the Town and Country Planning Act 1990, in respect of trees or woodlands. The principal effect of a tree preservation order is to prohibit the cutting down, uprooting, topping, lopping, willful damage or willful destruction of trees without the local planning authority's consent.
Trial trenching (cultural heritage)		A method of on-site archaeological investigation where trenches are dug at intervals across a site to identify any archaeological remains.
Trunk road		A road operated and maintained in England by Highways England.
U		
Unclassified (road)		A road which has no number.
Underbridge (or underpass)		A bridge crossing under a transport corridor (for example a highway).
Unexploded ordnance	UXO	Explosives that did not explode when deployed and thus still pose a risk of detonation.
Unitary Development Plan		A statutory document that sets out the council's planning policies for development, conservation, regeneration and environmental improvement activity.

Term	Acronym or Abbreviation	Definition
Unproductive strata		Layers of rock or superficial deposits with low permeability or porosity that have a negligible significance for water supply.
Utilities		The term utilities refers to the set of services provided by these organisations consumed by the public: Coal, electricity, natural gas, water, sewage, telephone, and transportation. Broadband internet services (both fixed-line and mobile) are increasingly being included within the definition.
V		
Variable Messaging Systems	VMS	An electronic traffic sign that provides travellers with information, for example alerts concerning special events or weather conditions.
Vehicle movement		A journey made by a vehicle. This can either be a one way or two way trip.
Vehicle recovery area		An area designated explicitly for vehicle recovery.
Veteran tree		Veteran trees are trees which have features of ancientness but at a younger age. These features include missing branches, hollow trunks and habitat features more commonly associated with ancient trees.
Vibration		A to-and-fro motion which oscillates about a fixed equilibrium position.
W		
Walkers, cyclists and horse riders	WCH	A collective term used to describe pedestrians, cyclists and equestrians.
Waste		Any substance or object which the holder disposes or intends / is required to dispose.
Waste Acceptance Criteria	WAC	Waste Acceptance Criteria
Water Framework Directive	WFD	A European Union Directive which commits member states to achieve good status of all waterbodies (both surface and groundwater), and also requires that no such waterbodies experience deterioration in status. Good status is a function of good ecological and good chemical status, defined by a number of elements.

Term	Acronym or Abbreviation	Definition
Wetness class		Soil wetness is classified according to the depth and duration of waterlogging in the soil profile. Six wetness classes are identified, ranging from 'very well drained' to 'very poorly drained'.
Written Schemes of Investigation	WSI	Documents which set out the approach to undertaking archaeological monitoring of ground investigation works.
Z		
Zone of Influence	ZoI	The geographic area (or timescale) over which existing environmental conditions are likely to be influenced by change.

9 Annex A - Air quality management plan

1.1 Background to the plan

1.1.1 This Outline Management Plan (OMP) sets out the generic and specific measures that will be used by the Principal Contractor (PC) to be implemented to manage dust and emissions of pollutants to air generated by the construction of the Scheme, which can affect residential occupants, businesses and commercial facilities, users of the road and public rights of way network, users of open space, and sensitive ecological sites and habitats.

1.1.2 This OMP will be updated by the PC, into a final Management Plan, as appropriate and necessary, prior to commencement of works in accordance with the Requirements in Schedule 2 of the Development Consent Order (DCO) **[TR010044/APP/3.1]** and must incorporate the requirements of this First Iteration Environmental Management Plan (EMP) and the Second Iteration EMP.

1.2 Responsibilities

1.2.1 In relation to the control and management of dust and emissions to air the PC shall establish the appropriate roles and responsibilities for site staff in accordance with the roles and responsibilities set out in Section 2 of this First Iteration EMP.

1.3 Consent requirements

1.3.1 Construction of the Scheme must be undertaken such that:

a. The works comply with the requirements of the DCO.

b. Data can be recorded, reviewed and provided to the Environmental Health Officer (EHO), when requested.

1.4 General control measures

1.4.1 To minimise potential emissions of fugitive dust during construction, best practice measures shall be employed during the works.

1.4.2 A construction dust assessment has been used to inform the best practice mitigation measures implemented. The general control measures set out in Table A.1 will be required in all works undertaken where there is potential for adverse effects on sensitive receptors, with specific control measures set out in Table A.3 required at the higher risk receptors identified in **Table A-2.**

1.4.3 The following control measures within **Table A-1**, which are based on the measures in the Institute of Air Quality Management publication *Guidance on the assessment of dust from demolition and construction (Version 1.1)* (REF 1-1), will be implemented to manage site-based risks associated with dust arising from demolition and general construction activities.

Table A-1: Dust mitigation control measures

Activity	Measure
Dust management	Develop and implement a series of dust management and monitoring measures. The level of detail shall include, as a minimum, the measures set out in this table. Monitoring may include monitoring of dust deposition, dust flux, real-time PM_{10} continuous monitoring and/or visual inspections.
	Monitoring:
	Undertake regular inspections, as will be set out in the Second Iteration EMP, where receptors are nearby, to monitor dust, record inspection results, and make the log available to the relevant local authority upon request.
	Preparing and Maintaining the Site:
	Fully enclose the site for specific operations where there is a high potential for dust production and the site is active for an extensive period.
	Keep site fencing, barriers and scaffolding clean using wet methods where there is the risk of dust accumulation.
	Remove materials that have the potential to produce dust from site as soon as possible, unless being re-used on site. If they are being re-used on-site, cover as appropriate.
	Cover, seed or fence stockpiles to prevent wind whipping.
	Avoid site runoff of water or mud.
	Operating Vehicle/Machinery and Sustainable Travel:
	Impose and signpost a maximum-speed-limit on surfaced and un-surfaced haul roads and work areas (if long haul routes are required these speeds may be increased with suitable specific control measures provided (refer to Section 1.5)).
	Ensure all vehicles switch off engines when stationary or not in use - no idling vehicles.
	All construction plant should use fuel equivalent to ultra-low sulphur diesel where possible.
	Operations:

Activity	Measure
	Ensure equipment is readily available on site to clean any dry spillages and clean up spillages as soon as reasonably practicable after the event using wet cleaning methods.
Demolition	Ensure effective water suppression is used during demolition operations. Hand held sprays are more effective than hoses attached to equipment as the water can be directed to where it is needed. In addition, high volume water suppression systems, manually controlled, can produce fine water droplets that effectively bring the dust particles to the ground.
	Avoid explosive blasting where possible, using appropriate manual or mechanical alternatives.
	Comply with measures set out in any Asbestos Management Plan prepared for the Scheme, where required.
Surfacing works	Surfacing equipment (e.g. planer) only to be operated with any manufacturer's dust abatement measures in place.
Construction	Avoid scabbling (roughening of concrete surfaces) if possible.
	Ensure sand and other aggregates are stored in bunded areas and are not allowed to dry out, unless this is required for a particular process, in which case ensure that appropriate specific control measures (refer to Section 1.5) are in place.
Trackout	Use water-assisted dust sweeper(s) on access and local roads, to remove, as necessary, any material tracked out of the site. This may require the sweeper being continuously in use.
	Avoid dry sweeping of large areas.
	Ensure vehicles entering and leaving sites are covered to prevent escape of materials during transport.
	Record all inspections of haul routes and any subsequent action in a site log book.
	Implement a wheel washing system (with rumble grids to dislodge accumulated dust and mud prior to leaving the site) where reasonably practicable.

1.5 Specific control measures

1.5.1 Locations within 100 metres of dust generating activities are at a higher risk of, or more sensitive to, dust emissions and will require additional site-specific measures to achieve the required level of control and suppression. These locations are set out in **Table A-2** and are illustrated on **Figure 5.5** of the Environmental Statement **[TR010044/APP/6.2]**. These locations will be confirmed by the PC when the final Management Plan is prepared.

1.5.2 The additional site-specific measures to be implemented at these locations are set out in **Table A-3**.

Table A-2: Locations requiring additional dust mitigation control measures

Location	Approximate chainage	Distance to nearest receptor (m)
New dual carriageway	6800 to 6850	65.4 (R84)
New dual carriageway	8150	30.4 (E17)
New dual carriageway	10000 to 10050	76.8 (R169)
New dual carriageway	19050 to 19137	12.0 (E22)
Black Cat junction southbound on-slip road	1650 to 1700	26.5 (R208)
Combined Kelpie Marina access track and public footpath	(1700 to 1850)*	69.6 (R212)
Greenacres access track	(1650 to 1700)*	8.5 (R208)
Roxton Road roundabout	(1050 to 1150)*	11.2 (R53)
Roxton Road link (north)	(1500 to 1650)*	36.3 (R199)
Nagshead Lane link	(1500 to 1650)*	24.0 (R200)
Improved Great North Road	(1750 to 1900)*	6.3 (R201)
A1 Southbound closed accesses	(1650 to 1800)*	5.8 (R199)
Realigned Barford Road	(2650 to 2750)*	10.3 (R209)
Realigned B1046	(7000 to 7050)*	27.5 (R83)
Realigned Potton Road	(6650 to 7000)*	14.1 (R83)
Cambridge Road junction North Roundabout	(9300 to 9400)*	65.6 (R170)
Cambridge Road junction South Roundabout	(10050 to 10250)*	8.4 (R169)
Cambridge Road junction westbound off-slip road	(10050 to 10100)*	44.4 (R169)
Realigned Toseland Road	(12950 to 13050)*	21.0 (R166)

Location	Approximate chainage	Distance to nearest receptor (m)
Eltisley link south Roundabout	(15850 to 15950)*	69.3 (R273)
Borrow Pit on land extending west from Roxton Road	(650 to 1100)*	151.6 (residential receptor on Spinney Road)
Borrow Pit on land immediately east of the A1 and north of Black Cat Quarry	(1750 to 2050)*	143.5 (residential receptor on Great North Road)
Borrow Pit on land immediately west of the A1198 (Ermine Street) and north of the existing A428	(17750 to 18150)*	51.6 (Iway Inn Hotel)
Borrow Pit on land immediately east of the A1198 and north of the existing A428	(18200 to 18650)*	19.6 (Iway Inn Hotel)

* Locations are set back from the main chainage line but approximately aligned with these chainages.

Table A-3: Additional dust mitigation control measures

Activity	Measure
Liaison	During construction, appropriate mechanisms to communicate with local residents would be set up to highlight potential periods of disruption (for example web-based newspapers and radio announcements). An information web-page shall be provided and kept up-to-date on the Highways England website to reflect construction and community liaison requirements. The web-page shall provide up-to-date information on the progress of the construction works, areas affected by construction (e.g. advanced notification of very dusty or noisy activities) mitigation in place to reduce adverse effects, information regarding planned construction works (including any proposed works outside normal hours (refer to **Chapter 2, The Scheme** of the Environmental Statement **[TR010044/APP/6.2]**) and works recently completed. The communication strategy shall minimise the likelihood of complaints. Residents shall be provided with a point of contact for any queries or complaints. The role of the Community Relations Manager is described under 'Project Team Roles and Responsibilities' section of the First Iteration EMP **[TR010044/APP/6.8]**.
	Regular liaison would be undertaken with the relevant local authorities, this would include discussing any complaints that had been received.
	Display the head or regional office contact information.
Dust management	Site Management:
	Record all dust and air quality complaints, identify cause(s), take appropriate measures to reduce emissions in a timely manner, and record the measures taken.
	Make the complaints log available to the relevant local authority as soon as reasonably practicable.
	Record any exceptional incidents that cause dust and/or air emissions, either on-site or off-site, and the action taken to resolve the situation in the logbook.
	If applicable, hold regular liaison meetings with other high-risk construction sites within 500m of the site boundary, to ensure plans are co-ordinated and dust and particulate matter emissions are minimised. In particular, an understanding of potential interactions of the off-site transport/deliveries which might be using the same strategic road network routes will be established.
	Monitoring:
	Carry out regular site inspections to monitor the effectiveness of mitigation measures, record inspection results, and make an inspection log available

Activity	Measure
	to the relevant local authority as soon as reasonably practicable upon request.
	Increase the frequency of site inspections by the person accountable for air quality and dust issues on site when activities with a high potential to produce dust (e.g. demolition works or large earthworks) are being carried out and during prolonged dry or windy conditions.
	Undertake air quality monitoring where necessary and after risk-assessing the activities/receptors Wherever possible, pre-construction monitoring of at least 3 months will be undertaken. Monitoring will be required at the Iway Hotel due to the proximity of the borrow pits in addition to the construction work at Caxton Gibbet junction.
	Preparing and Maintaining the Site:
	Plan site layout so that machinery and dust causing activities are located away from receptors, as far as is possible.
	Erect solid screens or barriers around particularly dusty activities or the site boundary that are at least as high as any stockpiles on site for higher risk sites.
	Operating Vehicle/Machinery and Sustainable Travel:
	Avoid the use of diesel or petrol-powered generators and use mains electricity or battery powered equipment where practicable.
	Where stationary generators are required ensure these are sited as far from sensitive receptors as possible.
	Operate stationary generators within manufacturer guidelines, under optimum load for periods of operation and regularly service equipment to maintain efficient operation.
	Manage the sustainable delivery of goods and materials through careful programming of delivery.
	Implement a travel plan that supports and encourages sustainable travel (e.g. public transport, cycling, walking, and car-sharing).
	Operations:
	Only use cutting, grinding or sawing equipment fitted or in conjunction with suitable dust suppression techniques such as water sprays or local extraction (e.g. suitable local exhaust ventilation systems).

Activity	Measure
	Ensure an adequate water supply on the site for effective dust/particulate matter suppression/mitigation, using non-potable water where possible and appropriate.
	Use enclosed chutes and conveyors and covered skips.
	Minimise drop heights from conveyors, loading shovels, hoppers and other loading or handling equipment and use fine water sprays on such equipment wherever appropriate.
	Waste Management:
	No bonfires and burning of waste materials.
Earthworks	Re-vegetate earthworks and exposed areas/soil stockpiles to stabilise surfaces as soon as practicable.
	Use hessian, mulches or tackifiers where it is not possible to re-vegetate or cover with topsoil, as soon as practicable.
	Where possible, only remove the cover in small areas during work and not all at once.
Construction	Ensure bulk cement and other fine powder materials are delivered in enclosed tankers and stored in silos with suitable emission control systems to prevent escape of material and overfilling during delivery.
	For smaller supplies of fine powder materials ensure bags are sealed after use and stored appropriately to prevent dust.
Trackout	Maintain and inspect on-site haul routes for integrity and operate a programme of routing maintenance and where necessary carry out repairs to the surface as soon as reasonably practicable.
	Install hard surfaced haul routes if possible, which are regularly damped down with mobile sprinkler systems, or mobile water bowsers and are regularly cleaned.
	Ensure there is an adequate area of hard surfaced road between the wheel wash facility and the site exit, wherever site size and layout permits.
	In locations without hard standing it may be necessary to clean the vehicle bodies in addition to wheels.
	Access gates to be located at least 10m from receptors where possible.

10 Annex B - Noise and vibration outline management plan

1.1 Background to the plan

1.1.1 This Outline Management Plan (OMP) sets out the generic measures that will be used by the Principal Contractor (PC) to manage noise and vibration generated by the construction of the Scheme, which can affect residential occupants, users of non-residential noise and vibration sensitive buildings, settings of heritage sites and sensitive ecological sites and habitats.

1.1.2 This OMP will be updated by the PC, into a final Management Plan, as appropriate and necessary, prior to commencement of works in accordance with the Requirements in Schedule 2 of the Development Consent Order (DCO) **[TR010044/APP/3.1]** and must incorporate the requirements of the First Iteration Environmental Management Plan (EMP) and the Second Iteration EMP.

1.2 Responsibilities

1.2.1 In relation to the control and management of noise and vibration, the PC shall establish the appropriate roles and responsibilities for site staff in accordance with the roles and responsibilities set out in Section 2 of the First Iteration EMP.

1.3 Consent requirements

1.3.1 Construction of the Scheme shall be undertaken such that:

a. The works comply with any requirements of the Environmental Health Officer (EHO) including, but not limited to, hours of working, mitigation measures and working methods.

b. Consent is sought from the EHO for works variations and/or over-run of activities, and night-working.

c. Data can be recorded, reviewed and provided to the EHO, when requested.

d. The EHO can be informed of any work that is likely to require communication with members of the public.

1.4 General control measures

1.4.1 An Environmental Aspects Register will be developed by the PC. This will form part of the Second Iteration EMP and will detail the attributes of the works that are expected to give rise to nuisance from noise and vibration. Appropriate controls will be identified from this register and applied to control or reduce impacts as far as reasonably practicable, based on the measures set out within this plan.

1.4.2 Noise and vibration from construction activities will be controlled by employing Best Practicable Means (BPM), as defined under Section 72 of the *Control of Pollution Act 1974* (Ref 1-1) and Section 79 of the *Environmental Protection Act 1990* (Ref 1-2), at all times.

1.4.3 BPM shall consider the recommendations of BS 5228: Code of practice for noise and vibration control on construction and open sites (Parts 1 and 2) (Ref 1-3, Ref 1-4), and BS 7385-2: Evaluation and measurement for vibration in buildings, Guide to damage levels from groundborne vibration (Ref 1-5).

1.4.4 BPM will include the control of noise and vibration at source – such as the provision of acoustic enclosures and the use of less intrusive alarms and the screening of equipment. Should the application of BPM at source not prove effective and noise exposure exceed the relevant trigger level (as defined in BS 5228-1) (Ref 1-3), the PC may offer:

a. Noise insulation.

b. Ultimately temporary rehousing.

1.4.5 The codes of practice for construction works and piling given in BS 5228-1 (Ref 1-3) and the guidance therein for minimising noise emissions from the site must be adhered to.

1.4.6 Local residents will be informed of construction works programmes and emergency or unscheduled works which may affect them, in order to maintain good relations.

Control of noise

1.4.7 The following noise control measures will be implemented across all construction works:

a. All ancillary plant such as generators, compressors and pumps will be positioned so as to cause minimum noise disturbance. If necessary, acoustic barriers or enclosures will be provided, where appropriate.

b. Working methods will be developed specific to the area, and will consider use of equipment and methods of operations to minimise noise.

c. Whenever possible, fabrication of materials will be undertaken off-site.

d. All plant and machinery in intermittent use will be shut down in intervening periods between work, or throttled down to a minimum.

e. Proper use of plant with respect to minimising noise emissions with regular maintenance will be undertaken. All vehicles and mechanical plant used for the purpose of the works will be fitted with exhaust silencers and be maintained in good working order.

f. Minimising the drop height of materials into hoppers, lorries or other plant.

g. Use of less intrusive alarms on vehicles, for example broadband vehicle reversing warnings.

Control of vibration

1.4.8 Where potential exists for significant vibration to arise as a consequence of construction activities, the following actions will be carried out:

a. Evaluate the potential for vibration (and thereby damage to buildings and structures).

b. Carry out vibration monitoring at the associated location.

c. Inform neighbours of the works and the vibration control measures to be implemented.

1.4.9 The PC will make efforts to minimise vibration effects during construction by implementing the following measures, as necessary:

a. The appropriate selection of plant e.g. piling, rollers.

b. Consideration of low vibration working methods, including non-vibratory compaction plant where possible.

c. Haul routes within the site boundary will be kept in good condition

d. The removal of obstructions that can cause, or add, resonance e.g. concrete bases.

e. No start-up or shut down of large vibratory rollers (approximately 13 tonnes) within 50 metres of receptors and medium vibratory rollers (approximately 3.5 tonnes) within 15 metres of receptors.

f. The use of cut-off trenches to disrupt direct vibration movement through the ground.

g. The use of pre-bores for piles.

Control of subcontractors

1.4.10 Subcontractors whose works are likely to give rise to noise, vibration or other nuisance issues must develop appropriate control measures within method statements. These control measures will be communicated to the subcontractors' staff through the use of site inductions and toolbox talks.

1.4.11 In addition, the requirements of the local authority EHO shall be communicated to subcontractors during site inductions, project briefings and start of shift briefs.

Noise monitoring and measurement

1.4.12 Noise measurement surveys during construction will be carried out by the PC, if required, and as agreed with the relevant local authorities.

1.4.13 Suitably trained staff will be tasked with undertaking the noise measurements on site.

1.4.14 In instances where a member of the public has made a noise complaint, the complaint will be registered in accordance with the site complaints procedure.

11 Annex C - Waste management plan

1.1 Introduction

Overview

1.1.1 This Outline Waste Management Plan (OWMP) sets out the generic measures that will be implemented by the Principal Contractor (PC) to manage waste generated by the construction of the Scheme.

1.1.2 This OWMP will be updated by the PC into a final Waste Management Plan (WMP), as appropriate and necessary, prior to commencement of works in accordance with the Requirements in Schedule 2 of the Development Consent Order (DCO) **[TR010044/APP/3.1]** and must incorporate the requirements of this First Iteration Environmental Management Plan (EMP) and the Second Iteration EMP.

1.1.3 Key terminology in relation to this OWMP is detailed in **Table C-1**.

Table C-1: Terminology

Terminology	Definition
The Considerate Constructors Scheme (CCS)	The CCS – a non-profit making, independent organisation founded in 1997 by the construction industry to improve its image.
C&D waste	Construction and demolition waste
CD&E waste	Construction, demolition and excavation waste
CIRIA	Construction Industry Research and Information Association – a member-based research and information organisation dedicated to improvement in all aspects of the construction industry.
Controlled waste	Household, industrial and commercial waste (not agricultural waste, waste from mines or quarries and most radioactive waste).
DMRB	Design Manual for Roads and Bridges. Contains information about current standards relating to the design, assessment and operation of motorway and all-purpose trunk roads in the United Kingdom
Duty of Care	Legal responsibility to prevent waste from being mismanaged by any person who holds it and from escaping their control.
Duty of Care checks	Checks to ensure that only authorised persons transfer waste, and that the waste is managed legitimately, including checks on: c. The waste carrier's registration certificate. d. The waste broker's registration certificate (if used). e. The Environmental Permits for waste management facilities or proof of exemptions from permitting.
Environment Agency (EA)	The main environmental regulatory body in England.
European Waste Catalogue (EWC) code	A six-digit number used to classify a particular waste stream.

Terminology	Definition
exempt activities	Activities not requiring an Environmental Permit (an exemption will require registration).
Flood Zone 3	The area of the floodplain where there is a high risk of flooding.
Hazardous Waste Consignment Note (HWCN)	A document that accompanies the movement of any hazardous waste from production (cradle) to disposal (grave).
hazardous waste	Waste with any hazardous properties as listed in Annex III of The Hazardous Waste (England and Wales) Regulations 2005 (as amended).
non-hazardous waste	Waste which does not display any of the hazardous properties listed in Annex III of The Hazardous Waste (England and Wales) Regulations 2005 (as amended).
Principal Contractor (PC)	Contractor appointed to coordinate the construction phase of a project where it involves more than one contractor.
Registered Waste Carrier	A person who holds a registration certificate from the EA to transport waste.
Waste Management Plan (WMP)	Sets out how material resources and waste will be managed and controlled at all stages during a construction project.

Purpose and benefits

1.1.4 WMPs are used as a good practice measure on construction projects and to support planning and consenting applications.

1.1.5 This OWMP has been developed to act as a guide to Scheme personnel on how to manage material resources and waste, in accordance with both legal and best practice requirements. The PC will use this OWMP as a framework for producing the final WMP for use throughout the duration of the Scheme.

1.1.6 The PC will take all reasonable steps to ensure that:

a. All waste from the site is dealt with in accordance with the waste duty of care (defined in section 34 of the *Environmental Protection Act 1990* (REF 1-1) and *The Waste (England and Wales) Regulations 2011* (as amended) (REF 1-2).

b. Materials are handled efficiently, and waste managed appropriately.

Scope

1.1.7 This OWMP includes:

a. An overview of applicable legislation.

b. Details of the Scheme.

c. Management arrangements, including roles and responsibilities, training, key performance indicators (KPIs) and best practice measures.

d. Estimates of material use and waste arising and how they will be managed.

e. Design decisions.

f. Materials and waste management on-site.

g. Opportunities for waste minimisation, reuse, recycling and recovery in line with the requirements of the waste hierarchy.

1.2 Waste management legislation

1.2.1 This section summarises the key legal requirements with regards to waste management and control within England.

Definition of waste

1.2.2 Waste is defined by Article 1(a) of the *European Waste Framework Directive (EWFD) 2008/98/EC* (REF 1-3) as *"any substance or object (in the categories set out in Annex I) which the holder discards or intends to discard or is required to discard"*.

1.2.3 The legal definition of waste also covers substances or objects, which fall outside of the commercial cycle or out of the chain of utility. In particular, most items that are sold or taken off-site for recycling are wastes, as they require treatment before they can be resold or reused.

1.2.4 In practical terms, wastes include surplus earthworks materials and soil, scrap, unwanted surplus materials, packaging, recovered spills, office waste, and damaged, worn-out, contaminated or otherwise spoiled plant, equipment and materials.

Duty of care

1.2.5 The duty of care for waste management is set out under section 34 of the *Environmental Protection Act 1990* (REF 1-1) and *The Waste (England and Wales) Regulations 2011* (SI 2011 No. 988) (as amended) (REF 1-2). It requires anyone who produces, imports, keeps, stores, transports, treats or disposes of waste to take all reasonable steps to ensure that the waste is managed properly. Anyone in possession of waste must take all reasonable steps to:

a. Prevent unauthorised or harmful deposit, treatment or disposal of waste.

b. Prevent a breach (failure) by any other person to meet the requirement to have an environmental permit, or a breach of a permit condition.

c. Prevent the escape of waste.

d. Ensure that waste is transferred to an authorised person.

e. Provide an accurate description of the waste when it is transferred to another person, by using a compulsory system of Waste Transfer Notes (WTN) that control the transfer of waste between parties.

1.2.6 Failure to comply with the duty of care requirements is a criminal offence and could lead to prosecution.

Apply the waste hierarchy

1.2.7 *The Waste (England and Wales) Regulations 2011* (as amended) (REF 1-2) transpose the requirements of the *European Waste Framework Directive* (2008/98/EC) (EWFD) (REF 1-3), and require:

a. Those undertaking waste management activities, such as the import, production, collection, transportation, recovery and/or disposal of waste, to take all reasonable measures to apply the waste hierarchy, in priority order, as follows:

   i. Prevention

   ii. Preparation for reuse

   iii. Recycling

   iv. Other recovery, such as energy recovery

   v. Disposal

a. Those producing waste to confirm that they have applied the waste hierarchy when transferring waste and to include a declaration on their WTN or consignment note.

Hazardous waste

1.2.8 The *Hazardous Waste (England and Wales) Regulations 2005* (as amended) (REF 1-4) require that a consignment note be used to document the transfer and management of all hazardous waste.

Registration of waste carriers

1.2.9 Under the *Control of Pollution (Amendment) Act 1989* (REF 1-5) it is a criminal offence for anyone not registered as a waste carrier to transport controlled waste. *The Waste (England and Wales) Regulations 2011* (as amended) (REF 1-2) updated the system for the registration of waste carriers, including brokers and dealers.

1.2.10 Anyone undertaking any of the following activities as part of their business must register as a waste carrier, broker or dealer:

a. Transporting their own waste.

b. Transporting waste for someone else.

c. Buying or selling waste.

d. Acting as a waste broker (arranging for someone to handle waste produced by someone else).

1.2.11 Details of all appointed waste carriers, brokers and contractors must be included in the WMP, including copies of appropriate waste carrier licences/registrations. The register of waste carriers, brokers and dealers can be checked using the Environment Agency's Public Registers (at environment.data.gov.uk/public-register/view/search-waste-carriers-brokers).

Environmental permits and exemptions

1.2.12 The *Environmental Permitting (England and Wales) Regulations 2016* (as amended) (REF 1-6) require sites where waste is processed, treated or disposed of to hold a valid Environmental Permit issued by the EA.

1.2.13 The Regulations also include a schedule of activities that are exempt from the requirements of permitting. However, to comply with these Regulations, an exempt activity must generally be registered with the EA before commencing.

1.2.14 A permit is not usually required where waste is temporarily stored on the site where it is produced prior to management or disposal. Depending upon the types and quantities of waste to be stored, the duration and place of storage and compliance with other defined conditions:

a. A non-waste framework directive exemption may apply, which does not need to be registered.

b. An exemption may need to be registered with the EA.

1.2.15 The PC will be responsible for obtaining the necessary permits and exemptions, where required.

1.3 Details of the Scheme

1.3.1 The PC will complete **Table C-2** below prior to commencement of construction.

Table C-2: Project details

Project title	**A428 Black Cat to Caxton Gibbet improvements**			
Project location	Address			
	Town			
	Postcode			
Client	Name			
	Address			
	Contact		Email	
	Phone		Mobile	
PC	Name			
	Address			

Project title	**A428 Black Cat to Caxton Gibbet improvements**					
	Contact		Email			
	Phone		Mobile			
WMP Drafter	Name					
	Address					
	Contact		Email			
	Phone		Fax			
Construction cost (estimated)						
Site area (gross area)						
Construction programme:						
Start date	Day		Month		Year	
Completion date	Day		Month		Year	
Waste Management Champion						
Person responsible for WMP						
Document Controller/ Secretary						
Location of WMP						

Description of the Scheme

1.3.2 A description of the Scheme activities is presented in Section 1.2 of the First Iteration EMP.

1.4 Management arrangements

Roles and responsibilities

1.4.1 The main contract personnel responsible for producing the WMP are shown in **Table C-3** below. The PC will complete **Table C-3** prior to the commencement of construction.

Table C-3: Responsibilities for producing the WMP

Position	Name	Contact details	WMP responsibility
Main Contract personnel			
The Authority Project Manager			Monitor the PC's performance against the contract including any environmental commitments and targets agreed for the Scheme.
Project Manager (Principal Contractor (PC PM))			Approval of the WMP for the relevant phase of works. Ensure that all controls specified within the WMP are implemented by employees and sub-contractors.
Environment Manager (Principal Contractor PC EM))			Undertake site inspections to monitor compliance with the environmental licences/consents for the works and the measures within the WMP. Ensure that the Scheme complies with all environmental legislation, consents, objectives, targets and other environmental commitments, including those arising from the ES throughout the relevant project phase.
Site Materials and Waste Manager (Principal Contractor)			Prepare the WMP. Implement the WMP throughout the construction of the Scheme and ensure that waste is disposed of legally, economically and safely in line with the WMP and all relevant legislation. Provide appropriate professional and practical advice to contractors, consultants and project team members associated with materials and waste issues.
Sub-contractor details			
Individual Sub-contractor(s), as appointed			Read through, familiarise and understand the requirements of the WMP. Produce waste documentation and a Management Plan. Comply with the requirements set out in the WMP.

Instruction and training

1.4.2 The PC will incorporate the WMP requirements into the site induction and training procedures and must provide on-site instruction of appropriate separation, handling, recycling, reuse and return methods to be used by all parties at all appropriate stages of the Scheme.

1.4.3 The PC must ensure that all personnel working on the site, including sub-contractors, are inducted and appropriately trained.

Key performance indicators (KPIs)

1.4.4 The environmental assessment of the Scheme is based on the Scheme achieving certain performance standards with respect to the use of recycled and secondary aggregates and the recovery of construction and demolition waste.

1.4.5 In order to achieve these performance standards, the PC will adopt the following KPIs for the Scheme and will record the necessary data to confirm compliance with these KPIs:

a. At least 31% (by weight) of aggregates imported to site for use within the Scheme must comprise alternative (reused, recycled or secondary) aggregates, for those applications where it is technically and economically feasible to substitute these alternatives to primary aggregates. Where primary aggregate materials are mandated within DMRB they are excluded from the target.

b. Recovery of at least 70% (by weight) of non-hazardous construction and demolition waste (excluding naturally occurring materials with European Waste Catalogue Code 17 05 04), with the aim to achieve recovery of 90% (by weight).

Best practice measures

1.4.6 To reduce the potential impacts from materials and waste, and to achieve high levels of sustainability in the Scheme as a whole, the PC will apply the principles of the waste hierarchy and adopt best practice measures (BPM) which go beyond statutory compliance.

1.4.7 This may include BPMs set out in construction industry guidance for example, guidance from the CCS, Waste & Resources Action Programme (WRAP) and CIRIA.

1.4.8 The following approaches will be implemented, where practicable, to minimise the quantity of waste arising and requiring disposal:

a. Agreements with material suppliers to reduce the amount of packaging or to participate in a packaging take-back scheme.

b. Implementation of a ‘just-in-time’ material delivery system to avoid materials being stockpiled, which can increase the risk of damage and subsequent disposal as waste.

c. Attention to material quantity requirements to avoid over-ordering and the generation of waste materials due to surplus.

d. Reuse of materials on-site wherever feasible, e.g. reuse of excavated soil for landscaping, recycling of demolition materials into aggregates.

e. Off-site prefabrication, where practical, including the use of prefabricated structural elements.

f. Segregation of waste at source, where practical, to facilitate a high proportion and high-quality recycling.

g. Off-site reuse, recycling and recovery of materials and waste where reuse on-site is not practical, e.g. Through use of an off-site waste segregation or treatment facility or for direct reuse or reprocessing off-site.

1.4.9 The PC will implement the following waste management measures in order to minimise the likelihood of any localised impacts from pollution or nuisance from waste on the surrounding environment:

a. Damping down of surfaces during spells of dry weather and brushing/water spraying of heavily used hard surfaces/access points across the site as required.

b. Burning of waste or unwanted materials will not be permitted on-site.

c. All hazardous materials including fuels, chemicals, cleaning agents, solvents and solvent containing products to be properly sealed in containers at the end of each day prior to storage in appropriately protected and bunded storage areas.

d. All demolition and construction workers will be required to use appropriate personal protective equipment whilst performing activities on-site.

e. Any waste effluent will be tested and, where necessary, disposed of at a correctly licensed facility by a licensed specialist contractor/s.

f. Materials requiring removal from the site will be transported using licensed carriers and records will be kept detailing the types and quantities of waste moved, and the destinations of this waste, in accordance with the relevant regulations.

1.5 Estimate of material use and waste arisings

Introduction

1.5.1 This OWMP provides estimates of:

a. the types and quantities of aggregates required for the construction of the Scheme and the likely reused, recycled and secondary content.

b. The types and quantities of earthworks materials arising during construction of the Scheme and the likely cut and fill balance and material management routes.

c. The types and quantities of waste arising during the Scheme demolition and construction works and the likely management routes and resulting recovery rate.

1.5.2 The PC will review, update and monitor these estimates throughout the design and construction of the Scheme, and incorporate these updates in the final WMP to ensure delivery of the Scheme KPIs (as set out in paragraph 1.4.6).

1.5.3 The PC must ensure that the final WMP is updated to reflect current legal requirements and the waste management practices of the Scheme as necessary, both prior to and during the construction works. The PC must ensure all required authorisations are obtained.

Material use

1.5.4 The main types and quantities of aggregate required for the construction of the Scheme have been estimated by Highways England's appointed buildability advisor for the Scheme. This is shown in **Table C-4** along with the recycled content that may potentially be achievable by adopting good practice approaches.

1.5.5 The PC must ensure that reused, recycled and secondary aggregates imported to site comply with all relevant technical and regulatory requirements.

Table C-4: Estimated main types and quantities of aggregates to be used during the construction of the Scheme and potential alternative aggregate content

Material category	Material subcategory	Quantity required for construction (tonnes)	Quantity to be imported to site (tonnes)	Alternative aggregate content	
				(% by weight) [1]	(tonnes)
Temporary works					
Unbound aggregates	Class 6F2 aggregate	85,000	Site-sourced materials	Site-sourced materials	Site-sourced materials
Permanent works					
Unbound aggregates	Sub-base	710,000	710,000	50	355,000
	Pipe bedding	140,000	140,000	50	70,000
Asphalt	Asphalt	500,000	500,000	25	125,000
Total		1,435,000	1,350,000	40.7	550,000

[1] The estimated alternative aggregate content for each material is based on the "good practice" recycled content rates from the Waste & Resources Action Programme's *Designing Out Waste Tool for Civil Engineering* (REF 1-7). The total alternative aggregate content is calculated as a percentage by weight.

Excavated materials

1.5.6 The main types and quantities of excavated materials expected to be generated during construction of the Scheme have been estimated by Highways England's appointed buildability advisor for the Scheme. The estimates are based on the Scheme design and mass haul and includes the estimated cut and fill including material sourced from engineering earthworks (for example those associated with junctions and the new dual carriageway), and from borrow pits. This is shown in **Table C-5** along with the expected cut and fill balance.

1.5.7 An additional 1 million cubic metres of topsoil and subsoil materials will be stripped and stored on-site in the designated soil storage areas, prior to reuse in the Scheme's landscaping and reinstatement works.

1.5.8 It is anticipated that the use of excavated materials within the Scheme will be undertaken in accordance with a Materials Management Plan (MMP) prepared under the CL:AiRE *Definition of Waste: Code of Practice* (REF 1-8) and these materials will not be classified as waste.

1.5.9 The PC will be responsible for the management of any surplus excavated materials and must apply the waste hierarchy in determining the most suitable options.

Table C-5: Estimated main types and quantities of excavated materials arising and used during the construction of the Scheme

Excavated material	Source		Description
	Engineering earthworks	Borrow pits	
Cut required (million m^3)	2.50	-	Cut required to construct the Scheme.
Cut material suitable for use as engineering fill (million m^3)	2.00	0.52	Cut material used to meet engineering fill requirements.
Cut material unsuitable for use as engineering fill (million m^3)	0.50	0.13	'Cut material unsuitable for use as engineering fill', used for borrow pit restoration (where suitable).
Engineering fill required (million m^3)	2.52		Requirement met from 'cut material suitable for use as engineering fill' from engineering earthworks and borrow pits.

Waste

1.5.10 The main types and quantities of waste expected to arise during the demolition works and construction of the Scheme have been estimated by Highways England's appointed buildability advisor for the Scheme. **Table C-6** shows estimated demolition waste arisings and **Table C-7** shows estimated construction waste arisings. **Table C-6** and **Table C-7** also identify potential recovery rates that may be achievable by adopting good practice approaches.

1.5.11 Construction site operations will also generate waste streams from offices, welfare facilities, material packaging and construction plant maintenance. The quantities are anticipated to be small compared to the main demolition and construction wastes summarised in **Table C-6** and **Table C-7**. Estimated types and quantities of construction site operational wastes and procedures for the storage and management of these wastes will be set out in the Second Iteration EMP.

1.5.12 The PC will be responsible for the management of waste and must apply the waste hierarchy in determining the most suitable options.

1.5.13 Where waste is reused, recycled or recovered for use within the Scheme, the PC must ensure compliance with all relevant technical and regulatory requirements.

Table C-6: Estimated main types and quantities of demolition waste arising during the construction of the Scheme including potential management routes and recovery rates

Waste	Density (tonnes/m^3)	Waste arising (tonnes)	Reuse / recycle / recover on-site		Reuse / recycle / recover off-site		Disposal to landfill off-site	
			(%)	(tonnes)	(%)	(tonnes)	(%)	(tonnes)
Non-hazardous wastes								
Subgrade (unbound aggregate)	2.3	106,901	80%	85,521	20%	21,173	0%	207
Asphalt planings	2.3	81,223	43%	34,741	39%	31,759	18%	14,723
Concrete	2.4	9,708	83%	8,044	16%	1,534	1%	130
Bricks / blocks	2.3	984	80%	787	20%	197	0%	0
Metal	7.85	407	0%	0	100%	407	0%	0
Soft strip (mixed waste)	1.5	660	4%	24	88%	578	9%	58
Total non-hazardous waste		**199,883 (86,758m^3)**	**65%**	**129,117 (55,998m^3)**	**28%**	**55,648 (24,176m^3)**	**8%**	**15,118 (6,584m^3)**
Hazardous wastes								
Materials containing coal tar	2.3	1,311	50%	655	30%	393	20%	262
Total hazardous waste		**1,311 (570m^3)**	**50%**	**655 (285m^3)**	**30%**	**393 (171m^3)**	**20%**	**262 (114m^3)**

Table C-7: Estimated main types and quantities of construction waste arising during the construction of the Scheme including potential management routes and recovery rates

Construction material	Waste type	Density (tonnes/m^3)	Quantity of construction material required (tonnes)	Wastage rate (%)	Waste arising (tonnes)	Reuse / recycle / recover on-site		Reuse / recycle / recover off-site		Disposal to landfill off-site (2)	
						(%)	(tonnes)	(%)	(tonnes)	(%)	(tonnes)
Temporary works materials (1)											
Class 6F2 aggregate (for piling platforms) (1)	Aggregate	2.3	85,000	5.0%	89,250	80%	71,400	20%	17,850	0%	0
Formwork (1)	Formwork	0.8	500	2.0%	510	0%	0	100%	510	0%	0
Permanent works materials											
Sub-base	Aggregate	2.3	710,000	5.0%	35,500	100%	35,500	0%	0	0%	0
Pipe bedding	Aggregate	2.3	140,000	15.0%	21,000	80%	16,800	20%	4,200	0%	0
Asphalt	Asphalt	2.3	500,000	5.0%	25,000	50%	12,500	50%	12,500	0%	0
Concrete for piles	Concrete	2.4	76,000	5.0%	3,800	95%	3,610	5%	190	0%	0
Concrete for structures	Concrete	2.4	61,000	5.0%	3,050	95%	2,898	5%	153	0%	0
Concrete for V-channel	Concrete	2.4	67,000	5.0%	3,350	95%	3,183	5%	168	0%	0

Construction material	Waste type	Density (tonnes/m^3)	Quantity of construction material required (tonnes)	Wastage rate (%)	Waste arising (tonnes)	Reuse / recycle / recover on-site		Reuse / recycle / recover off-site		Disposal to landfill off-site (2)	
						(%)	(tonnes)	(%)	(tonnes)	(%)	(tonnes)
Concrete for RCB	Concrete	2.4	35,000	5.0%	1,750	95%	1,663	5%	88	0%	0
Kerbs	Concrete	2.4	1,000	2.0%	20	95%	19	5%	1	0%	0
Drainage pipes	Concrete	2.4	15,000	2.0%	300	95%	285	5%	15	0%	0
Manhole rings	Concrete	2.4	500	2.0%	10	95%	10	5%	1	0%	0
Steel for structures	Metal	7.85	6,500	2.5%	163	0%	0	100%	163	0%	0
Geotextile	Geotextile	0.5	100	15.0%	15	80%	12	20%	3	0%	0
Total			1,697,600 (732,024m^3)		183,718 (80,044m^3)	80%	147,878 (64,102m^3)	20%	35,840 (15,942m^3)	0%	0 (0m^3)

(1) Material required for temporary works is assumed to require management after use.

(2) Some disposal to landfill may be required.

1.6 Design decisions

1.6.1 Decisions made at the detailed design stage of the Scheme will impact on the quantity and types of materials used, the quantity and types of waste arising and the management of materials and waste.

1.6.2 The Scheme design development will apply the principles of Designing out Waste (DoW) as set out in *Design Manual for Roads and Bridges (DMRB) LA 110 Material assets and waste* (REF 1-9). The DoW principles include:

a. Design for reuse and recovery.

b. Design for off-site construction.

c. Design for materials optimisation.

d. Design for waste efficient procurement.

e. Design for deconstruction and flexibility.

1.6.3 DoW opportunities will be captured in the Designing out Waste opportunities log (Annex 1: Designing Out Waste opportunities log). The log must be regularly updated with the outcomes of investigation of each opportunity and any new opportunities that are identified.

1.6.4 In general, the following measures will be implemented during the design and construction phases of the Scheme, where technically, economically and environmentally practicable:

a. Manage waste in accordance with the waste hierarchy.

b. Design-out and prevent waste arising.

c. Reuse excavated earthworks materials within the Scheme.

d. Recycle demolition materials arising from Scheme within the construction of the Scheme.

e. Divert waste from landfill through off-site recycling and recovery.

f. Use recycled and secondary aggregates in the construction of the Scheme.

1.6.5 Prior to construction, the PC must record, in the final WMP (**Table C-8**) all actions to be implemented to reduce waste or material use on the Scheme, and the resulting benefits. Embedded measures considered in the preliminary design in relation to waste are included in **Chapter 2, The Scheme** of the Environmental Statement **[TR010044/APP/6.1]**. **Table C-8** below will be populated by the PC in the detailed design of the Scheme.

Table C-8: Waste prevention actions

Material / waste	Estimated reduction in waste arising		Approach by which reduction achieved	Will additional planning permissions / authorisations be required?	Estimated cost saving (£)	Persons responsible for completing action
	tonnes	m^3				

1.7 Materials and waste management on-site

Waste management routes

1.7.1 The waste hierarchy sets out the priority order that should be considered when managing wastes. A basic representation of the waste hierarchy is provided below in **Plate 1** and the PC will use the hierarchy as a guide to encourage the prevention of waste and to define waste management options.

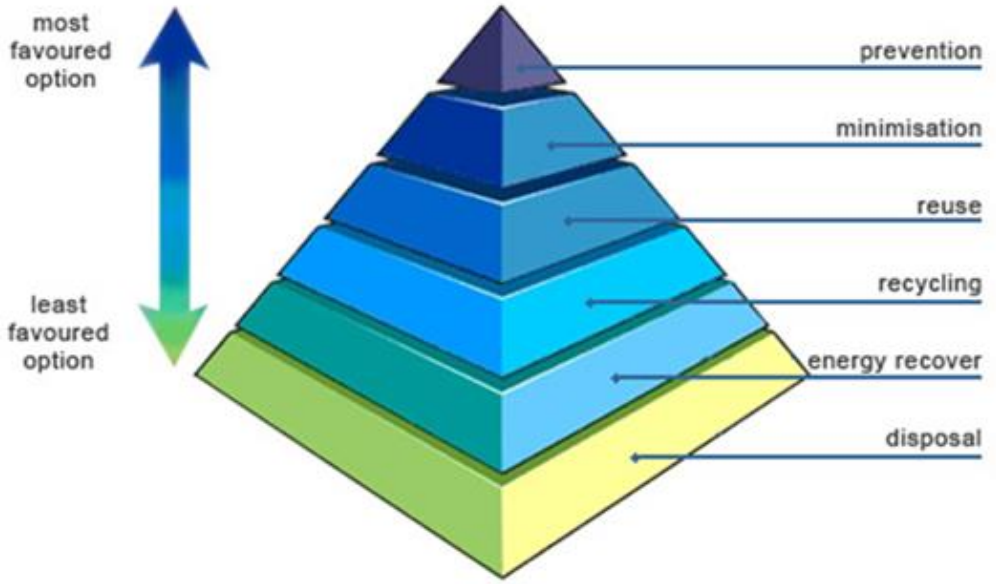


Plate 1: Waste hierarchy

1.7.2 When considering waste management options for the Scheme, the PC will take account of the site's location, natural environment and available infrastructure. The PC will consider the following options when determining the preferred waste management option for each waste stream.

Preparing for reuse

1.7.3 The aim is to provide design features on the Scheme to use materials in their current state and form. Reuse can be undertaken either on-site or off-site.

1.7.4 Where possible, excavated earthworks materials and soils arising from the Scheme will be stockpiled on-site and reused within the Scheme.

Recycling

1.7.5 The aim is to reuse materials won on-site by recycling them into an alternative form that can be used for construction purposes (for example crushing concrete, brick or other inert wastes to produce aggregate material). By recycling on-site, as far as practicable, the quantity of waste requiring off-site management is reduced and carbon emissions associated with transportation are eliminated.

1.7.6 Recycling may also be achieved by utilising materials with a recycled content, such as recycled aggregates produced off-site.

Recovery

1.7.7 This generally aims to recover energy from waste which cannot otherwise be reused or recycled. This may include waste materials such as hazardous liquids or solids that can be sent to energy from waste facilities.

1.7.8 Recovery may also include the beneficial use of materials on land for restoration (deposit for recovery).

Disposal

1.7.9 The least preferred option in the waste hierarchy is a final disposal route such as landfill. Some waste streams will inevitably end up with such a solution.

1.7.10 When placing waste disposal contracts, the PC will consider the implications of long distance travel in terms of health and safety risk, commercial terms and increased emissions from vehicles.

1.7.11 The PC will ensure the pre-treatment of all hazardous and non-hazardous wastes prior to disposal to landfill. The methods of pre-treatment will enable the waste to meet the ‘three-point test’:

a. It must be a physical, thermal, chemical or biological process including sorting.

b. It must change the characteristics of the waste.

c. It must do so in order to:

   i. Reduce its volume

   ii. Reduce its hazardous nature

   iii. Facilitate its handling

   iv. Enhance its recovery

1.7.12 Source segregation can be seen as a pre-treatment option and as such can be applied to waste generation on-site including general waste and arisings, and will take place on the Scheme.

1.7.13 The PC will ensure that a declaration stating the pre-treatment method applied to the waste is appended to any WTN for non-hazardous waste being sent for disposal.

Materials and waste storage and segregation options

1.7.14 The PC must store excavated soils and earthworks materials on-site in stockpiles until required for use.

1.7.15 Demolition materials that are to be recycled for use on-site must be separated at source and stored separately both before and after the treatment process.

1.7.16 Construction materials that are stored on-site must be in designated areas that are flat, accessible and secure in order to avoid damage or loss. Materials must be stored in appropriate conditions to avoid damage through, for example, water ingress or vermin. Materials must be retained in their original packaging to protect them from damage.

1.7.17 The PC must ensure that the construction site compounds incorporate designated waste storage areas for skips or similar suitable waste receptacles. The PC must ensure that these areas are surfaced with an impermeable barrier, such as hardstanding/tarmac or using impermeable membranes and the location of any existing drainage will be noted.

1.7.18 At the waste storage areas, the PC must segregate waste into the following types as a minimum: inert; wood; metals; packaging; general waste; hazardous solid wastes; hazardous liquid wastes.

1.7.19 The PC will implement the following waste management procedures:

a. All waste containers must be secure and ensure that no waste is allowed to escape.

b. All waste containers must be clearly labelled using a colour coding system so that users know what wastes can be placed in each container. Waste containers must be appropriately colour coded using generic colour codes as shown below:

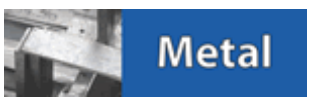
Grey: Inert

Green: Wood

Black: Mixed

Brown: Packaging

Blue: Metal



Orange: Hazardous

White: Gypsum 

c. Lockable storage will be provided for all hazardous waste.

d. All waste containers must be sited at least 10m away from watercourses, ditches and other areas of environmental sensitivity.

e. Liquid wastes must be stored in enclosed/lidded containers and stored within a suitable bunded area, or otherwise provided with secondary containment.

f. Separate containers must be provided for each type of hazardous waste.

g. Each type of hazardous waste must not be mixed with any other hazardous or non-hazardous waste.

h. Sewage from the site offices/compounds will drain to septic tank and be collected by a suitable specialist waste contractor.

i. Portable toilet facilities on-site (portaloos etc.) must be emptied by the facility provider as per their service agreement.

Waste carriers and facilities

1.7.20 The PC will manage all waste generated on the Scheme in accordance with legal requirements. The PC must record details of the proposed waste carrier for each waste stream in the registration table (Annex 2: Waste carriers), with Waste Carriers Licence details appended to the final WMP.

1.7.21 The PC will ensure that the following information is recorded for all waste facilities used:

a. Contractors name.

b. Date(s) of waste removal.

c. Type(s) of waste removed (i.e. Non-hazardous waste, hazardous waste, inert (specify).

d. Method of treatment, recovery or disposal (i.e. Reuse, recycling, incineration, landfill etc.).

e. Volume or weight of waste removed.

f. Recovery rate achieved.

g. Costs associated with waste removal, transport and treatment, including Landfill Tax charges where applicable.

Waste documentation

Waste Transfer Notes (WTN)

1.7.22 The PC must ensure that all movements of waste from site are accompanied by a WTN, which will detail specific information. The PC's Site Materials and Waste Manager or other competent person will check that each WTN contains the following:

a. The name of the person receiving the waste and what they are authorised to do with that waste as a Registered Waste Carrier can only transport waste.

b. Type of waste.

c. The Standard Industrial Classification (SIC) code.

d. The six-digit EWC code.

e. Address of the producing site and details of the waste producer.

f. Waste carrier's details including registration number.

g. Quantity of waste.

h. How it is contained (e.g. 8 cubic yard skip).

i. Address of the receiving site (e.g. Landfill) and the Environmental Permit or Exemption No. Associated with the receiving site.

j. The date to which the WTN applies.

k. If the material is non-hazardous waste and it is destined for disposal directly to landfill, pre-treatment must have been applied and a declaration detailing the treatment applied appended to the WTN.

l. A declaration that the waste has been treated in line with the requirements of the waste hierarchy.

1.7.23 The site representative signing the WTN must ensure all WTNs are placed in the Site Waste Management File and kept for a minimum period of two years (for non-hazardous waste).

1.7.24 By signing a WTN the site representative is confirming that all the details are correct and that the material is to be sent by a licensed waste carrier to a suitably licensed receiving site, permitted to receive that type of waste. The signature is binding of this fact and completes the WTN as a legal document.

1.7.25 The Site Materials and Waste Manager or other competent person signing the WTN must additionally ensure that the Waste Carrier is using a suitable vehicle with adequate, covered containment for the waste.

Waste Consignment Notes (hazardous waste)

1.7.26 The PC must ensure that a Hazardous Waste Consignment Note (HWCN) is completed for every movement of hazardous waste. The HWCN must be prepared before the waste is moved. Prior to signing, the Site Materials and Waste Manager or another competent person must ensure that the HWCN includes:

a. Hazardous Waste Premises Code.

b. Consignment note code.

c. SIC Code.

d. Name and address of the site from which the waste is being moved.

e. Date of removal.

f. Type of waste produced, including the quantity and the EWC code.

g. The name of the person who is receiving the waste and what they are authorised to do with that waste e.g. Registered waste carrier can only transport waste.

h. The final disposal site that is authorised to accept the waste;

i. Retention period for hazardous waste.

1.7.27 The PC must retain a copy of the Waste Consignment Note for a minimum of three years.

Waste documentation

1.7.28 The PC must retain all waste documentation at the main site compound and, following completion of the Scheme, at the PC's head office. This includes:

a. The final WMP (two years after end of construction of the Scheme).

b. Waste transfer documentation (two years for WTNs and three years for HWCNs);

c. Copies of any exemptions or permits.

d. Copies of waste carrier and treatment/disposal site licences or permits.

Fly-tipping

1.7.29 Fly-tipping of waste on or adjacent to ongoing construction projects can be a significant issue.

1.7.30 A site assessment of pre-existing fly tipping hotspots must be undertaken and, where appropriate, security measures to prevent access to such areas will be implemented.

1.7.31 If waste is fly-tipped on the site, the PC will have a duty of care to ensure it is dealt with safely and disposed of correctly, even though not the producer of the waste. The PC must report any instance of fly-tipping to the relevant authorities.

Fuels, oils and Control of Substances Hazardous to Health (COSHH) materials

1.7.32 The PC must establish appropriate control and management measures for the storage, dispensing, containment and use of all fuels, oils and COSHH materials and wastes that will be required during construction of the Scheme.

1.7.33 The storage, dispensing, containment and use of fuels, oils and COSHH materials have the potential to cause significant damage to the environment. Causes of environmental incidents linked to fuel, oil and COSHH materials on construction sites include:

a. Delivery and use of materials.

b. Overfilling of storage containers.

c. Plant or equipment failure.

d. Containment failure.

e. Accidents and vandalism.

f. Mixing of inappropriate materials and wastes.

1.7.34 Environmental incidents could affect:

a. Drainage systems, surface waters, groundwater and soil.

b. Air quality, by producing fumes, vapours and airborne pollutants.

c. Land quality by contamination through spillages.

1.7.35 The storage, dispensing, containment and use of all fuels, oils and COSHH materials and wastes shall be undertaken in accordance with regulatory and good practice guidance.

1.7.36 For COSHH materials and waste, relevant control and management measures may include:

a. Storage must be in a secure, bunded and sheltered area.

b. Waste must be segregated.

c. COSHH liquids must not be stored in areas within Flood Zone 3.

d. Areas must be supervised, and records of materials and waste stored and removed from the area recorded.

e. The handling, storage and disposal must be undertaken as described in the COSHH Assessment and any Material Safety Data Sheet (MSDS).

1.7.37 Fuel and oil (including mould oil) shall be stored in accordance with The Control of Pollution (Oil Storage) (England) Regulations 2001, with fuels and oil handled in such a way that risk of pollution is minimised. Specifically:

a. Fuel and oil storage tanks must comply with *The Control of Pollution (Oil Storage) (England) Regulations 2001* (REF 1-10) and must be locked outside working hours.

b. Storage areas must not be located within 20 metres of watercourses, ponds, site drainage or within any areas of Flood Zone 3 or on a gradient.

c. Refuelling must not be permitted within 20 metres of a watercourse/pond, within 20 metres of a highway drainage gully/site drainage, or within areas of Flood Zone 3.

d. Mobile bowsers must be bunded/double skinned and must comply with *The Control of Pollution (Oil Storage) (England) Regulations* (REF 1-10) and must be secured outside working hours.

e. Trained operatives must carry out refuelling of plant and equipment.

f. Plant nappies must be used during refuelling.

g. Drums must be stored in bunded areas with a minimum capacity of 25% of the total volume contained within the bund, or 110% of the largest container, whichever is the greater. Where possible, these bunds must be fitted with roofs to prevent the collection of rainwater. Individual drums in use shall be stored on a drip tray sufficient to contain 25% of the full capacity of the drum.

h. Storage tanks and drums must be maintained in a good condition, fitted with lids and labelled to indicate the contents.

i. Static combustion engine plant (e.g. compressors, lighting sets) must be integrally bunded or placed on plant nappies.

j. Bunds, tanks pipework and plant must be regularly checked for signs of damage or leaks and must be regularly maintained.

k. Spill kits must be provided within close proximity to fuel and oil storage areas, with plant that is operating in isolated areas, and in welfare facilities. Drivers, operators and stores personnel will be trained in security and the use and safe disposal of spill kits.

l. Drums must be stored in bunded areas with a minimum capacity of 25% of the total volume contained within the bund, or 110% of the largest container, whichever is the greater. Where possible, these bunds will be fitted with roofs to prevent the collection of rainwater. Individual drums in use must be stored on a drip tray sufficient to contain 25% of the full capacity of the drum.

1.8 Key responsibilities

Reporting and auditing

1.8.1 The effectiveness of the final WMP will depend upon the enforcement of its requirements on-site by the nominated Site Materials and Waste Manager and Site Manager. Responsibility for the formal recording of waste movements lies with the Site Materials and Waste Manager or PM.

1.8.2 The PC must maintain a record of all materials that come on to site. The quantity of reused, recycled and secondary aggregate must be recorded, alongside details of the supplier, the producing facility and records that demonstrate that the material meets all relevant technical and regulatory requirements (Annex 3: Aggregates imported to site).

1.8.3 The PC must maintain a record of all wastes that are removed from the site and their management route. Each waste management contractor must provide details of the types and quantities of waste removed from the site, the receiving waste management facility and the associated recycling, recovery and disposal rates for each waste stream (Annex 4: Waste management).

1.8.4 The PC must monitor and record details of the wastes placed in all waste receptacles to ensure that contamination has not occurred.

1.8.5 The PC must continually review the types of surplus materials and waste being produced and change the site set up to minimise wastage rates and maximise reuse or recycling.

1.8.6 The Authority or its representatives may carry out 'spot checks' in relation to the completeness of any WTNs and any HWCNs.

Review of the final Waste Management Plan

1.8.7 The PC must review the final WMP at least once every six months during the lifetime of the Scheme to ensure that KPI targets are being achieved and that realistic solutions are provided for unplanned events or abnormal wastes. The PC must also review the final WMP if there is any significant change in the Scheme. These reviews will involve the completion and submission of a monitoring report to The Authority (or its representative) in an agreed format.

Additional duty of care checks

1.8.8 The PC must periodically, at intervals to be determined, follow waste loads to confirm that the waste has been transferred to the place stated on the WTN, with any irregularities investigated immediately, and reported as an environmental incident. Action may involve termination of contract and/or notification to the EA.

Site inspections

1.8.9 The Site Manager or nominated deputy must undertake a daily inspection of the construction areas including all areas used for waste management. Any issues shall be recorded in the daily log along with any corrective action taken.

Closure reporting

1.8.10 Within three months of the completion of works under a contract, the PC must submit a Waste Management Closure Report to The Authority (or its representative) to demonstrate the effective implementation, management and monitoring of construction materials and waste during the construction lifetime of the Scheme.

Annex 1: Designing out waste opportunities log

The Designing Out Waste (DoW) opportunities log is a live document. It should be reviewed and updated at each Project Control Framework (PCF) Stage with the outcomes of investigations into the identified opportunities and any new opportunities that are identified.

DoW workshops were undertaken:

a. At PCF Stage 3 (on 05/11/2019), with representatives from AECOM design team, AECOM Environment team, Skanska, Mott MacDonald.

Step 1: Identify						Step 2: Investigate		Step 3: Implement	
No.	**Designing out Waste (DoW) principle**	**Opportunity**	**Activities**	**Opportunity status**	**Opportunity owner**	**PCF stage(s) to undertake further investigation**	**Outcome of further investigation**	**Opportunity to be taken forward to implementation (yes/no)**	**Recorded in Waste Management Plan (yes/no)**
1	1. Design for reuse and recovery	Designing the Scheme in a manner that facilitates the reuse of acceptable material arising from earthworks cuttings and other excavations.	Initial ground investigation undertaken to understand ground conditions and the potential for reuse of earthworks materials. Earthworks mass balance and earthworks strategy development	Open	designer / contractor	5 / 6			

Step 1: Identify						Step 2: Investigate		Step 3: Implement	
No.	Designing out Waste (DoW) principle	Opportunity	Activities	Opportunity status	Opportunity owner	PCF stage(s) to undertake further investigation	Outcome of further investigation	Opportunity to be taken forward to implementation (yes/no)	Recorded in Waste Management Plan (yes/no)
			have informed the design. Construction programme and mass haul have been developed to facilitate the reuse of earthworks materials.						
2	1. Design for reuse and recovery	Identify whether treatment of earthworks materials that are unsuitable for reuse (as dug) could enable their reuse on-site.	Opportunities for further investigation during detailed design could include further identification of soil treatment options and their suitability for particular applications within the	Open	designer / contractor	5 / 6			

Step 1: Identify						Step 2: Investigate		Step 3: Implement	
No.	**Designing out Waste (DoW) principle**	**Opportunity**	**Activities**	**Opportunity status**	**Opportunity owner**	**PCF stage(s) to undertake further investigation**	**Outcome of further investigation**	**Opportunity to be taken forward to implementation (yes/no)**	**Recorded in Waste Management Plan (yes/no)**
			construction of the Scheme.						
3	1. Design for reuse and recovery	The inclusion of land within the Order Limits for the temporary on-site storage of soils, excavated materials and other materials.	The design includes planned areas for the storage of soils, excavated materials and other materials on-site to enable reuse within the construction of the Scheme. Sufficient land area has been set out to accommodate expected material quantities.	Open	designer / contractor	4 / 5 / 6			

Step 1: Identify						Step 2: Investigate		Step 3: Implement	
No.	Designing out Waste (DoW) principle	Opportunity	Activities	Opportunity status	Opportunity owner	PCF stage(s) to undertake further investigation	Outcome of further investigation	Opportunity to be taken forward to implementation (yes/no)	Recorded in Waste Management Plan (yes/no)
4	1. Design for reuse and recovery	The appropriate sizing of construction compounds to enable the segregation and storage of waste, and to facilitate off-site recovery.	The design includes construction compound layouts that ensure sufficient space for waste segregation and storage.	Open	contractor	5 / 6			
5	1. Design for reuse and recovery	Recycling of suitable demolition and construction waste for use within the construction of the Scheme.	The majority of the demolition works relate to removal or amendment to the existing highway infrastructure. Limited buildings demolitions will be required. Initial estimates of	Open	designer / contractor	5 / 6			

Step 1: Identify						Step 2: Investigate		Step 3: Implement	
No.	Designing out Waste (DoW) principle	Opportunity	Activities	Opportunity status	Opportunity owner	PCF stage(s) to undertake further investigation	Outcome of further investigation	Opportunity to be taken forward to implementation (yes/no)	Recorded in Waste Management Plan (yes/no)
			demolition and construction waste types and quantities have been undertaken. Initial considerations of the potential for recycling for use within the construction of the Scheme. Consideration of construction programme.						
6	1. Design for reuse and recovery	Optioneering for whether the existing Roxton Road bridge could be retained.	The existing Roxton Road bridge is the only highway bridge being demolished as part of the Scheme. The structure is	Closed (not feasible)	n/a	n/a			

Step 1: Identify						Step 2: Investigate		Step 3: Implement	
No.	Designing out Waste (DoW) principle	Opportunity	Activities	Opportunity status	Opportunity owner	PCF stage(s) to undertake further investigation	Outcome of further investigation	Opportunity to be taken forward to implementation (yes/no)	Recorded in Waste Management Plan (yes/no)
			less than 15 years old and is in good condition. Optioneering initially considered retaining the structure, or part of it. However, there were a number of reasons that this was concluded as not feasible including that it did not suit the highway alignment and that the cost and effort required to widen and lengthen the structure and put the						

Step 1: Identify						Step 2: Investigate		Step 3: Implement	
No.	**Designing out Waste (DoW) principle**	**Opportunity**	**Activities**	**Opportunity status**	**Opportunity owner**	**PCF stage(s) to undertake further investigation**	**Outcome of further investigation**	**Opportunity to be taken forward to implementation (yes/no)**	**Recorded in Waste Management Plan (yes/no)**
			supports in different positions would have been prohibitive.						
7	1. Design for reuse and recovery	Identify the potential for the reuse, recycling or recovery of components from the Roxton Road bridge demolition.	Opportunities for further investigation during detailed design could include: - recycling of structural concrete into fill material - reuse of weathering steel girders in temporary works - unbolt bridge parapets for use on new structures,	Open	designer / contractor	5 / 6			

Step 1: Identify						Step 2: Investigate		Step 3: Implement	
No.	Designing out Waste (DoW) principle	Opportunity	Activities	Opportunity status	Opportunity owner	PCF stage(s) to undertake further investigation	Outcome of further investigation	Opportunity to be taken forward to implementation (yes/no)	Recorded in Waste Management Plan (yes/no)
			subject to condition, suitability and safety requirements.						
8	2. Design for off-site construction	The optimisation of bridge, underpass and culvert designs through the incorporation of precast concrete elements to reduce on-site waste arisings.	The bridge design options mainly include for the use of precast concrete for the main bridge elements. Precast concrete is also proposed for the culverts, where segmental precast concrete units of the same dimensions are produced and	Open	client / designer / contractor	5 / 6			

Step 1: Identify						Step 2: Investigate		Step 3: Implement	
No.	Designing out Waste (DoW) principle	Opportunity	Activities	Opportunity status	Opportunity owner	PCF stage(s) to undertake further investigation	Outcome of further investigation	Opportunity to be taken forward to implementation (yes/no)	Recorded in Waste Management Plan (yes/no)
			then installed on-site, as an assembly process. Opportunity for further investigation of whether precast concrete could be used for the Rigid Concrete Barrier (RCB) and whether there would be associated benefits.						
9	2. Design for off-site construction	Optioneering investigated the feasibility of precasting the concrete base / foundation plinths of the cantilever gantries.	This investigation concluded that it would not be feasible due to the size and weight of the elements and	Closed (not feasible)	n/a	n/a			

Step 1: Identify						Step 2: Investigate		Step 3: Implement	
No.	**Designing out Waste (DoW) principle**	**Opportunity**	**Activities**	**Opportunity status**	**Opportunity owner**	**PCF stage(s) to undertake further investigation**	**Outcome of further investigation**	**Opportunity to be taken forward to implementation (yes/no)**	**Recorded in Waste Management Plan (yes/no)**
			also the complexity of the rebar detailing and bonding.						
10	3. Design for materials optimisation	Achieving an earthworks balance (cut and fill material) within the design of the Scheme, where possible, to minimise the need to import and export material.	Earthworks cut and fill quantities have been considered early in the design. Options for meeting the potential deficit in earthworks materials have been investigated. Consideration has been given to the proportion of excavated materials that	Open	designer / contractor	5 / 6			

Step 1: Identify						Step 2: Investigate		Step 3: Implement	
No.	Designing out Waste (DoW) principle	Opportunity	Activities	Opportunity status	Opportunity owner	PCF stage(s) to undertake further investigation	Outcome of further investigation	Opportunity to be taken forward to implementation (yes/no)	Recorded in Waste Management Plan (yes/no)
			are unlikely to be suitable for reuse. Borrow pits have been included in the design to enable the earthworks cut and fill balance to be achieved within the Scheme. Proposing the use of the CL:AiRE Definition of Waste Industry Code of Practice to enable the reuse of materials on-site.						

Step 1: Identify						Step 2: Investigate		Step 3: Implement	
No.	**Designing out Waste (DoW) principle**	**Opportunity**	**Activities**	**Opportunity status**	**Opportunity owner**	**PCF stage(s) to undertake further investigation**	**Outcome of further investigation**	**Opportunity to be taken forward to implementation (yes/no)**	**Recorded in Waste Management Plan (yes/no)**
11	3. Design for materials optimisation	The inclusion of borrow pits within the Order Limits to obtain materials local to the Scheme and minimise the need to import and export material.	The main deficit of earthworks materials were determined as being at the two geographical ends of the Scheme at Black Cat junction and Caxton Gibbet junction. Borrow pits have been included within the Order Limits adjacent to Black Cat junction and Caxton Gibbet junction in proximity to where the additional	Open	client / designer / contractor	4 / 5 / 6			

Step 1: Identify						Step 2: Investigate		Step 3: Implement	
No.	Designing out Waste (DoW) principle	Opportunity	Activities	Opportunity status	Opportunity owner	PCF stage(s) to undertake further investigation	Outcome of further investigation	Opportunity to be taken forward to implementation (yes/no)	Recorded in Waste Management Plan (yes/no)
			earthworks materials will be required. Siting of the proposed borrow pits has taken account of known and emerging environmental constraints.						
12	3. Design for materials optimisation	The retention of existing highways infrastructure within the Scheme design where feasible, to minimise the need for the demolition of components and infrastructure and the associated generation of waste material.	The design largely retains the existing A428 as a local road. Where existing side roads are being realigned onto bridges over the new dual carriageway, the design proposes to	Open	client / designer / contractor	5 / 6			

Step 1: Identify						Step 2: Investigate		Step 3: Implement	
No.	Designing out Waste (DoW) principle	Opportunity	Activities	Opportunity status	Opportunity owner	PCF stage(s) to undertake further investigation	Outcome of further investigation	Opportunity to be taken forward to implementation (yes/no)	Recorded in Waste Management Plan (yes/no)
			retain sections of these existing side roads to be used for the required emergency access routes. This approach reduces the need for demolition of the existing pavement and the construction of new pavement.						
13	3. Design for materials optimisation	The optimisation of the design of Black Cat junction to reduce the height of retaining walls and pile lengths and their associated	The preliminary design includes the optimisation of the design at Black Cat junction to reduce the	Open	designer / contractor	5 / 6			

Step 1: Identify						Step 2: Investigate		Step 3: Implement	
No.	Designing out Waste (DoW) principle	Opportunity	Activities	Opportunity status	Opportunity owner	PCF stage(s) to undertake further investigation	Outcome of further investigation	Opportunity to be taken forward to implementation (yes/no)	Recorded in Waste Management Plan (yes/no)
		material requirements.	height of the retaining walls and pile lengths and their associated material requirements.						
14	3. Design for materials optimisation	Importing alternative (recycled and secondary) aggregate materials during construction, where practicable.	A target for the proportion of alternative (reused, recycled or secondary) aggregates imported to site for use within the Scheme is a requirement of DMRB LA 110 Material assets and waste. For the East of England region the target is	Open	client / designer / contractor	4 / 5 / 6 / 7			

Step 1: Identify						Step 2: Investigate		Step 3: Implement	
No.	Designing out Waste (DoW) principle	Opportunity	Activities	Opportunity status	Opportunity owner	PCF stage(s) to undertake further investigation	Outcome of further investigation	Opportunity to be taken forward to implementation (yes/no)	Recorded in Waste Management Plan (yes/no)
			31% (by weight), for those applications where it is technically and economically feasible to substitute alternatives to primary aggregates. Where primary aggregate materials are mandated within DMRB they are excluded from the target.						
15	3. Design for materials optimisation	Identify the potential for the use of soil stabilisation techniques and geosystems to	Opportunities for further investigation at detailed design stage include:	Open	designer / contractor	5 / 6			

Step 1: Identify						Step 2: Investigate		Step 3: Implement	
No.	Designing out Waste (DoW) principle	Opportunity	Activities	Opportunity status	Opportunity owner	PCF stage(s) to undertake further investigation	Outcome of further investigation	Opportunity to be taken forward to implementation (yes/no)	Recorded in Waste Management Plan (yes/no)
		reduce the quantity and/or quality of the material that can be used.	- the use of soil stabilisation techniques for haul roads and compounds. - the use of soil stabilisation techniques to reduce the thickness of pavement layers (depending on design standards and specifications) - use of geosystems to enable steepened embankments where physical constraints exist						

Step 1: Identify						Step 2: Investigate		Step 3: Implement	
No.	Designing out Waste (DoW) principle	Opportunity	Activities	Opportunity status	Opportunity owner	PCF stage(s) to undertake further investigation	Outcome of further investigation	Opportunity to be taken forward to implementation (yes/no)	Recorded in Waste Management Plan (yes/no)
16	3. Design for materials optimisation	Identify the potential for the standardisation of minor retaining wall structures within the Scheme.	Opportunity for further investigation at the detailed design, although the Scheme only has limited requirements for minor retaining wall structures and therefore this opportunity may not be beneficial.	Open	designer / contractor	5 / 6			
17	3. Design for materials optimisation	The bridge options have been designed as integral bridges that do not require bridge bearings or deck joints that traditionally require	Preliminary design proposes integral bridges, which eliminate maintenance requirements and have a	Open	client / designer / contractor	5 / 6			

Step 1: Identify						Step 2: Investigate		Step 3: Implement	
No.	Designing out Waste (DoW) principle	Opportunity	Activities	Opportunity status	Opportunity owner	PCF stage(s) to undertake further investigation	Outcome of further investigation	Opportunity to be taken forward to implementation (yes/no)	Recorded in Waste Management Plan (yes/no)
		replacement during the lifetime of the structure.	simplified design. Opportunity for further investigation at detailed design to minimise bridge maintenance requirements.						
18	4. Design for waste efficient procurement	Maximise recovery of demolition and construction wastes.	A target for the recovery of non-hazardous demolition and construction waste (excluding naturally occurring materials with European Waste Catalogue Code 17 05 04) is a	Open	client / designer / contractor	4 / 5 / 6 / 7			

Step 1: Identify						Step 2: Investigate		Step 3: Implement	
No.	Designing out Waste (DoW) principle	Opportunity	Activities	Opportunity status	Opportunity owner	PCF stage(s) to undertake further investigation	Outcome of further investigation	Opportunity to be taken forward to implementation (yes/no)	Recorded in Waste Management Plan (yes/no)
			requirement of DMRB LA 110 Material assets and waste. The target is for the recovery of at least 70% (by weight), with the aim to achieve recovery of 90% (by weight).						
19	4. Design for waste efficient procurement	Understand what sources of alternative aggregate are becoming available in the local area, their suitability for use and the requirements of specifications.	Opportunities could include undertaking a procurement exercise to work with other stakeholders, projects and local supply chain to understand what sources of alternative	Open	client / designer / contractor	5 / 6			

Step 1: Identify						Step 2: Investigate		Step 3: Implement	
No.	**Designing out Waste (DoW) principle**	**Opportunity**	**Activities**	**Opportunity status**	**Opportunity owner**	**PCF stage(s) to undertake further investigation**	**Outcome of further investigation**	**Opportunity to be taken forward to implementation (yes/no)**	**Recorded in Waste Management Plan (yes/no)**
			aggregate are becoming available in the local area. At detailed design, investigate the potential for the use of new and innovative materials, including low carbon and recycled materials.						
20	4. Design for waste efficient procurement	Prepare, update and use a Waste Management Plan throughout all phases of the Scheme.	The First Iteration Environmental Management Plan includes an Outline Waste Management Plan.	Open	client / designer / contractor	5 / 6 / 7			

Step 1: Identify						Step 2: Investigate		Step 3: Implement	
No.	Designing out Waste (DoW) principle	Opportunity	Activities	Opportunity status	Opportunity owner	PCF stage(s) to undertake further investigation	Outcome of further investigation	Opportunity to be taken forward to implementation (yes/no)	Recorded in Waste Management Plan (yes/no)
			Update the Waste Management Plan on a regular basis throughout detailed design and construction. Planning for waste management, including procurement of services.						
21	4. Design for waste efficient procurement	Potential for on-site precast concrete facilities to be shared with other schemes / major projects in the region.	Opportunities for further investigation could include the use of on-site precast concrete facilities and the potential for the facilities	Open	client / designer / contractor	5 / 6 / 7			

Step 1: Identify						Step 2: Investigate		Step 3: Implement	
No.	Designing out Waste (DoW) principle	Opportunity	Activities	Opportunity status	Opportunity owner	PCF stage(s) to undertake further investigation	Outcome of further investigation	Opportunity to be taken forward to implementation (yes/no)	Recorded in Waste Management Plan (yes/no)
			to be shared with other schemes / major projects in the region either concurrently or as a legacy benefit.						
22	5. Design for deconstruction and flexibility	Potential for the design of the Wintringham Park (urban and civic) main compound to offer legacy benefits to future site developer.	Opportunities for further investigation during detailed design could include the layout of the compound and access arrangements, including any roundabout from the existing A428.	Open	client / designer / contractor	5 / 6 / 7			

Step 1: Identify						Step 2: Investigate		Step 3: Implement	
No.	Designing out Waste (DoW) principle	Opportunity	Activities	Opportunity status	Opportunity owner	PCF stage(s) to undertake further investigation	Outcome of further investigation	Opportunity to be taken forward to implementation (yes/no)	Recorded in Waste Management Plan (yes/no)
23	5. Design for deconstruction and flexibility	Use of BIM model from the early stages of project design.	BIM model developed from the early stages in design. Contractor rebuilding the BIM model to reflect the way in which the Scheme will be constructed.	Open	client / designer / contractor	5 / 6 / 7			

Annex 2: Waste carriers

Waste type(s)	EWC code	Waste carrier name	Contact details	Waste carriers registration number	Expiry date (dd/mm/yyyy)	Date checked with Environment Agency (dd/mm/yyyy)

Annex 3: Aggregates imported to site

Client Name:		**KPI:**
Project:		**At least 31% (by weight) of aggregates imported to site for use within the Scheme shall comprise alternative (reused, recycled or secondary) aggregates, for those applications where it is technically and economically feasible to substitute these alternatives to primary aggregates. Where primary aggregate materials are mandated within DMRB they are excluded from the target.**
Contractor:		

Material / aggregate	Material density	Quantity required for construction	Quantity to be imported to site		Supplier	Supplier facility	Facility permit / licence / exemption number	Evidence of compliance with specification	Evidence of compliance with aggregates from inert waste quality protocol	Recycled content (% by weight)
	(tonnes/m^3)	m^3	m^3	tonnes						

Overall proportion of reused, recycled and secondary aggregates	% (by weight)

Annex 4: Waste management

Client Name:		**KPI:** **Recover (through reuse, recycling or recovery) of at least 70% (by weight) of non-hazardous construction and demolition waste (excluding naturally occurring materials with European Waste Catalogue Code 17 05 04), with the aim to achieve recovery of 90% (by weight).**
Project:		
Contractor:		

Waste type and quantity			**Management route (% or quantity)**						**Waste carrier**	**Off-site waste management facility**
Waste type	**EWC Code**	**Quantity (tonnes)**	**On-site**		**Off-site**					
			Reused on-site	**Recycled for use on-site**	**Reused off-site**	**Recycled off-site**	**Recovered off-site**	**Disposal**		

Non-hazardous construction and demolition waste recovered (excluding waste code 17 05 04)	**% (by weight)**

12 Annex D – Biodiversity management plan

1.1 Background to the plan

1.1.1 This Biodiversity management plan (BMP) describes the biodiversity mitigation and enhancement measures that will be implemented to protect the terrestrial and aquatic habitats and species of plants and animals prior to, and during, the construction phase of the Scheme as well as the management and monitoring measures to be implemented once the Scheme is operational.

1.1.2 This document should be read in conjunction with **Chapter 7, Landscape and visual effects** and **Chapter 8, Biodiversity** of the Environmental Statement (ES) **[TR010044/APP/6.1]** and the Landscape and Ecology Mitigation Plan (LEMP) contained in the First Iteration EMP **[TR010044/APP/6.8]**.

1.1.3 The proposed biodiversity mitigation and enhancement measures are summarised below. These proposals have been designed to be delivered within the Order Limits, as well as to retain, where possible, the existing planting within the Order Limits. Habitat creation and landscaping have been accommodated, alongside the protection and enhancement of existing habitats where feasible.

1.1.4 The key measures within the Scheme design are:

e. Biodiversity mitigation and enhancement by the provision of new habitats which will also maintain and enhance connectivity.

f. Management of new and retained habitats within the Order Limits.

g. Inclusion of structures under the Scheme which allow a range of mammals and other species to safely cross under the new dual carriageway.

1.1.5 The proposed measures are illustrated on **Figure 2.4** Environmental Masterplan of the Environmental Statement **[TR010044/APP/6.2]** which shows the mitigation measures embedded into the Scheme design, including the habitat creation. Combined with this document and the LEMP, this outlines the mitigation measures for the Scheme in relation to ecology.

1.1.6 The measures include protection for habitats and for protected or notable species; habitat creation and maintenance during the construction period and post-construction management. The undertaking of these works will be the responsibility of the Principal Contractor (PC) during the construction and initial maintenance period of 5 years. Ongoing management required during the operational life of the Scheme after this period will lie with Highways England as the organisation responsible for the long-term maintenance of the asset.

1.1.7 This plan is a live document. The content will continue to be updated and revised as required.

1.2 The purpose and structure of this document

1.2.1 The purpose of this BMP is to set out the proposed strategy to mitigate potentially adverse effects of the Scheme on the biodiversity features within the Order Limits. The measures identified for implementation by the PC are based on the outcomes of the assessments reported in **Chapter 7, Landscape and visual effects** and **Chapter 8, Biodiversity** of the Environmental Statement **[TR010044/APP/6.1]**, and reflect the preliminary design of the Scheme illustrated on **Figure 2.4** Environmental Masterplan of the Environmental Statement **[TR010044/APP/6.2]**.

1.2.2 The Scheme has been designed, as far as is practicable, to avoid or reduce effects on biodiversity features through design development and impact avoidance, as reported in **Chapter 2, The Scheme** and **Chapter 3, Assessment of alternatives** of the Environmental Statement **[TR010044/APP/6.1]**.

1.2.3 This BMP sets out the following:

a. The responsibilities of the PC and others in relation to the control and management of general ecology.

b. Requirements for licensing.

c. General control measures to be implemented to protect biodiversity features.

d. Species-specific biodiversity mitigation measures to be implemented for protected and priority notable species.

1.2.4 The PC will be responsible for developing construction method statements, for example site clearance, for other construction works and operations, as required, based on the content of this BMP.

1.2.5 At this stage, this BMP is based on the outline measures for ecology. It will be updated by the PC into a final BMP (as part of the Second Iteration EMP) prior to commencement of works, in accordance with the Requirements in Schedule 2 of the Development Consent Order (DCO) **[TR010044/APP/3.1]**.

1.2.6 The final BMP within the Second Iteration EMP will incorporate the requirements of this BMP, and will include as a minimum:

a. Aims and objectives of the ecological mitigation measures identified.

b. How the management will be implemented.

c. A schedule of reporting.

d. Construction management measures to ensure the protection of species and habitats during the construction phase.

e. Methods to identify and implement any remedial measures and to establish a feedback mechanism to change or add new mitigation (if required), should ecological mitigation measures fail during establishment.

f. Approach to document the survey and monitoring results including the supply of biodiversity data to the relevant local biological records centres.

g. Details of monitoring including frequency, reporting and responsibility.

h. Detailed information on the ecological management strategy including prescriptions for all habitats and species of local, regional or national importance identified as present or possibly present.

1.3 Responsibilities

1.3.1 In relation to the control and management of the general ecology, the PC will establish appropriate roles and responsibilities for the site staff in accordance with the roles and responsibilities set out in Section 2 of this First Iteration EMP **[TR010044/APP/6.8]**.

1.4 Licence requirements

1.4.1 **Chapter 8, Biodiversity** of the Environmental Statement **[TR010044/APP/6.1]** identifies that licences will be required for the following protected species:

e. Badger.

f. Great Crested Newt.

1.4.2 The licence for badger will be sought from Natural England.

1.4.3 District Level Licensing will be used for Great Crested Newt, the requirements of which will be agreed with Natural England and the NatureSpace Partnership.

1.4.4 The PC will not commence works until the required licences have been obtained.

1.4.5 Work will be carried out under the conditions of the given licences.

1.4.6 Further information on licence requirements for these species is presented in Section 3.

1.5 General biodiversity control measures

Scheme-wide control measures

1.5.1 This section of the BMP sets out the general biodiversity control measures that will be employed by the PC to protect habitats and species from impacts during construction of the Scheme.

1.5.2 The PC will appoint an Ecology Clerk of Works (ECoW), who's role will be to ensure that the Scheme and its associated construction works complies with all relevant ecological legislation, consents and requirements, including those arising from this BMP.

1.5.3 The following general control measures will be applied by the PC in all construction working areas:

a. Prior to starting any work with potential to affect protected species, site operatives will be informed by toolbox talk on requirements, constraints, what to look out for and what to do in the event that a protected species is found.

b. Construction compounds and storage areas will, where practicable, be established away from areas with potential for use for breeding by amphibians.

c. The ECoW will oversee site clearance operations in sensitive habitats.

d. Where night-time working is necessary, task lighting will be kept to a minimum and will be set up to avoid light spill on sensitive habitats and, wherever practicable, to avoid any light spill within 20 metres of any confirmed bat roost in particular.

e. Where excavations have to be left open overnight and cannot be covered, at least one temporary ramp will be placed within the excavation to allow animals to escape. This should be no greater than 45 degrees in angle.

f. All excavations left open overnight or longer will be checked for animals prior to the continuation of works or infilling.

g. Where individuals of any species protected by biodiversity legislation are noted during the works, construction operations will stop in those areas and the ECoW contacted for further advice on how to proceed.

h. Where underpasses or mammal tunnels are provided, environmental fencing will be erected to direct animals to these structures. Underpasses will be inspected regularly to check that they are not blocked or flooded. Any remedial work will be carried as required.

i. Retained habitats will be protected from damage during construction.

1.6 Habitat protection, mitigation and enhancement

Retained habitats

1.6.1 A number of habitats within the Order Limits will be retained within the design of the Scheme.

1.6.2 The PC will implement the general control measures described below to protect habitats shown in principle on Figure 2.4 Environmental Masterplan of the Environmental Statement [TR010044/APP/6.2] identified for retention.

Terrestrial habitats

1.6.3 Trees will be protected from construction works in accordance with the best practice measures contained in the following British Standards:

a. *BS 5837:2012 – Trees in relation to design, demolition and construction* (Ref 1-1) (see below).

b. *BS 3998:2010 – Tree Work: Recommendations* (Ref 1-2).

1.6.4 This will include the following measures which will be adopted and implemented for the protection of trees, hedges and woodland (see also requirements specific to bats):

c. A Root Protection Area (RPA) will be set up around trees to be retained onsite prior to commencement of construction.

d. The RPA will be demarcated by a suitable physical barrier. The protective fencing will be maintained for the duration of the construction phase and checked on a regular basis.

e. In the event that an RPA cannot be maintained at 12 times the diameter at breast height mitigation such as bog matting, flotation tyres and hand digging will be utilised.

f. No machinery or material will be stored within the RPA.

g. To ensure retained trees do not become hazardous, the condition of trees will be checked by the Environmental Manager or ECoW at an appropriate frequency and following storm events where there may be damage from wind throw.

h. Where a tree is damaged or diseased advice will be sought from an arboriculturalist (unless the ECoW is appropriately qualified) for appropriate treatment measures.

i. Where hazardous branches or trees require to be felled this will be undertaken by a qualified tree surgeon in line with *BS 3998:2010* (Ref 1-2).

j. Before felling trees, surveys for potential bird nest or bat roosts will be undertaken by the ECoW.

1.6.5 Construction working areas and haul routes will be clearly demarcated, and boundaries adhered to where these are located adjacent to retained habitats.

1.6.6 The waste hierarchy will be applied to vegetation and biomass arisings and alternate onsite uses will be sought before disposal is considered.

Aquatic habitats

1.6.7 Standard best practice pollution prevention and control measures will be adhered to at all times during construction including:

a. *CIRIA C649: Control of Water Pollution from Linear Construction Projects* (Ref 1-3).

b. *CIRIA C741: Environmental Good Practice on Site (fourth edition)* (Ref 1-4).

1.6.8 Surface water monitoring will be undertaken to demonstrate no adverse effects on water quality during construction. This monitoring will reflect the minimum requirements set out in the Water Management Plan within the First Iteration EMP [TR010044/APP/6.8].

1.6.9 Bankside vegetation within 8 metres of any watercourse or waterbody will be retained where appropriate. Where clearance is necessary, removal of vegetation will be minimised as far as possible and will be overseen by the ECoW.

1.6.10 All works within 8 metres of a watercourse or waterbody will be carried out in accordance with the requirements of the Invasive Non-native Species Management Plan, which will be developed by the PC based on the framework of measures set out in this BMP.

1.7 Species-specific mitigation measures

1.7.1 Measures are specified to ensure mitigation with respect to protected, priority and notable species. These are:

c. Bats.

d. Badger.

e. Riparian mammals.

f. Birds – Breeding and wintering.

g. Hobby (*Falco Subbuteo*) and Red Kite (*Milvus milvus*).

h. Barn Owl (*Tyto alba*).

i. Reptiles.

j. Great Crested Newt (*Triturus cristatus*).

k. Fish.

1.7.2 Measures are also specified to avoid the spread of invasive non-native plant species.

1.8 Bats

1.8.1 The results of the bat surveys provided in Appendix 8.5 of the Environmental Statement [TR010044/APP/6.3] highlighted the requirement for the following measures to mitigate the effects reported in Chapter 8, Biodiversity of the Environmental Statement [TR010044/APP/6.1].

Bat roosts

1.8.2 The survey results confirmed non-breeding bat roosts for: Common Pipistrelle (Pipistrellus pipistrellus); Soprano Pipistrelle (Pipistrellus pygmaeus); and Brown Long-eared Bat (Plecotus auritus).

1.8.3 The design and positioning of construction lighting will be reviewed and implemented by the PC in a manner that avoids illumination of any roost entrances and associated flightpaths.

1.8.4 Wherever practicable to do so, lighting will also avoid illumination of any habitats used by large numbers of bats, for example woodland and established hedgerows.

Roosts within buildings

1.8.5 Buildings that are identified for demolition with low roosting suitability (i.e. 1/B4 and 1/B7) and high suitability (6/B1) were found to have no bat roosts associated with them.

1.8.6 Building 4/B1 was identified as having high suitability; however, access to survey the building was unavailable.

1.8.7 The locations of the Buildings 1/B4, 1/B7, 6/B1 and 4/B1 and the survey findings are presented in Appendix 8.5 of the Environmental Statement [TR010044/APP/6.3].

1.8.8 As the Biodiversity assessment reported in Chapter 8, Biodiversity of the Environmental Statement [TR010044/APP/6.1] identified potential for indirect impacts on roosts in buildings within 50 metres of the Scheme (for example Building 7/B1), For those buildings within the Order Limits, the PC will implement and follow general precautions for bats (and other protected species) in these buildings, and for other buildings within the Order Limits with roosting suitability (i.e. those identified as having low or higher suitability, but with no confirmed roosts).

1.8.9 These precautions will be included in a "Non-licensed Precautionary Working Method Statement", and will include:

a. An ecological watching brief for work close to roosts.

b. Avoiding the use of lighting at night close to roosts.

c. Implementing a buffer zone from roost locations to minimise additional noise and other physical human disturbance.

Tree and woodland roosts

1.8.10 The Scheme would be constructed close to confirmed roosts of local importance in Tree 7/T5, and woodlands (Transect 2/T11 and Transect 8/T4). The locations of these confirmed roosts are presented in Appendix 8.5 of the Environmental Statement [TR010044/APP/6.3].

1.8.11 Felling of any trees directly impacted by the Scheme with potential roost features but no confirmed roosts (i.e. low or higher suitability) will follow a "Non-licensed Precautionary Working Method Statement" to limit the potential for bat roosts to be impacted.

1.8.12 For the felling of any trees with low, moderate or high rated bat suitability within the Scheme (but with no confirmed roost following sufficient survey work), the method statement will include the following:

a. Trees will be subject to an updated survey to comprise: (i) A ground based survey to record any potential change in roost suitability (i.e. upgrade or downgrade); and (ii) a climbed inspection for trees rated as providing moderate or high potential suitability for bats (including any additions from possible upgrades resulting from the ground based survey).

b. Wherever practicable, trees will be felled outside of the main summer activity season of May-August.

c. Trees with rated or unknown hibernation potential will be felled outside of the core winter period November – February inclusive.

d. Felling of trees will be undertaken under the supervision of a licensed bat worker and competent ECoW. Where possible trees will be either section felled or lowered to the ground by other means (such as by a mechanical digger).

e. Provision will be made for the potential transfer of any injured bat to a recognised bat carer.

f. Upon felling of the tree, a check will be undertaken by the licensed bat worker and competent ECoW and the tree left in-situ for one day prior to removal to allow any potentially present bats time to leave.

1.8.13 Whilst new habitats are establishing, there will be limited replacement roosts within new woodland.

1.8.14 The installation of bat boxes of various designs in retained woodlands within the Order Limits will be delivered as part of the mitigation measures incorporated into the design of the Scheme (as shown in principle on Figure 2.4 Environmental Masterplan of the Environmental Statement **[TR010044/APP/6.2]**).

Other mitigation for bats

1.8.15 The design of the Scheme includes the re-establishment of areas of hedgerow, grassland and scrub to provide future commuting/foraging habitat for bats. These areas will be established by the PC, the locations of which are shown in principle on Figure 2.4 Environmental Masterplan of the Environmental Statement [TR010044/APP/6.2]. The plan also shows the location of a bespoke mammal tunnel designed for bats beneath the new dual carriageway.

1.8.16 Important foraging/commuting habitats will be retained by the PC where possible and kept unlit at night.

1.8.17 The mix of hedgerows, grassland, scrub and wetland created as part of the Scheme, as outlined in the LEMP, will provide corridors of connecting habitat running in a north-south direction through the Scheme.

Monitoring

1.8.18 Monitoring surveys will be undertaken by the PC to determine the success of the bat mitigation.

1.8.19 (Table 3-1).Monitoring of existing bat flyways and new crossing features (e.g. as underpasses, culverts or bridges) will be undertaken by the PC at least once during the construction phase of the Scheme and in the first, second and third years post opening of the Scheme to help determine the success of any mitigation and enhancement.

Table 3-1 Proposed monitoring for bats – indicative programme (dates to be confirmed by the PC)

Task	Timing
Construction 2023 – 2025/6	
Bat crossing point surveys	Six visits between June to August 2023 or 2024
Bat activity surveys– 10 transects each walked twice	July to August 2023 or 2024
Static detector surveys spring/summer and autumn	April/May, June/July/August and September/October 2023 or 2024
3 years of bat box monitoring (2 visits per year)	Survey in April or May and August or September 2023 to 2025
Operation 2025/6 to 2028/9	
Bat crossing point surveys	Years 1, 2 and 3 - June to August 2025/6, 2026/7 and 2027/8
Bat activity surveys– 10 transects each walked twice	Years 1, 2 and 3 - June to August 2025/6, 2026/7 and 2027/8
Static detector surveys spring/summer and autumn	Years 1 and 3 - April/May, June/July/August and September/October 2025/6 and 2027/8
2 years of bat box monitoring (2 visits per year)	Survey in April or May and August or September 2026 to 2027

Badger

1.8.20 The results of the Badger survey are provided in the CONFIDENTIAL Appendix 8.6 of the Environmental Statement [TR010044/APP/6.3] and the requirement to implement best practice mitigation due to the construction and operational-related effects is described in Chapter 8, Biodiversity of the Environmental Statement [TR010044/APP/6.1].

1.8.21 The PC will implement best practice mitigation measures for this species as described below.

Precautionary measures

1.8.22 The following control measures will be implemented during construction to minimise the potential risk of disturbance and harm to badgers. These measures will not require a Natural England licence in advance of their implementation by the PC.

a. Any pipework greater than 250mm in diameter will be capped if they are left open overnight, thereby preventing badgers from accessing them and becoming trapped.

b. Any pits or trenches will be covered overnight or fitted with a suitable means of escape.

c. Check for signs of badger activity within working areas will be undertaken to reduce the risk of setts becoming established, including temporary stockpiles.

1.8.23 In the event that there is reasonable likelihood that any newly established setts will be directly affected or disturbed by works then further mitigation may be necessary including, as appropriate, Natural England licenses for additional closure of setts.

1.8.24 Mitigation measures for badgers will include:

a. Closing setts where they are within working areas and cannot be retained without damage or loss.

b. Constructing an artificial sett to replace a main sett which has to be closed.

c. Providing foraging habitats via the habitat creation shown in principle on **Figure 2.4** Environmental Masterplan of the Environmental Statement **[TR010044/APP/6.2]**.

d. Temporarily excluding badgers from areas using fencing, where required.

1.8.25 Shrubs in conjunction with fencing will be established near the entrances of mammal underpasses (without blocking them) to encourage Badger and other animals to use the structures.

Sett closures (licensed activities)

1.8.26 The setts identified as requiring closure due to the Scheme will be closed during the period July – November inclusive and only following receipt of a licence from Natural England.

1.8.27 Licences to exclude badgers and to close down or destroy a sett are only issued between July and November, other than in exceptional circumstances.

1.8.28 A method statement will be prepared for the closure of setts by the PC and implemented in accordance with the licence. Illustrative content for the method statement is included as Appendix B.

Artificial sett construction

1.8.29 Artificial setts will be constructed as part of a sett closure programme to provide alternative habitat to mitigate for closures of Main and Annex setts.

1.8.30 In order to ensure that badgers excluded from a main sett have an alternative sett within their territory, the replacement artificial sett will be constructed in advance of any exclusion of badgers from a main sett. Where practicable, the artificial sett will be constructed at least 6 months prior to exclusion from the main sett. This period may be reduced if monitoring shows that the sett has been occupied by the social group for which it is intended in a shorter time.

1.8.31 The artificial sett will be extensive enough to accommodate the social group using the natural sett with scope for badgers to extend or modify the sett themselves.

1.8.32 Illustrative content for the method statement on construction of artificial setts is included in Appendix B.

1.8.33 Following the construction of the artificial sett, monitoring of the usage will be carried in consultation with Natural England to inform any remedial management (if required).

1.9 Riparian mammals

1.9.1 The results of the riparian mammal surveys are presented in **Appendix 8.7** of the Environmental Statement **[TR010044/APP/6.3]** and the requirement to implement best practice mitigation due to the effects of the Scheme is described in **Chapter 8, Biodiversity** of the Environmental Statement **[TR010044/APP/6.1].**

1.9.2 Otter was found to be using some of the brooks crossed by the Scheme and specific mitigation for this species is provided below. Although Water Vole was absent during the surveys, the mitigation for Otter is appropriate for this species (should it colonise any of the brooks in the future).

1.9.3 The PC will implement a 10 metre stand-off distance from watercourses during construction, except where works need to be carried out in the channel, to minimise the risk of disturbance to Otter.

1.9.4 An ECoW will oversee works in or adjacent to those watercourses identified as having potential presence of Otter.

1.9.5 The ECoW will demarcate any restricted areas required to prevent unnecessary entry to sensitive Otter habitats along the watercourses.

1.9.6 Night-time working will be minimised, where possible, near watercourses where Otter are present.

1.9.7 Temporary construction lighting will be positioned, where possible, in a manner that avoids light spill on watercourses and into the 10 metre stand-off zone.

1.9.8 Routes likely to be regularly used by Otter (e.g. along watercourses and their riparian zones) will be kept passable for Otter except during any construction on the channel which would risk harm to this species.

1.9.9 Temporary fencing will be erected to exclude Otter from construction working areas where there is considered to be a risk of accidental collision with construction traffic.

1.9.10 The proposed measures for Otter are illustrated on **Figure 2.4** Environmental Masterplan of the Environmental Statement **[TR010044/APP/6.2].** Ledges to aid crossing by Otter will be provided within culverts at the locations specified on this plan.

7.1.2 A monitoring programme will be prepared during the detailed design stage to record usage of culvert ledges and mammal tunnels (e.g. by remote cameras and footprint recording).

1.9.11 Publicly available road traffic accident data and roadkill data of mammals such as badger, otter and deer will be reviewed by the PC during the contract period. The findings will be analysed to identify any 'hotspots' for mammal mortality.

1.9.12 Where feasible, remedial measures will be considered to reduce the risk.

1.10 Birds (breeding and wintering)

1.10.1 The results of the breeding birds and wintering birds survey are provided in **Appendix 8.10 and Appendix 8.9** of the Environmental Statement [**TR010044/APP/6.3]** and the requirement to implement best practice mitigation due to the construction and operational-related effects is described in **Chapter 8, Biodiversity** of the Environmental Statement **[TR010044/APP/6.1].** Mitigation for breeding birds is outlined below for species other than for Hobby and Barn Owl, which are addressed in the following two sections.

Precautionary measures

1.10.2 To avoid disturbance to nesting birds, site clearance works including the demolition of buildings and the removal of any woody vegetation and ground flora will be conducted, where possible, outside the bird nesting season (i.e. clearance between September and February).

1.10.3 Where this is not achievable, works will be preceded by a survey for nesting birds conducted by a suitably qualified ecologist, acting as an ECoW, to conduct a survey for nesting birds in advance of planned clearance works.

1.10.4 During the bird breeding season site clearance and other work will not commence until the ECoW confirms that a survey for birds has been carried out.

1.10.5 If an active nest site is present within or adjacent to a work area a suitable exclusion zone will be designated by the ECoW appropriate to species, nest location and works activities. This exclusion zone will be protected from works and monitored until the ECoW (or other appropriate specialist) has confirmed that the nest site is no longer in use.

1.10.6 During construction, any use of legal measures to deter birds from nesting in a work area of the Scheme will be implemented under the advice and supervision of an ECoW (e.g. physical means to prevent establishment of nests, such as sealing holes in trees after tree-climbing and inspection, or other legal means of disturbance, such as the regular ploughing of soils, or use of falconry to deter nesting).

1.10.7 Deterrence measures will not be used where there is considered to be a risk of disturbance to any active nests of bird species listed under Schedule 1 of the *Wildlife and Countryside Act 1981* (Ref 1-5).

1.10.8 A Schedule 1 species that could pose a constraint during the construction phase is Little Ringed Plover (*Charadrius dubius*). It was recorded during bird surveys

at the western end of the Scheme (see **Appendix 8.9 and Appendix 8.10** of the Environmental Statement **[TR010044/APP/6.3**]) and there were records from the local environmental records centres.

1.10.9 Little Ringed Plover is an opportunistic ground nesting species using areas of open gravel with little or no plant growth, typically near freshwater. It is also relatively tolerant of disturbance. The risk of Little Ringed Plover nesting within Order Limits during construction is greatest at the western end of the Scheme due to the presence of open water and the River Great Ouse. The nesting period is March to July.

1.10.10 Measures will be taken to minimise the risk of nesting plovers within the works, for example programming of works and planning of access routes for construction; minimising the time areas of open gravel are left exposed, and temporary seeding to produce unfavourable conditions for little ringed plover to nest.

Monitoring

1.10.11 All exclusion zones set up for the protection of breeding birds will be monitored for bird activity and the location, start and end dates and outcome will be recorded.

1.11 Hobby and Red Kite

1.11.1 The results of the Hobby and Red Kite surveys are presented in **Appendix 8.11** of the Environmental Statement **CONFIDENTIAL [TR010044/APP/6.3]** and the requirement to implement best practice mitigation due to the construction and operational-related effects is described in **Chapter 8, Biodiv**ersity of the Environmental Statement **[TR010044/APP/6.1].**

Precautionary measures

1.11.2 In the event that during construction a breeding Hobby or Red Kite is located within the Scheme, the ECoW will determine a protective exclusion zone of an appropriate distance around the nest location.

1.11.3 The radius of any protective exclusion zone, and its duration, will be dependent on the stage of breeding (i.e. with eggs, chicks, fledging etc.), the definition of which will be informed by the indicative guidance distances used for Peregrine and Merlin (Ref 1-8) to avoid disturbance.

1.11.4 The surrounding habitat, topography and screening from disturbance will all be considered when defining any protective exclusion zone.

Artificial nests

1.11.5 At locations where artificial nests will be provided for Hobby wire hanging baskets will be provided as the main platform, lined with sticks.

Monitoring

1.11.6 Where an exclusion zone is set up for the protection of breeding hobby or red kite it will be monitored for bird activity and the location, start and end dates and outcome will be recorded.

1.12 Barn Owl

1.12.1 The results of the Barn Owl survey are provided in **CONFIDENTIAL Appendix 8.12** of the Environmental Statement **[TR010044/APP/6.3]** and the requirement to implement best practice mitigation due to the construction and operational-related effects is described in **Chapter 8, Biodiversity** of the Environmental Statement **[TR010044/APP/6.1].** The latter identified the requirement to implement best practice mitigation measures for this species during the construction of the Scheme and measures to minimise the risk of Barn Owl crossing the carriageway during operation.

Precautionary measures

1.12.2 Precautionary measures will apply to protect breeding Barn Owl as a Schedule 1 (Ref 1-5) bird.

1.12.3 If any Barn Owl nest is found within or adjacent to areas of works, the ECoW will determine the extent and duration of the protective exclusion zone required around the nest location. This will be dependent on such factors as the stage of breeding (e.g. nest building, eggs, chicks, fledging etc.).

Monitoring

1.12.4 Any mortalities of Barn Owl within the limits of the Scheme during the construction and initial maintenance period will be recorded. The records will be reviewed to identify any requirement or opportunities for improvement of mitigation.

1.13 Reptiles

1.13.1 The results of the reptile survey presented in **Appendix 8.13** of the Environmental Statement **[TR010044/APP/6.3]** identified a low population of Common Lizard in a few locations within the Order Limits.

1.13.2 Best practice mitigation measures will be implemented by the PC for this species during the construction of the Scheme.

1.13.3 The PC will prepare a method statement for site clearance in areas of habitat suitable for reptiles, based on surveys undertaken and reported in **Appendix 8.13** of the Environmental Statement **[TR010044/APP/6.3].**

1.13.4 Any features suitable as hibernation sites will be dismantled under the supervision of the ECoW and removed.

1.13.5 Site staff will be briefed during toolbox talks on the specific working practices in the method statement, including identification of reptiles and suitable action to take if any reptiles are found during the works.

1.13.6 The method statement will include measures relating to vegetation management, to encourage reptiles to move from identified working areas into adjacent semi-natural vegetation. This will include:

a. Phased vegetation clearance outside the hibernation period for reptiles to render habitat unfavourable for reptiles to shelter, which will encourage dispersal into adjacent areas of suitable habitat.

b. Keeping vegetation short prior to topsoil stripping in order to keep it unfavourable for reptiles.

1.13.7 The method statement will include measures relating to establishment of reptile habitat and hibernacula within the Order Limits. This will include:

a. The creation of grassland and scrub.

b. The installation of artificial hibernacula.

1.13.8 Design principles for the established of hibernacula are presented in Appendix A.

1.13.9 Post-construction condition monitoring of reptile habitats will be carried out by the PC.

1.14 Great Crested Newt and other amphibians

1.14.1 The results of the Great Crested Newt survey are provided in **Appendix 8.14** of the Environmental Statement **[TR010044/APP/6.3].** The requirement to implement best practice mitigation measures for this species during the construction and operation of the Scheme are included in the Scheme design (**Chapter 8, Biodiversity** of the Environmental Statement **[TR010044/APP/6.1]** and **Figure 2.4** Environmental Masterplan of the Environmental Statement **[TR010044/APP/6.2]).** Of six ponds within the Order Limits, two will retained and four will be lost. A further seven ponds which have been confirmed by survey to not support breeding Great Crested Newt will also be lost to the Scheme. Specific mitigation for this species is provided below.

Habitat creation

1.14.2 The Scheme would impact aquatic and terrestrial habitat used by Great Crested Newt and other amphibians. Impacts on aquatic habitat will be avoided where feasible and as much existing habitat as possible will be retained to avoid direct habitat loss, aquatic and terrestrial, and damage to waterbodies that support Great Crested Newt. Improvements to habitat quality and connectivity for Great Crested Newt will be undertaken through habitat creation, as illustrated on **Figure 2.4** of the Environmental Statement **[TR010044/APP/6.2].** At detailed design planting plans for waterbodies will include plant species that provide good egg- laying sites for Great Crested Newt, (e.g. Water Forget–me-not (*Myosotis scorpioides*) and Floating Sweet-grass (*Glyceria fluitans*), where sites are suitable for enhancement for newts to breed.

District level licensing

1.14.3 For those ponds and associated terrestrial habitat that would be lost to the Scheme, district level licensing will be used to mitigate for these losses and achieve an overall net increase of Great Crested Newt habitat.

1.14.4 District level licensing of development affecting Great Crested Newt involves consideration of the conservation of this species at a geographical scale broader than the development site in question. It allows harm to individual Great Crested Newts and loss of habitat to be compensated for by the creation and/or restoration of new habitat elsewhere. The approach takes into account the time-scale and other factors involved in the creation of new ponds by requiring more than one for one replacement of ponds. The district level licensing of Cambridgeshire is a Natural England-led scheme, and Bedfordshire is a NatureSpace Partnership-led scheme.

1.14.5 Under district level licensing, Natural England and NatureSpace Partnership collect data on Great Crested Newt occurrence and use modelling to predict the distribution of Great Crested Newt across an area. The modelled distribution is then used to map risk zones, assess the likely impact of proposed development and to predict suitable habitat in which mitigation can be targeted (Compensation Priority Zones). Instead of relying solely on site-specific mitigation and compensation, in adopting district level licensing Highways England will make a 'Conservation Payment' which will be used to fund a net increase in Great Crested Newt ponds habitat elsewhere in the relevant districts.

Installation of kerbs and gully pot ladders

1.14.6 Modified kerbs and gully pot ladders will be installed to avoid or minimise amphibian mortalities. Modified kerbs feature a recess so that migrating amphibians 'hugging' the kerb side can pass round the gully pot which they would otherwise fall into, causing mortalities. Ladders provide an escape route for animals that fall into the gully pot and would not otherwise escape.

1.14.7 The condition of kerbs and ladders will be inspected annually during construction. If damaged, kerbs and ladders would be repaired and replaced, potentially in tandem with other maintenance.

Underpasses and culverts

1.14.8 Underpasses and culverts have been designed into the Scheme to allow amphibians and other animals the opportunity to pass under the highway (**Figure 2.4** of the Environmental Statement **[TR010044/APP/6.2]).**

Habitat management

1.14.9 Waterbodies retained and created will be managed to maintain value for biodiversity where feasible consistent with their primary function. Maintenance for waterbodies is stated in the Landscape and Ecology Mitigation Plan (LEMP) contained in the First Iteration EMP **[TR010044/APP/6.8].**

1.14.10 Where practicable, removal of over-shading vegetation and desilting will be undertaken outside the amphibian active season to minimise risk to any amphibians.

Monitoring

1.14.11 The Conservation Payment will be sufficient to provide a net increase in Great Crested Newt habitat. The implementation of district level licensing will ensure that this net increase is deployed to maximise benefit to the conservation status of Great Crested Newt, by targeting habitat delivery in areas where population level benefits can be delivered – often, though not exclusively, in 'Conservation Priority Zones'. A 25 year monitoring, management and maintenance strategy for all compensatory Great Crested Newt habitat is funded by the Conservation Payment.

1.15 Fish

1.15.1 The results of the fish surveys are presented in **Appendix 8.15** of the Environmental Statement **[TR010044/APP/6.3]** and the requirement to implement best practice mitigation in response to the effects described in **Chapter 8, Biodiversity** of the Environmental Statement [**TR010044/APP/6.1].** Where works involve the installation of culverts under the new dual carriageway, the method of working will avoid disturbance to any fish, including avoiding the need for temporary diversions.

Habitat restoration

1.15.2 Mitigation for loss of habitat for fish due to culverting will be achieved through the restoration of sections of watercourses, primarily the brooks, within the Order Limits to introduce a more natural form along these sections of brooks including in-channel structures, habitats and sediment type as well as riparian vegetation.

1.15.3 The proposed locations are illustrated on **Figure 2.4** of the Environmental Statement **[TR010044/APP/6.2].** At the detailed design stage, the PC will prepare a restoration plan for these sections of watercourse, showing the design, the habitats to be created, in-channel structures and the restoration of riparian vegetation.

Monitoring

1.15.4 Monitoring of the restored sections of watercourses will be undertaken annually against the criteria for habitat quality. The duration of monitoring will be agreed with the Environment Agency as part of the restoration plan.

1.16 Invasive non-native plant species

Invasive species

1.16.1 The results of the invasive non-native plant species surveys are presented in Appendix 8.18 of the Environmental Statement [TR010044/APP/6.3] and the requirement to implement best practice biosecurity measures is described in Chapter 8, Biodiversity of the Environmental Statement [TR010044/APP/6.1].

1.16.2 The following 11 invasive species were found to be present within the Order Limits or in the immediate environs (comprising five terrestrial and six aquatic species):

a. Giant Hogweed (*Heracleum mantegazzianum*).

b. Himalayan (Indian) Balsam (*Impatiens glandulifera*).

c. Japanese Knotweed (*Reynoutria japonica*).

d. Rhododendron (*Rhododendron ponticum*).

e. Variegated Yellow Archangel (*Lamiastrum galeobdolon* subspecies argentatum).

f. Canadian Waterweed (*Elodea canadensis*).

g. Curly Waterweed (*Lagarosiphon major*).

h. Floating Pennywort (*Hydrocotyle ranunculoides*).

i. New Zealand Pigmyweed (*Crassula helmsii*).

j. Nuttall's Waterweed (*Elodea nuttallii*).

k. Water Fern (*Azolla filiculoides*).

1.16.3 All of these species are listed in Schedule 9 of the *Wildlife and Countryside Act 1981* (Ref 1-5), and as such it is an offence to plant, or cause to grow, any of these species in the wild. Himalayan (*Indian Balsam*) Balsam is also listed in the *Invasive Alien Species (Enforcement and Permitting) Order 2019* (Ref 1-9).

Invasive Species Management Plan

1.16.4 A Construction Works Invasive Species Management Plan will be produced by the PC as part of the Second Iteration EMP.

1.16.5 The plan will specify in detail the biosecurity measures to be undertaken to ensure that none of Schedule 9 (Ref 1-5) species are spread off, or within, the Order Limits during construction, and that measures are specified to ensure that no such species are inadvertently brought into the Order Limits during the works.

1.16.6 All works affecting invasive species will be completed in accordance with the following legislation:

a. *Treatment and disposal of invasive non-native plants: RPS 178* (Ref 1-6).

b. *The Waste (England and Wales) Regulations 2011* (, Ref 1-7).

1.16.7 The movement of materials will also be undertaken in accordance with the Materials Management Plan, to be developed by the PC as part of the Second Iteration EMP.

1.16.8 The Construction Works Invasive Species Management Plan will include the best timing of works, biosecurity procedures and treatments and how to carry out the works minimising the risk of dispersion of invasive non-native plant species from, into and within the Scheme and to ensure that they do not cause any delays to the programme. However alongside appropriate management plans, the following general biosecurity measures will be adopted:

c. Cleaning stations will be set up at designated entry/exit points to invasive species demarcated areas. A jet wash will be available for vehicles and brushes and buckets of water will be available for clothing and equipment.

d. All staff members will be made aware of the locations of invasive species relevant to their work and will be informed of the necessary precautions required to prevent spread.

e. A toolbox talk will be provided by a suitably qualified ECoW at the onset of works, providing details on identification and the required biosecurity precautions.

f. No plant, equipment or personnel will leave an infested area without ensuring that as far as reasonably practicable all mud and/or plant material has been removed from vehicles, equipment and clothing.

g. Within demarcated areas, ground disruptive works will be carried out as far away from visible above ground invasive species as is possible.

h. Where ground disruptive works take place near visible above-ground invasive species (particularly larger stands), programming and method of works in these locations will preferentially work in unaffected areas prior to working in or near invaded areas, to reduce the risk of spreading invasive species within a working area.

i. Any soil in demarcated areas will be considered to potentially contain invasive species material (rhizome, seeds, etc.).

j. If soils potentially containing Japanese Knotweed rhizome or Himalayan Balsam seeds are taken off site, such soils are classified as controlled waste and there is a duty of care for their proper disposal, i.e. the soil must be transported by an appropriately licensed carrier and disposed of at an appropriately licensed waste disposal facility.

k. Personnel will be reminded of biosecurity requirements at the start of each work day and will be updated on any changes to management plans, i.e. information on the locations of any newly identified stands.

l. Soil brought on site will only be sourced from a reputable source with a good track record relating to not providing soil contaminated with invasive species propagules.

m. All invasive works in proximity to watercourses and waterbodies will be undertaken in accordance with the Invasive Species Management Plan.

n. Prior to undertaking any herbicide spraying near watercourses, consent will be obtained from the Environment Agency.

o. When travelling or working between watercourses, measures will be employed to reduce the risk of transferring problem species or diseases between watercourses. Such measures will include, but not be limited to, the checking for and cleaning mud and vegetation from boots, construction equipment and machinery, and allowing such items to dry in sunlight. Where works are carried out within watercourses with invasive species measures will be taken to avoid or minimise the risk of dispersal of fragments of invasive plants downstream.

1.16.9 Regular inspections will be undertaken by the PC. In the event that invasive species are identified as a result of the inspections, the following control and management measures will be applied:

p. Any early regrowth of invasive plant species will be reported and communicated through the above means. If plant disposal cells have been completed when new growth is discovered, this will be excavated and taken for offsite disposal to an appropriately licenced facility.

q. A vehicle cleaning area will be established adjacent to the burial zone and all vehicles used to transport invasive plant material will be cleaned prior to leaving this area. This area will not be located greater than 7 metres from the burial zone. Material left in the clean down zone will be collected and deposited into the burial cell.

r. The excavation and transfer of invasive plant species material, and its haulage to the holding area, will be supervised.

s. Vehicles collecting and removing material will be positioned over geotextile prior to loading.

t. Once the works have been completed, the excavator will be thoroughly cleaned and all arisings placed into the final load of contaminated material.

u. In the event of material requiring storage prior to burial, this will be stored in a designated location on an impermeable membrane to prevent spread of the plants. This area will also have a clean down zone.

v. If any material is to be removed for offsite disposal, this will be performed once an appropriately licenced disposal site has been identified and conformation received on their acceptance of the waste.

8 References

Ref 1-1. BS 5837:2012 Trees in relation to design, demolition and construction. British Standards Institution (2012).

Ref 1-2. BS 3998:2010 – Tree Work: Recommendations. British Standards Institution (2010).

Ref 1-3. CIRIA C649: Control of Water Pollution from Linear Construction Projects. CIRIA (2006). https://www.ciria.org//ProductExcerpts/C532.aspx

Ref 1-4. CIRIA C741: Environmental Good Practice on Site (fourth edition). CIRIA (2015). https://www.ciria.org/ItemDetail?iProductcode=C741&Category=BOOK

Ref 1-5. Wildlife and Countryside Act 1981. HMSO (1981). https://www.legislation.gov.uk/ukpga/1981/69

Ref 1-6. Treatment and disposal of invasive non-native plants: RPS 178. Environment Agency (2016). https://www.gov.uk/government/publications/treatment-and-disposal-of-invasive-non-native-plants-rps-178/treatment-and-disposal-of-invasive-non-native-plants-rps-178

Ref 1-7. The Waste (England and Wales) Regulations 2011. HMSO (2011). https://www.legislation.gov.uk/uksi/2011/988/made

Ref 1-8. A Review of Disturbance Distances in Selected Bird Species. Ruddock, M., & Whitfield, D.P. (2007).

Ref 1-9. Invasive Alien Species (Enforcement and Permitting) Order 2019. HMSO (2019). https://www.legislation.gov.uk/uksi/2019/527/contents/made

Ref 1-10. Reptile Habitat Management Handbook. Paul Edgar, Jim Foster and John Baker (2010).

Appendix A – Reptiles: design principles for hibernacula, log piles and egg laying sites

Hibernacula

Hibernacula will be constructed of rubble or alternative material, and covered by topsoil created from materials on site that are to be cleared. The *Reptile Habitat Management Handbook* (Ref 1-10) provides the following design principles for hibernacula that will be applied by the PC:

a. A sunny position.

b. A well-drained site, not prone to flooding.

c. Orientation so that one of the long banks faces south.

d. Access to reptiles through openings of some sort.

e. Location in a patch of habitat favourable for dispersal, such as tussocky grassland.

f. Minimal public disturbance.

g. At least 4 metres long, by 2 metres wide by 1 metre high and ideally much larger.

Log piles

Log piles (with potential to incorporate additional brash) will be installed to form sheltering sites for reptiles. A number of these features are to be multifunctional and designed to allow reptiles and other animals to overwinter within them and, additionally, will benefit deadwood invertebrates.

Brash material can be added to log piles by adding additional material as the existing material decomposes. This can be provided from ongoing tree and scrub management activity.

Both represent methods of utilising felled wood generated from any on-site tree felling.

Egg laying sites

Egg laying sites will be formed of brash and/or grass and vegetation cuttings mounded up.

The decay of any cuttings will create heat encouraging grass snake egg laying.

The structure of these features should ensure entry points for reptiles are maintained.

Appendix B – Badger: illustrative content for the method statement

Overview

The following sections outline the principles to be applied when constructing artificial badger setts and closing existing setts.

These principles shall be developed by the PC into a detailed site-specific method statement.

Construction of an artificial badger sett

Construction of an artificial sett does not require a licence provided that the work does not damage or disturb any existing sett. It can be carried out at any time of year provided ground conditions are suitable. The construction will be overseen by a suitably experienced ECoW or other ecologist.

Construction of an artificial sett shall take account of the following:

a. Requirements for vegetation clearance – which will be kept to the minimum required to construct the sett.

b. Any archaeological mitigation requirements – which will be completed prior to any excavation for the artificial sett.

c. Any soil management requirements associated with excavations near watercourses – where topsoil is removed it will be retained for reuse in the construction of the sett (imported topsoil may be required to cover the sett).

An excavator will be used to excavate the sett.

Chambers and pipe runs will be buried at a depth of at least 1 metre except around the entrances. Trenches will be excavated for pipes and any additional gravel required to provide drainage.

The excavator will dig channels between some of the chambers and the sett entrances. Plastic pipes (of 300mm diameter) will be installed to connect some of the chambers and link to the sett entrances. The bottom of the pipes will be removed prior to installation so that badgers can walk on the soil. If not possible, large slits will need to be made in the bottom of the plastic pipes at frequent intervals to allow water to drain out of the pipes. Pipes will be placed on a bed of gravel to further encourage drainage of water out of the pipes. The connections between the pipes and the chambers will not be flush resulting in soil being exposed at the sides in some places to allow digging opportunities for badgers.

Once the chambers and the pipes are *in situ*, the sett will be covered in mesh to deter illegal interference with the sett. The excavator will then cover the mesh-covered sett in soil to a depth of 1 metre. Tree and shrubs (particularly scrub species of local provenance) will be planted by hand over the sett to provide cover.

Once the sett is complete, evidence of Badger from active setts (e.g. bedding and latrines) will be moved and will be placed outside the artificial sett to encourage badger use.

Any loose sub-soil at the front of the badger setts will also be moved across and placed outside the entrances to the artificial sett to produce a spoil heap. The moving of materials from the setts to the artificial sett will be done by hand (or using hand tools), to avoid any accidental damage. Other woody material sourced from site clearance such as cut branches, rooted bramble and leaf litter, will be used to provide additional cover over the sett and to screen the sett entrances.

A monitoring programme will be developed for the artificial sett, and will involve the ECoW or another experienced ecologist, recording evidence of regular use of the sett (e.g. by using sticks placed in entrance holes, using a camera-trap and recording field sign).

Closing setts

Closure of an existing sett will not be undertaken until such time that the artificial sett has been constructed and evidence is obtained of its use.

Baiting will be used to encourage badgers to find the new sett and take up residence. The bait will be placed out underneath a rock to prevent smaller animals eating it, at regular intervals. During this period of familiarisation, partial vegetation clearance from around the original sett may be required to 'open up' the sett and discourage the badgers from remaining in it.

No works to damage or destroy any badger sett will be carried out except under the conditions of a licence from Natural England. All work will be carried out in accordance with the requirements of the licence and under the supervision of a suitably experienced ecologist licensed for the activity.

The exclusion of any resident badgers will be carried out prior to the destruction of any sett or part of one, for a period of 21 days.

One-way badger gates will be installed around setts using hand tools and light machinery. The gates will be set in the one-way position to allow badgers to exit, but not enter, and will be placed over the sett entrances. The gates will be checked by the licence holder / accredited agent at periods of no more than three days apart to ensure that the gates remain effective and have not been damaged.

If necessary, the ground around the sett will have appropriate gauge wire laid around the setts to prevent badgers from digging back into the sett. If Badgers re-enter the sett during this exclusion period, the three-week exclusion will begin again from day one.

If Badgers re-enter the sett during the 21 day exclusion period, the exclusion period will recommence again from day one.

For the permanent closure of setts, following the 21 day exclusion period, the sett will be carefully excavated under the supervision of the licence holder / accredited agent.

Destruction will be undertaken with a excavator or similar plant from the outer sett entrances, working towards the centre of the sett, cutting 0.5 metre slices in a trench to a depth of 2 metres. Exposed tunnels will be checked for recent badger activity with full attention paid to health and safety requirements. The sett will be destroyed from several directions in the above manner until only the central core of the sett remains. Once it is confirmed that no badgers remain, the core will also be destroyed and the entire area backfilled and made safe.

Sett excavation will be concluded within one working day, as badgers may re-enter exposed tunnels and entrances. Subsequent site works will not begin until the sett has been successfully closed.

Following successful destruction of the sett, the site will be cleared of all dense vegetation to discourage excavation of new setts.

If necessary, prior to the destruction of the sett, vegetation in and around the sett will be removed. It may be possible to do this with hand tools such as chainsaws and strimmers prior to the completion of the exclusion, providing no heavy equipment is taken within the likely footprint of the setts and the ground surface is not broken.

13 Annex E - Soil handling and management plan

1.1 Background to the plan

1.1.1 This Outline Management Plan (OMP) sets out the generic measures that will be used by the Principal Contractor (PC) to be implemented for soil handling and management during construction of the Scheme, and details the arrangements for areas where soil material shall be stripped and stored before being returned to its original location or reused elsewhere on the Scheme.

1.1.2 This OMP will be updated by the PC into a final Management Plan, as appropriate and necessary, prior to commencement of works in accordance with the Requirements in Schedule 2 of the Development Consent Order (DCO) **[TR010044/APP/3.1]** and must incorporate the requirements of this First Iteration Environmental Management Plan (EMP) and the Second Iteration EMP.

1.1.3 Further information regarding the borrow pits is contained within the Borrow Pits Optioneering Report **[TR010044/APP/7.6]**.

1.2 Responsibilities

1.2.1 In relation to the control and management of soil, the PC will establish the appropriate roles and responsibilities for site staff in accordance with the roles and responsibilities set out in Section 2 of this EMP.

1.3 Legislation and best practice

1.3.1 Although not a regulatory requirement, the preparation of a Soil Management Plan (SMP) is good industry practice for all construction projects with an estimated cost greater than £300,000.

1.3.2 Topsoil management will adhere to the Department for Environment, Food & Rural Affairs (Defra) published *Construction Code of practice for the sustainable use of soils on construction sites* (Ref 1), which details approaches and techniques for the following:

a. The identification of soil resources at an early stage in the development process.
b. Improved planning of soil use.
c. Better level of soil management during project implementation, including sustainable use of surplus soil.
d. The maintenance of soil quality and function both on and off site.
e. Avoidance of soil compaction and erosion (with a consequent reduction in flooding and water pollution).
f. Improved knowledge and understanding of soil at all levels in the construction industry, including soil amelioration techniques.
g. Areas of soil to be protected from earthworks and construction activities.
h. The areas and types of topsoil and subsoil to be stripped, haul routes and stockpile locations.

i. The methods for stripping, stockpiling, re-spreading and ameliorating landscape soils.

1.4 Construction impacts on soil resources

1.4.1 Construction-related activities can result in some of the most significant adverse impacts on soil properties and soil quality.

1.4.2 The Defra published *Safeguarding our Soils: A Soil Strategy for England* (Ref 2) states that soil is often not considered until the landscaping phase of a project, by which time most of the damage has already been done. These adverse effects on soils can occur in a number of ways:

a. Accidental spillages or the use of chemicals resulting in the contamination of soil resources.

b. The mixing of topsoil and subsoil reducing the overall soil quality.

c. Offsite disposal of soils due to the mixing of soil and construction waste or contaminated materials which require treating before reuse or ultimately disposed of at landfill.

d. The use of heavy machinery or the storage of construction materials can result in the over-compaction of the soil.

e. The use of impermeable materials to cover soils, which can result in detrimental impacts on the soils' biological, chemical and physical properties. In addition, this can result in certain geotechnical parameters being altered such as drainage characteristics and structure.

f. Destruction of topsoil structure by incorrect storage, for example over-high stockpiles (in excess of 2 metres in height) compressing soil structure.

1.4.3 Adverse effects on soils can be mitigated by adopting high standards of soil handling, storage and management during construction, and by avoiding the creation of bare areas of permanently exposed soil that would be vulnerable to erosion processes.

1.5 Outline proposals for soil management

Pre-construction activities

1.5.1 Prior to undertaking any stripping of soils, the soils will be subject to an analytical testing regime by the PC to assess the quality of the soil against *BS 3882:2015 – Specification for topsoil* (Ref 3).

1.5.2 The specification for soil testing must be developed by the PC, and will include the following analyses:

a. Visual examination (including description of soil structure, consistency and foreign matter).

b. Particle size distribution (including stone content).

c. pH and salinity values.

d. Major plant nutrients content.

e. Organic matter content.

f. Maximum levels of potential contaminants (for example heavy metals, hydrocarbons, cyanide and phenols).

1.5.3 The sampling of soil for analysis must be undertaken in line with the specification by suitably qualified personnel to the soil's full depth, with separate samples being obtained from each soil area and contrasting land use within them.

1.5.4 To provide an accurate representation for each sampling area, the mixing together of several incremental samples taken across a certain area will be undertaken using the random 'figure of W' or rectilinear grid sampling methodologies presented within the *Construction code of practice for the sustainable use of soils on construction sites* (Ref 1).

1.5.5 All samples obtained must be submitted to a suitably qualified, quality assured laboratory and tested for parameters in line with the specification. Permeability and porosity testing must be undertaken where such information will assist in establishing soil quality, for example to establish its required performance.

1.5.6 The depth of soil encountered must be recorded at each location where soil stripping is to be undertaken, to ensure that the same thickness of topsoil is replaced at the end of the construction works.

Preparation

1.5.7 Soil stripping will be undertaken only after analysis of the soil survey results has taken place.

1.5.8 Areas where soil stripping is required to be undertaken must be demarcated and fenced ahead of any major construction plant, vehicles or machinery entering the works area.

1.5.9 Temporary ditches will be excavated, where required, to act as cut-off drains to deal with surface water from adjacent fields, in accordance with the approaches and techniques presented in Annex F: Water Management Plan within the First Iteration EMP **[TR010044/APP/6.8]**.

1.5.10 Intrusive archaeological investigations must be undertaken ahead of construction works to avoid soil stripping resulting in damage to buried archaeology, in accordance with the approach and techniques presented within the Archaeology Mitigation Strategy **[TR010044/APP/6.12]**.

1.5.11 Stockpiles of soil must be located away from watercourses or other water features, to reduce the potential risk of pollution from suspended solids.

Topsoil stripping

1.5.12 The following principles must be adhered to during the stripping and handling of topsoil across all parts of the Scheme, in line with the *Construction code of practice for the sustainable use of soils on construction sites* (Ref 1):

a. The site must be carefully examined for non-vegetative potentially hazardous debris (e.g. glass, bricks, concrete) and also any invasive weeds prior to soil stripping, with any such material encountered removed. Remaining vegetation must be cut back to approximately 300mm in height and cleared. Vegetation must not be incorporated into topsoil to be stored. Appropriate guidance should be sought from an Ecologist if invasive species are identified. Measures relating to the management of invasive species are presented in Annex D: Biodiversity Management Plan within the First Iteration EMP **[TR010044/APP/6.8]**.

b. Any surface vegetation must be removed by blading off, by scarification and raking, or by kill off methods such as the application of a suitable non-residual herbicide applied not less than two weeks before stripping.

c. Stripping of topsoil must be restricted to those areas that are to be disturbed by construction activities such as where the soils would be likely to suffer damage associated with the engineering activities and or the installation of temporary buildings, haul routes or other areas of hardstanding. Topsoil from below any spread of trees proposed to be retained shall not be removed.

d. Topsoil must not be over-stripped such that subsoil becomes incorporated, as this will reduce quality and fertility of the material.

e. To avoid over compaction or damage to the existing topsoil, any dedicated haul routes must be stripped first with all haul distances minimised.

f. During periods of high rainfall, topsoil stripping will be prohibited with soils allowed to dry out to mitigate any potential damage to (and degradation of) the soils.

g. If sustained heavy rainfall occurs during soil stripping operations (10mm in 24 hours), work must be suspended until the ground has had at least one full dry day or agreed criteria (such as a specified moisture content) set out in the Second Iteration EMP has been met. Operations must not continue if pools of water remain on the surface.

h. In order to ensure that the works are undertaken under suitable weather conditions, the timing of all soil movements must be conditional upon approval of the PC's Environmental Manager / Landscape Specialist for the Scheme.

i. Earthmoving plant appropriate to the size of the site, the volume of soil to be stripped and the haulage distances must be used in accordance with appropriate work practices.

j. Tracked equipment must be used wherever possible to reduce topsoil compaction.

k. Where mechanical excavators are to be used, topsoil should be stripped in accordance with the guidance and procedures set out in the *Construction code of practice for the sustainable use of soils on construction sites* (Ref 1), *BS 3882:2015 – Specification for topsoil* (Ref 3), and the Ministry of Agriculture Fisheries and Food (MAFF) published *Good Practice Guidance For Handling Soils – Sheet 1: Soil Stripping with Excavators and Dump Trucks* (Ref 4).

l. The storage of stripped topsoil must be in temporary stockpile bunds by end tipping articulated dump trucks, subsequently shaped by the use of a dozer. At the end of each shift the dozer will seal stockpiles to prevent weather ingress by back blading.

m. Topsoil stockpiles must be formed in accordance with the requirements of Section 1.6 of this OMP and constructed in locations where they cannot be mixed or contaminated with other soil types.

n. Soils of different Agricultural Land Classification (Ref 5) grading must not be stored in the same bund.

o. Stripping operations must be appropriately supervised and follow a detailed plan showing soil units to be stripped, haul routes and vehicle movements throughout the works. Information relating to the range of thickness, types and layers of soils across the route should be available so as to allow for soil units to be defined on site.

1.5.13 Following completion of the works, stored topsoil must be taken to final place of deposition and re-spread at its original location in accordance with the requirements of Section 1.7 of this OMP.

Subsoil stripping

1.5.14 Following topsoil stripping, the subsequent operation will be to strip existing subsoil as required.

1.5.15 Subsoil stripping operations must be undertaken using similar equipment and techniques as the topsoil strip, and must be undertaken immediately following topsoil strip operations to avoid any degradation of subsoil resources.

1.5.16 Subsoil stripping must be undertaken to the depths specified on the Scheme earthworks plans to be developed at detailed design stage.

1.5.17 The principles of the *Construction code of practice for the sustainable use of soils on construction sites* (Ref 1) must be applied during the stripping and handling of subsoil, in addition to the following actions:

a. Haul routes must be run on the underlying soils and not the subsoil being stripped.

b. Subsoils of different quality and composition must not be mixed.

c. Stockpiles of subsoil must be segregated from topsoil to ensure that no mixing of the two soil types occurs.

Soil stripping controls and checks

1.5.18 Prior to undertaking any soil stripping operations, the following must be undertaken:

a. Ensure all necessary pre-construction surveys have been completed.

b. Follow and implement all identified mitigation requirements for the location and method of stripping.

c. Ensure adequate stockpile storage designation areas are prepared.

d. Check whether an archaeological watching brief is required by a suitably qualified archaeologist to supervise any soil stripping operations.

1.5.19 Detailed records must be kept of operations undertaken and must include the removal of stones and damaging materials, site and soil conditions, and the results of any assessment of the need for additional decompaction (and the effectiveness of decompaction work undertaken).

General controls during construction

1.5.20 The PC will confirm the soil types, the most appropriate reuse for the different types of soils, and the methods for handling, storing and replacing soils on-site.

1.5.21 The PC must follow the guidance in *Construction code of practice for the sustainable use of soils on construction sites* (Ref 1) when handling agricultural soils.

1.5.22 The PC must comply with the requirements of Defra and appropriate guidance to avoid, as far as possible, the spread of soil borne, crop and animal diseases. The PC will implement appropriate measures to control runoff to reduce any risks associated with disease transmission.

1.5.23 The PC must take all practical steps to ensure soils will be protected from accidental contamination during storage and transit.

1.5.24 The PC must implement measures on site in accordance with the CIRIA publication *Environmental Good Practice (fourth edition)* (Ref 6) to assess and control risks to humans, for example construction workers, site visitors and nearby residents, resulting from the disturbance of potentially contaminated soils.

1.5.25 In the event that unexpected soil contamination is encountered during construction, the process set out in Sections 1.4 and Sections 1.5 of Annex I Contaminated Land Management Plan must be followed. The PC is to quantify the extent of the potential risk from the contamination and follow a risk-based approach in accordance with *Land contamination: risk management* (Ref 7). In accordance with the process set out in Annex I Contaminated Land Management Plan, where significant risks from soil contamination are identified, appropriate mitigation (remediation) to reduce to acceptable levels the potential short and long-term health and safety and environmental risks to sensitive receptors will be identified and implemented.

1.5.26 The PC must assess excavated soils for any potential risks posed to health and the environment from the reuse of such soils as engineering fill. This will include mitigation of the effects on soils and the spread of contamination to ensure that those soils identified as contaminated are not mixed with uncontaminated soil. All excavated materials proposed for reuse will be required to meet risk-based acceptability criteria.

1.5.27 Should offsite disposal in relation to excavated soil be required, the material will be characterised to determine firstly whether it is Hazardous or Non-Hazardous waste in accordance with the Environment Agency's *Technical Guidance WM3* (Ref 8). The appropriate disposal facility will, where required, be determined through Waste Acceptance Criteria analysis, as required.

1.6 Soil storage

Stockpile construction

1.6.1 Following soil stripping activities, topsoil and subsoil must be stored in separate stockpiles, the construction and design of which will be in accordance with MAFF published *Good Practice Guide for Handling Soils – Sheet 2: Building Soil Storage Mounds with Excavators and Dump Trucks* (Ref 9).

1.6.2 Reference must also be made to the *Construction code of practice for the sustainable use of soils on construction sites* (Ref 1) which details how stockpile size is dependent on multiple factors including the nature/composition of the soil, the prevailing weather conditions at the time of the stripping, space limitations and any planning-related conditions or requirements attached to the consent for the Scheme.

1.6.3 As the quality of soil within stockpiles needs to be maintained to reduce the potential for damage to the soil's physical condition and structure, and to facilitate the re-spreading and reinstatement of soil material, stockpiles must:

a. Be carefully formed with a slope no greater than a slope of 1:2, so as to reduce the potential for damage to the physical condition and future economic viability of soil resources.

b. Segregate topsoil and subsoil to ensure no mixture and subsequent degradation of soil quality.

c. Be designed to be as narrow and as low as practicable, to allow the core material to be within 1 metre of the surface (to prevent anaerobic conditions developing).

d. Be shaped in a manner that facilitates the shedding of water.

e. Be shaped in a manner that avoids the potential for ponding.

f. Be located to avoid interference with rainwater runoff from adjacent areas, and to prevent the pollution of water bodies.

g. Be located beyond tree canopies and identified root protection zones around trees and vegetation to be retained.

h. Be located in excess of 10 metres from any existing watercourse or drains.

1.6.4 When stockpiles are constructed during a period of inclement weather, stockpile cores must be exposed and left for a minimum of one day to enable the soils to dry out prior to re-use.

1.6.5 Depending on the prevailing conditions, all stockpiling operations will be undertaken in a manner consistent with either of the following methods, as detailed in the *Construction code of practice for the sustainable use of soils on construction sites* (Ref 1):

a. Method 1: Dry non-plastic soils.

b. Method 2: Wet plastic soils.

1.6.6 **Plate 1** illustrates Method 1, and **Plate 2** illustrates Method 2.

Soil stockpiling

Soil should be stored in an area of the site where it can be left undisturbed and will not interfere with site operations. Ground to be used for storing the topsoil should be cleared of vegetation and any waste arising from the development (e.g. building rubble and fill materials). Topsoil should first be stripped from any land to be used for storing subsoil.

Method 1 – Dry non-plastic soils

The soil is loose-tipped in heaps from a dump truck (a), starting at the furthest point in the storage area and working back toward the access point. When the entire storage area has been filled with heaps, a tracked machine (excavator or dozer) levels them (b) and firms the surface in order for a second layer of heaps to be tipped. This sequence is repeated (c & d) until the stockpile reaches its planned height. To help shed rainwater and prevent ponding and infiltration a tracked machine compacts and re-grades the sides and top of the stockpile (e) to form a smooth gradient.

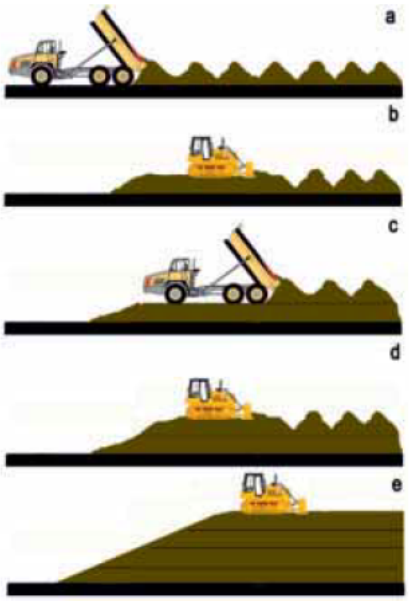


Plate 1: Soil stockpiling: Method 1

Method 2 – Wet plastic soils

The soil is tipped in a line of heaps to form a 'windrow', starting at the furthest point in the storage area and working back toward the access point (a). Any additional windrows are spaced sufficiently apart to allow tracked plant to gain access between them so that the soil can be heaped up to a maximum height of 2m (b).
To avoid compaction, no machinery, even tracked plant, traverses the windrow.

Once the soil has dried out and is non-plastic in consistency (this usually requires several weeks of dry and windy or warm weather), the windrows are combined to form larger stockpiles, using a tracked excavator (d). The surface of the stockpile is then regraded and compacted (e) by a tracked machine (dozer or excavator) to reduce rainwater infiltration.

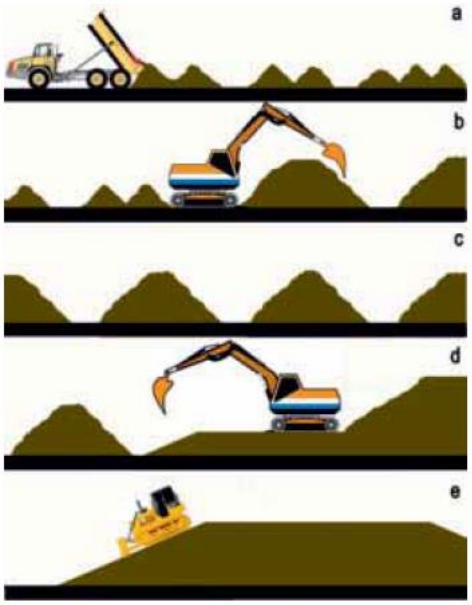


Plate 2: Soil stockpiling: Method 2

Management of stockpiles

1.6.7 Soil stockpiles must be placed on top of heavy-duty plastic sheeting to minimise any potential leaching of nutrients and contamination from underlying ground and construction materials. Soil stockpiles must be covered with material adequate to prevent erosion and disbursement by wind or rainwater runoff, and covers shall be maintained in good condition.

1.6.8 Upon completion of formation, stockpiles must be securely fenced off to prevent further disturbance and potential contamination by construction activities. Vehicles will be prohibited from tracking over areas of stockpiled materials with clear visible signage in place to identify stockpile content and type, for example topsoil or subsoil.

1.6.9 In order to mitigate the adverse effects of soil storage, the site will be managed in such a way that soil storage periods are minimised in duration. Should stockpile durations be greater than six months, the application of a mix of grass and clover seeds to the stockpile surface will be implemented to aid in reducing potential surface erosion and prevent potential nuisance weed infestation. Any weeds that have established on the stockpiles will be managed during summer months by the application of appropriate herbicide by spraying techniques to kill off the weeds, or by cutting techniques such as mowing and strimming to prevent any possible seed dispersion.

1.7 Soil restoration

Reuse and restoration of soils

1.7.1 A structured, uncompacted and well-aerated soil profile will be formed for the successful establishment and subsequent growth of vegetation.

1.7.2 Areas where soils are to be restored must be protected from the in-flow of water and ponding. In locations where ponding has occurred due to inclement weather, these areas will be drained in advance of restoration and allowed to dry out.

1.7.3 Prior to restoration, the basal layer will be profiled to a level and clean state.

1.7.4 Restoration operations must be undertaken in line with a detailed replacement plan, indicating which soil units are to be replaced, haul routes to be used, and the phasing of associated vehicle movements. Soil units will be defined on the site with information to distinguish types, layers and thickness.

1.7.5 Soil health (as well as plant health) will be closely monitored during the aftercare period to enable any deficiencies to be corrected as soon as possible after detection.

1.7.6 The PC must undertake further inspections of restored agricultural land with the landowner/tenant and Highways England's soils experts (and valuer, if required) to assess the progress of the restoration. These inspections will be carried out with timing appropriate to any perceived issues or concerns. Concerns will be assessed by all parties and appropriate remedial actions or compensation agreed within the parameters of the compensation code and/or any previous agreements made at the time of acceptance of the initial restoration works and handover to the landowner/tenant.

1.7.7 Following completion of the restoration, the PC will undertake monitoring at the start and end of the aftercare period (i.e. year one and year five) to determine whether pre-existing agricultural soil capability has been reinstated.

Substrate

1.7.8 The substrate must be properly decompacted to break up any panning or sealing of the ground surface, in order to reduce flood risk and to promote deeper root growth.

1.7.9 Should the substrate material require ripping, then the utilisation of heavy duty ripper equipment (such as a single rigid tine device or large winged-tine rippers) will be implemented.

1.7.10 Dedicated haul routes will be utilised to transport the subsoil to the first placement site and, thereafter, adherence to designated haul routes must continue.

1.7.11 The spreading of subsoil will be undertaken from the furthest point from the area access point, to avoid over compaction of already placed subsoil. Spreading will be undertaken in uniform thickness of an agreed thickness with subsequent layers applied, as required.

1.7.12 Should the ripping of subsoil material be deemed to be necessary, then:

a. The substrate material must be thoroughly ripped to a depth of 500mm with a minimum of two passes.

b. Where possible, the ripper blades used will have wide, shallow wings fixed. If this is not the case, the spacing at the surface will be reduced.

c. Following ripping, the subsoil windrow must be spread to an agreed depth across the area using a dozer.

1.7.13 At the end of each day, the current strip/segment will be completed in full if rain is forecast. If during a day it is evident that a full strip cannot be completed, then the current segment must be completed as a minimum.

1.7.14 Subsoil placement works must be suspended if sustained heavy rainfall (e.g. >10mm in 24 hours) occurs during the soil handling operations, and not restarted until the ground has had at least a full dry day or agreed moisture content criteria can be met.

Topsoil

1.7.15 The PC must endeavour to return topsoil stripped during the construction of the Scheme as close to its source of origin as possible during restoration. Soils should be reused as soon as is practicable and stored in such a way as to minimise structural damage (so far as reasonably practicable). Additionally, the creation of bare areas of permanently exposed soil that would be vulnerable to erosion processes will be avoided.

1.7.16 The application of topsoil to each designated area will be excavated from temporary storage stockpiles by 360 degree excavator and placed using articulated dumper trucks.

1.7.17 Topsoil must be placed in a windrow at appropriate centres from the edges of the site and spread evenly across the site. In spreading, the material operations will commence at the furthest location from the access point and work backwards to avoid tracking over newly placed topsoil.

1.7.18 The topsoil must be spread to an agreed depth, generally 300 to 350mm dependant on original soil depths, across the ripped subsoil by dozer.

1.7.19 Should the ripping of topsoil be deemed to be necessary, an agricultural subsoiler with wings and narrow legs must be used to rip the topsoil to an agreed depth, generally 400mm dependant on soil depths, in order to remove any remaining compaction and to key into the underlying subsoil.

1.7.20 Topsoil placement works must be suspended if sustained heavy rainfall (for example >10mm in 24 hours) occurs during the soil handling operations, and not restarted until the ground has had at least a full dry day or agreed moisture content criteria can be met.

14 Annex F - Water management plan

1.1 Background to the plan

1.1.1 This Outline Water Management Plan (OWMP) sets out the generic measures that will be used by the Principal Contractor (PC) to mitigate potential adverse impacts during construction on the water environment; monitor construction activities and provides an action plan that would be used in the event of a pollution incident.

1.1.2 This OWMP will be converted into a full Water Management Plan (WMP) during the detailed design phase post-Development Consent Order (DCO) consent, prior to commencement of works in accordance with the Requirements in Schedule 2 of the DCO **[TR010044/APP/3.1]**. Furthermore, under certain circumstances the WMP will need to be updated by the PC, as appropriate and necessary, and initial proposals for this are described in Section 1.

1.2 Purpose of the OWMP

1.2.1 The purpose of this OWMP is to detail the water management principles and procedures throughout the construction period of the Scheme.

1.2.2 The OWMP and the future detailed WMP will ensure that the following are complied with during construction:

a. The requirements of relevant environmental legislation.

b. The measures relied upon in the assessment of effects as reported in the Environmental Statement **[TR010044/APP/6.1]**.

c. Any conditions of environmental permits or other permissions/licences are complied with during construction.

1.2.3 It will be the responsibility of the PC to ensure the Scheme is executed in a manner compliant with the WMP, which will be based on this OWMP.

1.2.4 This OWMP has been developed by Highways England and will be adopted and implemented by the PC.

1.2.5 In preparing the WMP the PC will need to update this OWMP and set out:

a. The site and scheme-specific measures to control, manage and treat construction site runoff, and reduce the risk from chemical spillages.

b. a pollution incident response plan.

1.2.6 Any mitigation measures will be in keeping with the objectives, requirements and mitigation measures set out in this OWMP, including how clean and dirty water will be kept separate, how fine sediment will be trapped and removed from construction runoff, and how chemical spillages will be managed. The PC will also have a duty of care to those who benefit from Private Water Supplies (PWS).

1.2.7 Overall, the PC will implement this plan as a minimum, and in doing so will need to ensure that:

a. The OWMP is implemented in accordance with this First Iteration Environmental Management Plan (EMP) **[TR010044/APP/6.8]** and a Pollution Control Plan.

b. Their Construction Method Statements (or otherwise entitled) are prepared in line with the minimum requirements set out in this OWMP. Certain activities may require third party consultee approval of specific construction tasks as required by the Protective Provisions in the DCO or other permissions are not disapplied by the DCO. In such cases the method statement will be submitted to the consultees for review and approval as per the requirements of the DCO.

c. This OWMP is reviewed regularly and under each of the specific circumstances set out later in this plan.

1.3 Aims

1.3.1 **Chapter 13, Road drainage and the water environment** of the Environmental Statement **[TR010044/APP/6.1]** describes the principles of mitigation that will need to be delivered by the PC during all construction works where they are required. Mitigation measures will include:

a. Controlling and minimising the risk of pollution to surface waters and groundwater by managing construction site runoff and the risk of chemical spillages.

b. Measures to control the storage, handling and disposal of potentially polluting substances during construction.

c. The management of activities within floodplains in the area of River Great Ouse, Stone Brook, Hen Brook, and South Brook (i.e. kept to a minimum) with temporary land take required for construction to be located out of the floodplain as far as reasonably practicable or allowances made for floodplain control measures and contingency actions. Minimising pollution risks during flooding is also an important consideration.

d. Management of water removed from cuttings, borrow pits and other excavations. Managing the risk from groundwater flooding, for example in the area of the A1 underpass, through appropriate working practices (during excavations) and with adequate plans and equipment in place for de-watering to ensure safe dry working environments.

e. Appropriate methods and mitigation measures when undertaking works within, over, under and adjacent to water bodies.

1.4 Document control

1.4.1 The future WMP will be a 'live' document, which will be kept under continuous review by the PC. This is to take into account any additional environmental information obtained during the detailed design and construction phases, changes in legislation, policy and best practice, and any lessons learned on the Scheme.

1.4.2 It will allow for the inclusion of any further conditions and amendments that arise from: the granting of any temporary works environmental permits, licences and consents; a review of environmental monitoring results; or the legitimate concerns of Third Parties. It is proposed that the WMP is reviewed to ensure adequacy under the following circumstances as a minimum:

a. On the granting of or any relevant variation to the environmental permits, licences and consents as applicable to the water environment required for the Scheme.

b. Should there be any significant changes to proposed works and/ or site-specific activities known when it was drafted.

c. Relevant changes to the approved plans of the DCO, environmental permits or other consents where the risk to the water environment from the works may change.

1.4.3 The final WMP shall include details of how changes to the WMP will be communicated to the relevant local planning authorities, and how comments received will be addressed.

1.5 Responsibilities

1.5.1 In relation to the control and management of construction works to prevent pollution of surface and groundwater, or unacceptable physical impacts to water bodies, the PC will establish the appropriate roles and responsibilities for site staff in accordance with the roles and responsibilities set out in Section 2 of this First iteration EMP **[TR010044/APP/6.8]**. The following responsibilities will apply as a minimum:

a. All personnel and sub-contractors working on the project will perform their duties in accordance with the requirements of the OWMP/WMP.

b. The Environment Manager will report regularly to the Project Manager on the status and effectiveness of the implementation of the OWMP/WMP.

c. The Environment Manager and Environmental Clerk of Works will be responsible for implementing the 'during works' Water Quality Monitoring Programme described later in this OWMP.

d. Both the Environment Manager and Environmental Clerk of Works will have powers to stop, or request a change to the method statement of, any works they consider are not compliant with this OWMP/WMP or are causing or are likely to cause pollution.

1.5.2 All staff working on site will receive appropriate training from the PC regarding:

a. The water receptors present on site.

b. Details of what impacts may occur and how to recognise them.

c. What measures and procedures should be adopted to manage risks to the water environment.

d. The pollution response procedures outlined in the WMP.

Baseline conditions

2.1 Legislation and policy context

2.1.1 **Table F2-1** summarises the relevant legislation to the assessment of impacts of the Scheme on the water environment and the development and application of mitigation measures.

Table F2-1 Summary of relevant legislation

Legislation	Summary
Water Act 2014 **(Ref 1)**	The aim of the Act (Ref 1) was to reform the water industry to make it more innovative and responsive to customers and to increase the resilience of water supplies to natural hazards such as droughts and floods.
Floods and Water Management Act 2010 **(Ref 2)**	The Act (Ref 2) requires better management of flood risk, it creates safeguards against rises in surface water drainage charges and protects water supplies for consumers. Under the Act the responsibility for flood risk management from Ordinary Watercourses (where not within an Internal Drainage Board (IDB) and surface water was passed to Lead Local Flood Authorities (LLFA).
Land Drainage Act 1991 (as amended) **(Ref 3)**	The Act (Ref 3) requires that a watercourse be maintained by its owner in such a condition that the free flow of water is not impeded. Under this Act (as amended by the Floods and Water Management Act 2010) (Ref 2) permission is required from the LLFAs for works that affect the flow in Ordinary Watercourses.
Water Resources Act 1991 (as amended) **(Ref 4)**	The Act (Ref 4) sets out the responsibilities of the Environment Agency (EA) of England and Wales in relation to water pollution, resource management, flood defence, fisheries, and in some areas, navigation. The Act regulates discharges to controlled waters, namely rivers, estuaries, coastal waters, lakes and groundwaters.
Salmon and Freshwater Fisheries Act 1975 (as amended) **(Ref 5)**	The Act (Ref 5) aims to protect salmon and trout from commercial poaching, to protect migration routes, to prevent wilful vandalism and neglect of fishery's, ensure correct licensing and water authority approval.
The Water Environment (Water Framework Directive) (England and Wales) Regulations 2017 **(Ref 6)**	*The Water Framework Directive* (WFD) (Ref 6) establishes a legislative framework for the protection of surface waters (including rivers, lakes, transitional waters and coastal waters) and groundwater. It requires that all inland and coastal waters within defined river basin districts achieve 'good status' and defines how this should be achieved through the establishment of environmental objectives and ecological targets for groundwater and surface waters. Transposed into law in England and Wales via the *Water Environment (Water Framework Directive) (England and Wales) Regulations 2003* (Ref 7). Until revoked these regulations continue to apply in England.

Legislation	Summary
The Environmental Permitting (England and Wales) Regulations 2016 (as amended) **(Ref 8)**	These Regulations (Ref 8) requires operators of 'regulated facilities' to obtain a permit or to register some activities, which would otherwise require permits, as 'exempt facilities'. The discharge of unclean water to controlled waters may require an Environmental Permit under these Regulations.
The Environmental Damage (Prevention and Remediation) Regulations 2015 **(Ref 9)**	These Regulations (Ref 9) oblige those who create environmental damage, whether by water pollution, adversely affecting protected species or sites of special scientific interest (SSSIs), or by land pollution that causes risks to human health, to not only cease the damage, but also to implement a wide variety of remedial measures to restore an affected area.
The Eels (England and Wales) Regulation 2009 **(Ref 10)**	These Regulations (Ref 10) afford new powers to the EA to implement measures for the recovery of European eel stocks and have important implications for operators of abstractions and discharges.
The Groundwater (England and Wales) Regulations 2009 **(Ref 11)**	These Regulations (Ref 11) aim to prevent the entry into groundwater of 'hazardous substances' and the pollution of groundwater and provides a framework for the EA's regulation and management of groundwater.
The Control of Substances Hazardous to Health Regulations 2002 (as amended) **(Ref 12)**	*The Control of Substances Hazardous to Health Regulations* (Ref 12) (COSHH) requires employers to control substances that are hazardous to health and includes nanomaterials. These enforced by the Health and Safety Executive.
The Control of Pollution (Oil Storage) (England) Regulations **2001 (Ref 13)**	These Regulations (Ref 13) require anyone in England who stores more than 200 litres of oil, to provide more secure containment facilities for tanks, drums, Intermediate Bulk Containers and mobile bowsers. This is to prevent oil escaping into the environment. They are also known as the *Oil Storage Regulations* (Ref 13).

2.2 Existing water bodies

2.2.1 With reference to **Chapter 13, Road drainage and the water environment** of the Environmental Statement **[TR010044/APP/6.1]**, the following key water bodies have been identified within the 1 kilometre study area (from southwest to northeast) and which may be affected by the Scheme during construction (refer to **Figure 13.1** and **Figure 13.2** of the Environmental Statement **[TR010044/APP/6.2]**):

a. Begwary Brook.

b. Rockham Ditch.

c. South Brook.

d. River Great Ouse.

e. Stone Brook and unnamed tributaries.

f. Hen Brook and unnamed tributaries.

g. Wintringham Brook and tributaries.

h. Fox Brook and tributaries.

i. Gallow Brook and tributaries.

j. Headwater tributaries of West Brook.

k. Headwater drain to Eastern Brook, flowing to Bourn Brook.

l. Various ponds that are considered to be close to the works or online along watercourses downstream.

m. Groundwater - Superficial Secondary A Aquifer in the River Terrace Deposits and Alluvium.

n. Groundwater - Superficial Secondary Undifferentiated Aquifer in the Oadby Formation (Glacial Till).

2.2.2 Within Chapter 13, Road drainage and the water environment of the Environmental Statement [TR010044/APP/6.1]:

a. **Table 13-4** details of the classifications that apply to each water body (e.g. WFD, Main River and Ordinary Watercourse).

b. **Table 13-5** details of the location and description of ponds and their ecological potential.

c. **Table 13-7** provides a summary of the importance of each water body (although all water bodies are controlled waters and all should be equally protected from adverse impacts that may occur during construction works).

2.2.3 The following watercourses are also present within the 1 kilometre study area; however, these will not be impacted as they are away from the works or upstream of them:

a. River Kym.

b. River Ivel.

c. Duloe Brook.

d. Colmworth Brook.

2.2.4 Full descriptions of the watercourses that are directly crossed by the Scheme are provided in **Chapter 13, Road drainage and the water environment** of the Environmental Statement **[TR010044/APP/6.1]** (please also refer to **Figure 13.1** and **Figure 13.2** of the Environmental Statement **[TR010044/APP/6.2]**).

2.3 Flood risk

2.3.1 The Flood Risk Assessment (FRA) presented in **Appendix 13.1** of the Environmental Statement **[TR010044/APP/6.2]** assesses the present risk of flooding from all sources including fluvial, surface water, groundwater, artificial sources and sewer and water supply infrastructure. The Scheme is mainly situated on Flood Zone 1; however, some areas of land in the area of the following watercourses may be at risk of flooding:

a. River Great Ouse.

b. Rectory Farm / Stone Brook Tributary.

c. South Brook.

d. Hen Brook.

2.3.2 The Scheme is generally at low risk from surface water flooding, although there are some areas of medium and high risks associated with watercourses. The Scheme would not result in an increase in surface water flood risk.

2.3.3 The majority of the Scheme is located within fluvial Flood Zone 1 (low probability) except where it traverses each of the watercourses, in these areas the Scheme is shown to coincide with Flood Zone 3 (high probability) for River Great Ouse, Rectory Farm/Stone Brook Tributary, South Brook and Hen Brook.

2.3.4 The surface water flood risk over the majority of the study area is categorised as 'Very low' (less than 0.1% Annual Exceedance Probability). However, where the Scheme traverses an ordinary watercourse, the surface water flood risk increases and becomes 'Low' (between 0.1% and 1% Annual Exceedance Probability (AEP)), 'Medium' (between 1% and 3.33% AEP) and 'High' (greater than 3.33% AEP). Naturally risk is higher in areas closest to the all watercourses, as shown in **Figure 6.7** in **Appendix 13.4** of the Environmental Statement **[TR010044/APP/6.3]**.

2.3.5 The risk of flooding from artificial sources within the study area is considered to be very low.

2.3.6 Based on the ground investigation data, the conceptual model assessment and the groundwater susceptibility flood risk map, the risk of groundwater flooding is considered to be low in the vast majority of the study area with the only exception of the western part of the Scheme where the potential for groundwater flooding risk is considered to be high due to the shallow groundwater conditions and the potential for groundwater-surface water interaction in the floodplain of the River Great Ouse.

2.3.7 Due to the distance from the coast and the ground levels above predicted future tide levels and distance from coastal regions, the area is not considered to be at risk of tidal flooding.

2.3.8 Given the rural nature of the area surrounding the Scheme and known records of previous incidents, the flood risk from sewers is considered to be low.

Potential impacts on the water environment from the Scheme

3.1 Potential impacts

3.1.1 The Scheme has the potential to cause adverse impacts to the water environment during construction. These impacts are reported in **Chapter 13, Road drainage and the water environment** of the Environmental Statement **[TR010044/APP/6.1]**. The following sections describe the potential effects of the Scheme and provide the context for the mitigation measures referred to later in this OWMP.

3.1.2 During construction adverse effects may occur from the impacts on water quality due to deposition or spillage of soils, sediments, oils, fuels, or other construction chemicals, or through mobilisation of contamination following disturbance of contaminated ground or groundwater, or through uncontrolled site runoff.

3.1.3 Construction activities such as earthworks, excavations, site preparation, levelling and grading operations result in the disturbance of soils. Exposed soil is more vulnerable to erosion during rainfall events due to loosening and removal of vegetation to bind it, compaction and increased runoff rates.

3.1.4 Excavation works may also create preferential pathways for potential contaminants to enter groundwater through the mobilisation of sediments and/or leaching. These are greatest in areas with permeable soils and a relatively high water table.

3.1.5 Finally, works to watercourses can lead to the disturbance or generation of fine sediment or have a higher risk of pollution given the proximity of the works to flowing water. In the case of the River Great Ouse viaduct, there is also the risk of materials, equipment and chemicals falling from the bridge into the river below.

3.1.6 Surface runoff from such areas can contain excessive quantities of fine sediment, which may eventually be transported to watercourses where it can result in adverse impacts on water quality, flora and fauna. Construction works within, along the banks and across watercourses can also be a direct source of fine sediment mobilisation. When excessive levels of fine sediment enter a watercourse, it may smother macrophytes, invertebrates and substrate important for fish and invertebrates (particularly fish spawning gravels).

3.1.7 Dewatering activities may also generate excessive quantities of fine sediment within the abstracted water. If the abstracted water is not treated and discharged to watercourses properly, it can result in adverse impacts on water quality, flora and fauna.

3.1.8 Areas that are at risk of flooding may also present a greater risk of water pollution. Should a large fluvial flood event occur during the construction period, out of bank flows may erode bare surfaces that have been stripped of vegetation or earth and other material stockpiles and potentially carry this material back into the watercourse as the flood water recedes. This material may then be re-deposited further downstream within the channel, which may result in an adverse impact. In addition, it is also possible that flood waters will enter excavations and will become trapped and thus will need to be pumped out and discharged with appropriate pollution management measures.

3.1.9 Fine sediment pollution can also have trophic effects on fish through changes in invertebrate communities in response to high and persistent sediment loads and effects on food sources. Furthermore, it may reduce water clarity and increase turbidity, exerting a negative effect upon primary production. Suspended solids may also depress oxygen levels in the water by reducing the potential for plants to photosynthesise and exerting a Sediment Oxygen Demand. Fine sediments in runoff may also be associated with chemical pollutants or could increase flood risk where it builds up in sufficient quantities.

3.1.10 Contamination of surface waters, groundwater and soil could result from leakage and spills of fuels, oils, chemicals and concrete during construction affecting watercourses indirectly via site runoff or directly where works are close to and within a water body. Contamination may reduce water quality and impact aquatic fauna and flora. For example, pollution from oils can have an adverse effect on the water environment, as it spreads over the surface in a thin layer that stops oxygen getting to the plants and animals that live in the water.

3.1.11 Concrete and cement products are highly alkaline and may affect the pH balance if released into a water body. Additional impacts from concrete/cement fines are similar to those of other fine sediments, but may also cause damage to fish gill lamella, leading to fish suffocation and mortality.

3.1.12 Finally, the River Great Ouse is navigable from Bedford to the Wash at King's Lynn with connections to the River Nene via the Middle Level, the Cam, the Lark, the Wissey and Little Ouse. The total navigable length is approximately 120 kilometres (75 miles) and is used for recreation. The location of the Scheme is towards the most inland extent of the navigable River Great Ouse, with Bedford being approximately 18 kilometres (11 miles) upstream of the existing Black Cat roundabout.

3.1.13 The EA provided information in response to a data request regarding navigational use of the River Great Ouse. They noted that this is not the most heavily used section of the navigation. However, during busy summer weekends approximately 50 craft would pass through the Scheme area (upstream or downstream) per day. This would be a mix of narrow boats, wide beam boats and cruisers. However, detailed vessel movement numbers and craft type data are not available. There is also a marina (Kelpie Marine Boat Yard) adjacent to the A1 southbound bridge (NGR TL 16190 54619) with riverside moorings extending approximately 500m downstream of the A1. There is another smaller

marina approximately 100m upstream of this location. Furthermore, the Bedford River Festival is a multi-event festival that takes place in July and includes numerous river based activities. It is expected that higher than usual boat traffic would be expected during this period along the River Great Ouse. The next event is to be held in July 2021.

3.1.14 Works across the River Great Ouse will require the temporary closure of navigation rights, causing disruption to waterway users.

Mitigation, monitoring and consents

4.1 Prior to construction / detailed design stage

Monitoring

4.1.1 A programme of water quality, level and flow monitoring will be undertaken pre-construction, during construction, and for a short period post-construction works. The scope of monitoring will be defined during detailed design post-DCO consent, although the following represents minimum requirements. Statutory bodies should also be consulted on its scope.

4.1.2 Water bodies to be monitored and the scope of monitoring will be based on risk assessment but should include all watercourse (and possibly some ponds) that may be adversely impacted during the construction works. This will include watercourses that may be affected by new structures, diverted/realigned/re-routed, are close to the works, or potentially affected by dewatering of deep excavations (e.g. Rockham Ditch and South Brook). Monitoring may be undertaken on a catchment or sub-catchment basis, providing sufficient data can be collected.

4.1.3 Pre-construction monitoring will include regular monthly (as a minimum) visits to all watercourses and major water bodies that could be impacted by the Scheme for the recording of visual and olfactory observations, collection of in situ monitoring using a hand held water quality meter (e.g. for temperature, dissolved oxygen, turbidity and electrical conductivity), and collection of water samples for laboratory analysis (to include as a minimum appropriate physico-chemical parameters, major ions, total and dissolved heavy metals, hydrocarbons and organic compounds, sanitary pollutants and nutrients). A minimum of 12 months of water quality monitoring will be undertaken in advance of the works commencing on site (or otherwise agreed with the EA/LLFAs).

4.1.4 The flow in watercourses should also be recorded by observations or in some instances measured as flows can have a significant impact on the concentration of chemicals in the water and this information will be relevant to the interpretation of monitoring data during construction works. In particular, flow monitoring is important for Rockham Ditch and South Brook as these are located close to proposed borrow pits and other deep excavations. For these watercourses water level loggers will be installed and spot flow gauging carried out for a period of 12 months (or otherwise agreed with the EA) to ensure there is a good understanding of the flow regime prior to any dewatering works nearby.

4.1.5 The final scope of pre-construction (and any further) monitoring will be agreed with the EA, LLFAs and the Bedford Group of IDBs, Bedfordshire and River Ivel area during the detailed design stage post DCO-consent. The monitoring programme should be sufficiently comprehensive to ensure there is a robust baseline against which the monitoring during construction works can be compared to.

4.1.6 After completion of the baseline monitoring the Environmental Clerk of Works (ECoW) or other suitably qualified person will prepare a Water Quality Baseline Report that will be issued to the EA, the Bedford Group of IDBs, Bedfordshire and River Ivel area, the LLFAs (i.e. Cambridgeshire County Council, Central Bedfordshire Council, and Bedford Borough Council) and the health departments of local planning authorities that are not LLFAs (i.e. South Cambridgeshire District Council and Huntingdonshire District Council) in advance of construction works commencing on Site.

4.1.7 No PWS (i.e. any supply of potable water to one or more properties that is not provided by a water company) have been identified. However, this will be reviewed by the PC during the detailed design phase in consultation with the Environmental Health Departments of the various local planning authorities. If any PWS are identified the PC will need to undertake a risk assessment of the supply from the proposed works, and if required, undertaken supply investigation and monitoring.

Construction dewatering strategy

4.1.8 A construction dewatering strategy will be prepared by the PC in accordance with the Groundwater Risk Assessment presented in **Appendix 13.7** of the Environmental Statement **[TR010044/APP/6.3]** and **Chapter 13, Road Drainage and the Water Environment** of the Environmental Statement **[TR010044/APP/6.1]**.

4.1.9 The purpose of the construction dewatering strategy will be to:

a. Review and update existing ground investigation data and refine the Groundwater Risk Assessment to confirm the final volume estimates of water that may need to be dewatered and the likely quality of that water.

b. Consider how phasing/sequencing of the excavation of borrow pits and other cuttings will influence the amount of water that may need to be managed at any given time.

c. Undertake a feasibility assessment of options to remove water from the Site, including undertaking appropriate ecological and hydromorphological surveys, and hydraulic modelling (if necessary). Disposal options may include, but are not limited to:

   i. Re-use of water on-site (e.g. dust suppression);

   ii. Discharge to local watercourses (some discharge may be required to augment flows if future monitoring determines that the flow in local watercourse is being affected by the dewatering operation);

   iii. Direct discharge to the River Great Ouse via temporary pipelines or by mobile bowser; and

   iv. Spraying to nearby fields.

d. Subject to further surveys, modelling and assessment, determine the volume, rate and duration of flows that can be discharged to local watercourses without resulting in significant flood risk or environmental effects, or non-compliance with the WFD. Note that some water may need to be discharged to replenish any temporary reduction in baseflow.

e. Where it is deemed not possible to discharge all of the water removed from excavations and borrow pits to a nearby watercourse, and there are no other alternative options, the PC will consider methods to reduce further the ingress of groundwater (and overland flow) into borrow pits or excavations (e.g. working smaller area at a time or sealing the borrow pit/excavation by a suitable method).

f. Where water is to be discharged to watercourses agree with the regulating authority:

   i. The constraints on the discharge (e.g. no discharge when flows in the receiving watercourse exceed a certain level at a certain location etc.) and what pre-treatment may be required.

   ii. The scope of water quality and water level monitoring that is required (it is expected that baseline monitoring will be required for a period in advance of the works. This is to be agreed with the EA but is assumed to be a minimum of 12 months).

g. Provide technical information to support applications to the EA for a Water Abstraction Licence under the *Water Resources Act 1991* (Ref 4) and a Water Activity Environmental Permit under the *Environmental Permitting (England and Wales) Regulations 2016* (Ref 8), and potentially a Land Drainage Consent from the Bedford Group of IDBs), Bedfordshire and River Ivel area in accordance with the *Land Drainage Act 1991* (Ref 3) (where it is not agreed to disapply these regulatory processes through the DCO; refer to the **Consents and Agreements Position Statement [TR010044/APP/3.3]**).

Groundwater dewatering from the A1 underpass

4.1.10 The assessments reported in **Chapter 13, Road drainage and the water environment** of the Environmental Statement **[TR010044/APP/6.1**] have been based on the assumption of a sealed system being used at the location of the A1 underpass, but with an allowance made for groundwater ingress to be managed by the drainage system (including attenuation before being discharged to South Brook).

4.1.11 Details of the volume estimates are presented in **Appendix 13.7** of the Environmental Statement **[TR010054/APP/6.3]**.

4.1.12 The detailed design stage will accordingly include a review and consideration of options to prevent groundwater ingress, in consultation with the Environment Agency.

Water Framework Directive mitigation and enhancement strategy

4.1.13 A WFD mitigation and enhancement strategy will be prepared by the PC to develop site specific and appropriate environmental enhancements for various watercourses affected by the Scheme within the Order Limits, taking into consideration restrictions where works may be proposed between the highway boundary and the Order Limits.

4.1.14 The principles of the strategy have been agreed with the Environment Agency; however, these will be developed to reflect the objectives and outline enhancement options described in:

Appendix A **Chapter 13, Road drainage and the water environment** of the Environmental Statement **[TR010044/APP/6.1]**.

Appendix B **Appendix 13.1** of the Environmental Statement **[TR010044/APP/6.3]**.

4.1.15 The location of watercourse reaches to be considered for enhancement are shown on the Environmental Masterplan on **Figure 2.4** of the Environmental Statement **[TR010044/APP/6.2]**.

4.1.16 To support the determination of appropriate interventions and where, it will be necessary to carry out further geomorphic and ecological surveys as well as consider other constraints (for example flood risk, utilities, landowner requirements).

4.1.17 The Environment Agency shall be consulted during the preparation of the strategy to ensure that, where possible, existing Environment Agency WFD mitigation measures are taken into account. Agreed interventions will then need to be developed during the detailed design phase and implemented as part of the works.

HEWRAT and spillage risk

4.1.18 The detailed design of sustainable treatment measures will be in accordance with best practice guidance contained in the following documents:

Appendix A **Appendix 13.2** of the Environmental Statement **[TR010044/APP/6.3]**.

Appendix B **Appendix 13.3** of the Environmental Statement **[TR010044/APP/6.3]**.

Appendix C **Appendix 13.4** of the Environmental Statement **[TR010044/APP/6.3]**.

Appendix D **Chapter 13, Road drainage and the water environment** of the Environmental Statement **[TR010044/APP/6.1]**.

4.1.19 The design of these measures should not increase flood risk, by providing level for level and volume for volume flood compensation for Scheme's impacts on floodplain capacity, high flow culverts, retainment of storm flows greater than greenfield rates using sustainable urban drainage systems.

4.1.20 Should changes be made to these measures during the detailed design stage, the water quality assessment (HEWRAT and spillage risk) of new or modified road catchments will need to be reviewed and updated.

Mitigation of highway runoff

4.1.21 The water quality assessment reported in **Chapter 13, Road drainage and the water environment** of the Environmental Statement **[TR010044/APP/6.1]** is risk based approach, involving a sensitivity test analysis to investigate the effect of reducing the treatment performance of measures in the treatment train after the first measure.

4.1.22 This test identified that Road Network 15 may marginally fail against the short-term dissolved metals EQS.

4.1.23 To minimise the risk of insufficient treatment being provided by the Scheme, the design of the final ditch at the detailed design stage should be optimised for treatment, and should take into account site constraints (for example the incorporation of an additional pocket wetland(s) which may provide enhanced and incremental treatment prior to the receiving watercourse).

Drainage design

Culverts

4.1.24 The detailed design of new culverts will be informed by a geomorphologist to ensure that flow is adequately conveyed without interruption of any sediment transport processes, or the risk of formation of channel interruption due to excessive erosion or deposition, and that opportunities to enhance channel form and biodiversity are maximised.

4.1.25 The impact assessment presented in reported in **Chapter 13, Road drainage and the water environment** of the Environmental Statement **[TR010044/APP/6.1]**, and in **Appendix 13.1** of the Environmental Statement **[TR010044/APP/6.3]**. If, during the detailed design stage, the 10% contingency length included for in the assessment needs to be exceeded within each WFD water body catchment affected, the Environment Agency will be consulted to confirm that the mitigation and enhancements proposed remain adequate.

Highway outfalls

4.1.26 Where an engineered outfall is required, the location, position and orientation of any new outfall will be carefully determined during the detailed design stage. This will be informed by a hydromorphological survey to minimise: any local adverse impact on river processes; the loss of riparian habitat; the need for bed scour or hard bank protection; and localised flow disturbance or disruption to sediment transport processes.

4.1.27 Where possible, pre-fabricated concrete headwalls will be used to avoid the need to pour wet concrete into formwork close to watercourses.

Watercourses

4.1.28 As the Scheme will require watercourses to be diverted, re-aligned and re-routed, the detailed design of these channels will be informed by a

geomorphologist and ecologist, and be based on appropriate site survey and appraisal.

4.1.29 Details of these watercourses are presented in **Chapter 13, Road drainage and the water environment** of the Environmental Statement **[TR010044/APP/6.1] [TR010044/APP/6.1]**.

4.1.30 Detailed design should ensure flood risk is not increased, that flow is adequately conveyed without interruption of any sediment transport processes or the risk of formation of channel interruption due to excessive erosion or deposition, and that opportunities to enhance channel form and biodiversity are maximised.

4.1.31 Due to the existing modifications to most channels there are opportunities to provide enhancement over the baseline, with new channels being more natural, with greater geomorphic diversity, improved hydro-ecology, riparian habitat, and floodplain connectivity. Creation of vegetated buffer zones and fences could also future-proof the watercourse from adverse effects of diffuse agricultural pollution locally. Removal of any invasive plant species and the creation of wider buffer zones to support future management of diffuse agricultural pollution will also be considered where applicable. The design of altered watercourse channels and riparian corridors will also need to take into account flood risk, utilities, and landowner requirements.

Drainage ditches

4.1.32 The detailed design of new highway drainage ditches (from road drainage networks 3, 5, 6, 11 and 17) and land drainage ditches throughout the Scheme would be informed by a geomorphologist and ecologist.

4.1.33 Details of these ditches are presented in **Appendix 13.2** of the Environmental Statement **[TR010044/APP/6.3]**.

4.1.34 An engineered channel form will be avoided in favour of a more ‘natural’ channel in terms of planform, variety of cross-sections, and creation of riparian habitat (e.g. incorporating alternating shallow berms). The design will need to take into account site specific constraints and operational requirements, but should also seek to maximise biodiversity and connectivity with the existing watercourse network.

4.1.35 Where the new ditch joins an existing watercourse the hydromorphology of the receiving watercourse must be taken into account in the design. The ditches will also need to be suitably landscaped and their margins planted to provide riparian habitat to compensate for new culverting. Ditches will be designed so that they are sustainable and self-regulating, and so that ecology that develops in the new lengths of channels will not be impacted by future maintenance works.

4.1.36 Future maintenance of these ditches will take into account their biodiversity function as well as drainage requirements.

Permissions

4.1.37 The Scheme crosses a Main River, River Great Ouse, and numerous ordinary watercourses (see **Figure 13.1** of the Environmental Statement **[TR010044/APP/6.2]**). The proposed works in, around and over the River Great Ouse will require a flood risk activity permit from the EA under the *Environmental Permitting (England and Wales) Regulations 2016* (Ref 8), where exemptions do not apply. These would be for temporary and permanent works in and around the River Great Ouse. In addition to a flood risk activity permit from the EA, the following consents may also be required for construction works:

a. Temporary Water Abstraction Licence under Section 24 of the *Water Resources Act 1991* (Ref 4) for abstractions above $20m^3$ of water from a watercourse or ground source or less than $20m^3$ where the abstraction is to last more than 28 consecutive days.

b. Water Transfer Licence under Section 24 of the *Water Resources Act 1991* (Ref 4) for the diversion of any watercourse where more than $20m^3$ per day is moved from one source to another.

c. Water Impoundment Licence under Section 25 of the *Water Resources Act 1991* (Ref 4) for any structures within inland waters that can change water levels and flow.

d. An Environmental Permit(s) for the discharge of any temporary discharges of 'unclean' water to inland waters.

e. Land Drainage Consent under Section 23 of the *Land Drainage Act 1991* (Ref 3) for works that may affect the flow in ordinary watercourses.

f. Approvals from the Bedfordshire and River Ivel IDB (i.e. Land Drainage Byelaw consents) for works to Rockham Ditch, South Brook and Stone Brook.

g. Approval from the Central Bedfordshire Council Drainage Board under their byelaws for works to Stone Brook if this area falls under the statutory control of the Central Bedfordshire Drainage Board.

h. Trade Effluent Consent under the *Water Industry Act 1991* (Ref 14) for the purposes of discharging any trade effluent from welfare facilities.

i. Approvals from Cambridge Water / Anglian Water for diversion of underground water main assets.

j. Consent to temporarily suspend navigation rights on the River Great Ouse under the *Anglian Water Authority Act 1977* (Ref 15) in order to have temporary closure of the river for the construction of the viaduct.

4.2 During construction

Best practice guidance

4.2.1 All construction works for the Scheme will be undertaken in accordance with best practice techniques to avoid any pollution of waterbodies directly or indirectly, and will be delivered through the Second Iteration EMP and its associated management plans (e.g. WMP), based on the content of the First Iteration EMP **[TR010044/APP/6.8]**.

4.2.2 Relevant best practice guidance is outlined in **Table F4-1**.

Table F4-1 Summary of relevant best practice

Guidance	Document ID (where provided)	Publication year (where provided)
Above ground oil storage tanks: GPP 2 **(Ref 16)**	GPP 2	2018
Works and maintenance in or near water: GPP 5 **(Ref 17)**	GPP 5	2018
GPP 8 Safe storage and disposal of used oils **(Ref 18)**	GPP 8	2017
GPP 13: Vehicle washing and cleaning **(Ref 19)**	GPP 13	2017
GPP 19: Vehicles: Service and Repairs **(Ref 20)**	GPP 19	2017
GPP 21: Pollution Incident Response Plans **(Ref 21)**	GPP 21	2017
Dealing with spills: GPP 22 **(Ref 22)**	GPP 22	2018
GPP 26: Safe storage of drums and intermediate bulk containers **(Ref 23)**	GPP 26	2019
Working at construction and demolition sites: PPG6 **(Ref 24) [WITHDRAWN]**	PPG 6	2012
Use and design of oil separators in surface water drainage systems**: PPG3 (Ref 25) [WITHDRAWN]**	PPG 3	2006
Managing fire water and major spillages: PPG18 **(Ref 26) [WITHDRAWN]**	PPG 18	2000
British Standard - Code of practice for earthworks **(Ref 27)**	BS6031:2009	2009
British Standard - Code of practice for surface water management for development sites **(Ref 28)**	BS8582:2013	2013
Control of water pollution from construction sites – Guidance for consultants and contractors **(Ref 29)**	C532	2001
CIRIA C609B Sustainable drainage systems. Hydraulic, structural and water quality advice **(Ref 30)**	C609	2004

Guidance	Document ID (where provided)	Publication year (where provided)
CIRIA C624 Development and flood risk – guidance for the construction industry **(Ref 31)**	C624	2004
CIRIA C648 Control of pollution from linear construction sites – Technical Guidance **(Ref 32)**	C648	2006
Construction Industry Research and Information Association (CIRIA) C741 Environmental good practice on site guide, 4th Edition **(Ref 33)**	C741	2015
CIRIA C753 The SuDS Manual 2nd Edition **(Ref 34)**	C753	2015
Pollution prevention pays in England and Wales **[WITHDRAWN] (Ref 35)**	Not applicable	2013
Regulatory Position Statement: Temporary dewatering from excavations to surface water **(Ref 36)**	Not applicable	April 2020

4.2.3 As detailed in **Chapter 13, Road drainage and the water environment** of the Environmental Statement **[TR010044/APP/6.1]** mitigation measures will be implemented during the construction phase as based upon those detailed in the Guidance for Pollution Prevention (GPP) documents and the EA's Pollution Prevention Guidelines (PPG), which aim to prevent water resource pollution.

4.2.4 Although withdrawn in 2015, the PPGs still provide useful information and for some topics there are no corresponding GPPs yet. Notwithstanding their advice on the management of construction to avoid, minimise and reduce environmental impacts, the PPGs should not be relied upon to provide accurate details of the current legal and regulatory requirements and processes. They are referred to in this OWMP alongside other current guidance, and in the context of the Scheme and future site-specific mitigation measures by the PC.

4.2.5 Although the GPPs have been produced by the environment agencies of Northern Ireland, Scotland and Wales only, they represent environmental good practice for the whole of the UK and are more current that previous PPGs that are technically withdrawn.

4.2.6 In addition, **Chapter 5, Air quality** of the Environmental Statement **[TR010044/APP/6.1]** proposes a range of standard control measures to control dust from construction activities. These measures are presented in the Air Quality Management Plan within this First Iteration EMP **[TR010044/APP/6.8]**. and are relevant in that they can require the use of water and lead to the formation of construction site runoff containing high levels of fine material.

Training

4.2.7 All construction site staff will attend a Toolbox Talk on the risks to the water environment from construction site runoff and chemical spillages and the proposed measures set out in this OWMP.

4.2.8 Toolbox Talks will be given by a suitably qualified person (i.e. an environmental professional, the Environmental Manager (EM) or the ECoW). Construction workers shall not be authorised to work on site until they have received this Toolbox Talk. Technical notes shall be provided to all staff and put up on notice boards in relevant locations.

Monitoring

4.2.9 During construction water quality, water level and flow monitoring will be undertaken by the EM/ECoW or other suitably qualified person to ensure that mitigation measures are operating as planned and preventing pollution. The purpose of the monitoring programme would also be to ensure that should pollution occur it is identified as quickly as possible and appropriate action is taken in line with the Pollution Control Plan. The scope of water quality monitoring will be as per the Water Quality Monitoring Plan prepared pre-works. During construction, and post-construction where considered necessary, it is anticipated that as a minimum water quality monitoring would consist of regular site visits to make visual and olfactory observations, the use of in-situ water quality monitoring, and regular sampling for laboratory analysis. It is not anticipated that water samples are collected from every watercourse due to the large number of them, but rather a representative sample across each sub-catchment. During site visits any evidence of unnatural sediment accumulation that may be attributed to the construction works would also be recorded and action taken by the Principal Contractor if required.

4.2.10 As described for the pre-construction phase, flow monitoring is important for Rockham Ditch and South Brook as these are located close to proposed borrow pits and other deep excavations. The installed water level loggers and spot flow gauging should be continued throughout the period that deep excavations are active nearby and dewatering works are ongoing.

4.2.11 For works close to, in, under or over watercourses or ponds, the workers on site should keep constant observations of water quality so that if pollution is suspected this is identified as quickly as possible. The EM/ECoW should closely monitor these works, which depending on the circumstance may require daily visits, during which visual/olfactory observations can be made and in-situ water testing carried out. Ad hoc site visits by the EM/ECoW or other suitably qualified person is also required during periods of heavy or prolonged rainfall. Works elsewhere across the site may also contribute to the risk of water pollution, but given their distance from water bodies can be monitored less frequently but still on a regular basis (e.g. weekly).

4.2.12 The EM/ECoW or other suitably qualified person will prepare monthly Water Quality Monitoring Reports to be issued to the PC and discussed at monthly progress meetings. This will include details of site observations and routine laboratory testing, as well as reports on any incidents that have occurred and the lessons that can be learned from them.

4.2.13 It is anticipated that post completion of the works water quality monitoring would continue for a short period of time to verify that the works have been completed without adversely affecting water quality in the long term. The monitoring period is to be confirmed and will require consultation with the EA/LLFAs/IDB, but should be a minimum of three months and at least three visits/water samples collected from each water body.

4.2.14 The EM/ECoW will be responsible for undertaking any investigations required as a consequence of the programme of water quality monitoring. This will include liaison with EA and the local authorities about the production of Incident and Lessons Learned Reports. These reports will detail actual impacts, describe the outcomes of actions taken, proposals for additional monitoring of affected site and receptors, and potentially changes to method statements, works processes and staff training.

General measures

4.2.15 Mitigation measures can be considered as source control (i.e. to prevent fine sediment-laden runoff forming and to treat contaminated runoff close to where it forms), barriers and conveyance measures (i.e. to prevent site runoff draining uncontrolled into water bodies and to direct and treat it en-route to storage areas), and storage and final treatment areas (i.e. where water is stored on site and treated to the required quality prior to it being discharged from the site).

4.2.16 In any construction site temporary drainage system and treatment management scheme, it is typical for a combination of sustainable drainage systems (SuDS) or proprietary measures (i.e. engineered device for treatment such as a lamella clarifier) to be used. Measures are often used in series to make maximum use of available space and to ensure adequate removal of fine sediment prior to any discharge being made from the site (for example runoff may be initially stored in a small storage lagoon before being pumped via settlement tanks or lamella clarifiers to final treatment storage areas). Examples are provided in Appendix 1.

4.2.17 Information on the type of measures that could be implemented is provided in **Appendix A** with reference to good practice guidance *C648 Control of Water Pollution from Linear Construction Projects – Technical Guidance* (Ref 32). The specific treatment will be determined by the PC and will be adapted throughout the works depending on the need and circumstances at any given time, and ensuring the same outcomes are achieved. However, measures that may be used include:

a. Drainage cut-off ditches with check dams and/or sediment traps.

b. Fabric silt fences, sandbags and straw bales.

c. Earth bunds and settlement lagoons.

d. Settlement tanks, lamella clarifiers, and skips in series filled with clean aggregate or straw bales.

e. Baffle pads or other measures to dissipate flow energy on any temporary outfalls to water bodies.

Timing of works and programming

4.2.18 The timing of certain works or the programming of specific tasks on 'day-to-day', 'week-to-week' and 'month-to-month' basis can be important to reduce the risk of water pollution occurring during the construction period. It is recognised that many factors affect programme and avoidance of the wetter months of the year or periods of wet weather is unpractical. However, where this can be done the PC should look for opportunities to reduce the water pollution risk. It is recommended that the following principles are adopted:

a. Earth moving works and excavations should, where possible, be undertaken during the drier months of the year (typically early spring to early autumn).

b. When undertaking earth moving works periods of very wet or prolonged wet weather will be avoided, if possible, to minimise the risk of generating runoff contaminated with fine particulates. Where this is unavoidable, the adequacy of standard mitigation measures to control fine sediment laden runoff should be continuously reviewed.

c. Areas of vegetation clearance and top-soil strip should be limited as much as practicable. Where possible, vegetation clearance across the Scheme will be phased to minimise the areas of exposed ground and reduce the potential risk for runoff.

d. Flow should ideally only be allowed back along diverted channels once banks have been stabilised by vegetation, which typically takes approximately 12 months. Where this is not possible, the design of the new channel and new geomorphic features may need to be protected by the use of various sustainable products (e.g. coir matting/rolls) where deemed necessary by the design and what stabilisation period there is. Regular inspections of the post-diversion works will be carried out until 12 months have passed. Protection measures are needed where there is a risk of excessive sediment erosion/mobilisation.

Construction site establishment and general earthworks

4.2.19 During the initial preparation works prior to the start of construction, temporary measures to control runoff draining from the construction site will be implemented, and then managed and adapted by the PC accordingly as the works progress.

4.2.20 The proposed temporary drainage system will be developed in tandem with the detailed design and construction method statement prepared by the PC. However, this will be consistent with the objectives and treatment requirements of this plan, and the intended outcomes. The following measures are expected to be used to manage surface water:

a. Pre-construction drainage would be installed to intercept the existing land drainage system and divert water away from the working area.

b. Vehicle traffic to be limited to major path routes across the site to prevent soil compaction and associated increase in surface water runoff.

c. Construction SuDS to be used to ensure no increase in runoff rates or volumes from the construction sites and compound area (for example compound car park) to surrounding land drainage ditches and to manage surface water flood risk. Subject to consent, the SuDS would discharge to the local watercourses, ditches or to ground within the site boundaries.

4.2.21 Runoff from the construction site would not be allowed into any pond. It would only be allowed to be discharged directly into any watercourse under a Permit from the EA (where required) and following treatment and attenuation using a variety of measures alone or in combination including:

a. Identification of all land drains and their sealing using purpose-built covers or sandbags (where the risk of damage is low and providing their condition is regularly checked).

b. Sediment barriers such as silt fences, straw bales and earth bunds (used and positioned in appropriate locations).

c. Proprietary treatment measures (for example lamella clarifiers).

d. Temporary storage areas (for example settlement lagoons, tanks and skips in series).

4.2.22 The arrangements of such drainage infrastructure would be prepared during the detailed design and, as appropriate, agreed with the EA prior to the commencement of construction. The above measures would ensure that any sediment (including any adsorbed pollutants) carried in suspension in the surface water runoff from the site would have settled out to an acceptable level before it can be discharged to receiving watercourses under an environmental permit from the EA. Where required, the PC will agree with EA the acceptable suspended sediment limits in runoff discharged from the site during the application for temporary works Environmental Permits or under Protected Provisions within the DCO.

4.2.23 All earthworks will be undertaken in accordance with *BS6031:2009 Code of practice for earthworks* (Ref 27). Land disturbance will be kept to a minimum and disturbed areas will be stabilised as soon as possible after construction by seeding with grass, using geotextile covers or other suitable means.

Measures to intercept and treat suspended fine sediments

4.2.24 Mitigation measures relevant to controlling surface runoff, focusing on those areas where there would be exposed soils, excavations, storage of topsoil and other aggregate materials are summarised in this section and examples are illustrated and described in greater detail in **Appendix A**.

4.2.25 Measures will include:

a. Scheduling construction activities to minimise the area and period of time that soil would be exposed, particularly during the wetter months (i.e. autumn to early spring) or periods of forecast heavy or prolonged rain.

b. Construction areas would be demarcated from the rest of the site to minimise the direct disturbance of land not required for development.

c. Installation of cut-off drains around the working areas to intercept surface runoff and divert it around the working areas.

d. Existing land drains are to be identified and covered or protected by sand bags.

e. Minimising the stockpiling of materials and locating essential stockpiles as far away as possible from watercourses.

f. Topsoil/ subsoil will be stored away from water bodies, preferably on flat lying land. Where working space and methodology allows, topsoil will ideally be stored a minimum 20 metres away from a water body on flat land, with increasing distance on steeper topography subject to risk assessment and appropriate controls. In exceptional circumstances where site constraints mean that it is not possible to maintain a 20 metres buffer from a water body, additional mitigation measures (such as bunds) will be implemented to provide an adequate barrier between the potential source of contaminated runoff and the receptor. Smaller stockpiles could be created, reducing the pile height.

g. Movement of construction vehicles and plant would be strictly controlled to minimise the potential for soil compaction and erosion.

h. Exposed soils would be re-seeded to mitigate bare earth exposure and habitat loss as soon as possible. Geotextiles should be lain underneath areas of temporary hard standing to prevent erosion of earth beneath the stone.

i. Appropriately sized runoff storage areas for the settlement of excessive fine particulates in runoff will be provided. The PC will need to monitor the build-up of fine sediment in temporary construction SuDS and when they become ineffective either remove sediment or provide replacement measures.

j. Tools and heavy plant to be washed down and cleaned in designated areas on site only. At all wash down locations, the wash down water will be collected for treatment before discharge to surface water drainage under appropriate consent and/or agreement with EA or sewerage company, or otherwise removed from site for appropriate disposal at a licenced waste facility.

k. Debris and other material from the works will be prevented from entering surface water drainage or falling into the channel from height, through maintenance of a clean and tidy site, provision of clearly labelled waste receptacles, grid covers, the presence of site security fencing, and debris netting beneath structures.

l. Bio-security measures will be required to ensure that no invasive species are brought onto site. Measures will include checks of plant/vehicles and footwear to ensure clean and clear of potential contaminants with best

practice implemented as necessary. Refer to **Chapter 8, Biodiversity** of the Environmental Statement **[TR010044/APP/6.1]** for further details.

m. All mitigation measures would be subject to design and approval by construction managers for health and safety and environment, and by appropriate regulators for environmental compliance.

n. The rate of discharge to any watercourse of construction site runoff will be no greater than a controlled rate agreed in advance with the relevant regulatory authority (i.e. the EA, LLFAs or Bedford Group of IDBs, Bedfordshire and River Ivel area) and with appropriate measures to dissipate the flow energy at the temporary outfall to prevent erosion of the bed and banks of the receiving water body (for example correct orientation of the outfall and the use of baffle pads).

o. No discharges of construction site runoff, treated or untreated, to ponds on site (other than those being constructed as future highway treatment ponds).

p. Existing road or track crossings of watercourses should be used where possible. Where temporary crossings of the watercourses are required, open-span crossings should be used as far as possible, and plant must not enter the channel.

q. If needing to create a dry working area in the channel, the use of sand bags will be avoided if possible to avoid them breaking open and polluting the channel.

r. All access roads or purpose-built haul roads shall be kept free of mud by the use of a road sweeper, and if deemed required by the PC, a vehicle wheel wash facility on the main accesses to the site.

4.2.26 In practice, the application of these measures will be a continuously adaptive process in response to site specific constraints and changing needs on site. For example, different types and levels of treatment of fine sediment in runoff may occur depending on the time of year, the location of the works, and the nature of works being undertaken at that point in time. It is therefore not appropriate to be entirely descriptive at this stage, but to focus on the range of measures that the PC can deploy to provide the necessary water environment protection.

Measures to reduce the risk of chemical spillages

4.2.27 Mitigation measures to reduce the risk of a chemical spillage should include as a minimum:

a. Plant and machinery will be inspected before use to ensure they are clean and fit for operation on site.

b. All static plant or mobile plant parked for prolonged periods (for example overnight) will be fitted with 'plant nappies' or drip trays, which will be checked regularly and emptied if required by the PC in to the bunded waste oil containers.

c. All mobile plant will carry spill kits with other spill kits placed in seal containers and key locations close to watercourses (when there are works nearby). Spill kits are to be checked regularly and replaced immediately after use.

d. All construction workers on site to be trained in the use of spill kits.

e. Fuel oil to be stored in secure construction compounds on an impermeable surface and within a self-bunded container (capacity of the bund must be 110% the maximum oil storage).

f. Refuelling of mobile plant to be undertaken in designated construction compounds on an impermeable surface only.

g. Drilling fluids and additives (if used) will be stored appropriately in bunded tanks holding 110% of its capacity. Any waste or used drilling fluid will be stored and then tankered off-site for appropriate disposal or disposed of by other suitable method that the PC may determine.

h. Other liquid chemicals to be used on site to be stored within a secure container.

i. No equipment or materials other than those used for flow control (but excluding pumps and pipes) are to be left in the channel outside of working hours.

j. Where possible pre-fabricated concrete structures are to be used. Where this is not possible and wet concrete pours are to be made, care is to be taken when delivering the concrete to the site and during the operation. Formworks should be secure and fixed tightly to reduce egress of concrete. Measures to catch any spillage are to be provided and removed before water is allowed back into the working area.

k. Implementation of site working practices to minimise the risk of concrete spillages. In particular, specific concrete wash out facilities are to be provided away from any watercourse (minimum 20m), on flat land and operated to ensure no spillage of wet concrete to ground (for example by use of geotextiles, skips).

l. All construction compounds should be kept secure at all times to prevent vandalism and anti-social behaviour that could lead to a pollution incident.

Fuel handling and COSHH materials

4.2.28 In accordance with *The Control of Substances Hazardous to Health Regulations 2002* (Ref 12):

a. the storage of COSHH materials and waste must be in secure, bunded and sheltered area.

b. waste must be segregated.

c. COSHH liquids must not be stored in areas within Flood Zone 3.

d. areas must be supervised, and records of materials and waste stored and removed from the area recorded.

e. the handling, storage and disposal must be undertaken as described in the COSHH Assessment and any MSDS.

4.2.29 Fuel and oil (including mould oil) shall be stored in accordance with The Control of Pollution (Oil Storage) (England) Regulations 2001, with fuels and oil handled in such a way that risk of pollution is minimised. Specifically:

a. Fuel and oil storage tanks must comply with *The Control of Pollution (Oil Storage) (England) Regulations 2001* (Ref 13) and must be locked outside working hours.

b. Storage areas must not be located within 20 metres of watercourses, ponds, site drainage or within any areas of Flood Zone 3 or on a gradient.

c. Refuelling must not be permitted within 20 metres of a watercourse/pond, within 20 metres of a highway drainage gully/site drainage, or within areas of Flood Zone 3.

d. Mobile bowsers must be bunded/double skinned and must comply with *The Control of Pollution (Oil Storage) (England) Regulations* (Ref 13) and must be secured outside working hours.

e. Trained operatives must carry out refuelling of plant and equipment.

f. Plant nappies must be used during refuelling.

g. Drums must be stored in bunded areas with a minimum capacity of 25% of the total volume contained within the bund, or 110% of the largest container, whichever is the greater. Where possible, these bunds must be fitted with roofs to prevent the collection of rainwater. Individual drums in use shall be stored on a drip tray sufficient to contain 25% of the full capacity of the drum.

h. Storage tanks and drums must be maintained in a good condition, fitted with lids and labelled to indicate the contents.

i. Static combustion engine plant (e.g. compressors, lighting sets) must be integrally bunded or placed on plant nappies.

j. Bunds, tanks pipework and plant must be regularly checked for signs of damage or leaks and must be regularly maintained.

k. Spill kits must be provided within close proximity to fuel and oil storage areas, with plant that is operating in isolated areas, and in welfare facilities. Drivers, operators and stores personnel will be trained in security and the use and safe disposal of spill kits.

l. Drums must be stored in bunded areas with a minimum capacity of 25% of the total volume contained within the bund, or 110% of the largest container, whichever is the greater. Where possible, these bunds will be fitted with roofs to prevent the collection of rainwater. Individual drums in use must be stored on a drip tray sufficient to contain 25% of the full capacity of the drum.

Use of cement and wet concrete

4.2.30 There will be concrete batching plants located at the main project compound and the western compound. The area of the batching plants should be sited on impermeable hard standing away from watercourses (minimum 20 metres on flat land and further on sloping ground subject to site specific risk assessment).

4.2.31 Elsewhere on the Scheme it is not anticipated that large volumes of concrete batching will occur on site. Where possible, pre-fabricated concrete structures will be used. However, where this is not possible concrete will be delivered to the site in ready mixed lorries for casting in situ. However, some mixing of small quantities of cementitious substances is likely to take place.

4.2.32 Cement will be prevented from entering any water bodies unless it is not practical to create a dry working environment and works are critical for the construction of the project. Designated areas shall be set out for the purpose of concrete wash out and care shall be taken to ensure these are sited away from sensitive receptors such as watercourses and land drains. If these are shallow excavations they will be lined by a suitable geotextile membrane to prevent infiltration to groundwater.

4.2.33 The washing out of any concrete mixer and associated chute, tools or equipment will be carried out in a designated area away from drains and watercourses/bodies. Delivery drivers will be made aware of the requirement on arrival at site. Wash down activities will take place in designated areas consisting of impermeable and contained wash out lagoons.

Foul water from welfare facilities

4.2.34 All waste from toilet blocks must be stored in storage tanks. The storage tanks will be emptied regularly by a tanker (with appropriate waste carrier licence etc.) for offsite disposal at a suitably licenced waste water facility.

Surface water from compounds

4.2.35 The main site compound and any temporary or smaller secondary compounds should be located away from any water bodies and not within a minimum distance of 20 metres from a watercourse on flat land (and further on land sloping towards a watercourse subject to site specific risk assessment).

4.2.36 Any surface flows from compound areas that could be contaminated (for example adjacent to fuel stores) will pass through suitable attenuation and treatment measures prior to discharge to any watercourse under a permit from the EA, such as an oil separator, or otherwise pumped out for off-site disposal at a suitably licensed waste facility.

4.2.37 The generator compound would include an impermeable concrete pad with a bund, bunded fuel tanks, oil/diesel traps and drains, to mitigate against impacts on the water quality of nearby watercourses.

4.3 Working in and over watercourses – Management of pollution risk

4.3.1 All works in the channel of watercourses (including works to the banks) will be undertaken in a dry working area wherever possible. This will require the PC over-pumping or fluming the watercourse through the working area or the creation of temporary dams and barriers (for example using straw bales covered with a geotextiles and pumping equipment). The PC will ensure that there are more than adequate pumps and pipes on site for the flows anticipated.

4.3.2 All works will be planned and scheduled to minimise impacts on ecology, such as nesting or migration seasons. Proposed works to the watercourses should be programmed to minimise impacts during fish spawning (typically March-June) if possible. Please refer to **Chapter 8, Biodiversity** of the Environmental Statement **[TR010044/APP/6.1]** for further details. Protection of fish and the need for fish rescue etc. is not considered further in this OWMP.

4.3.3 For small areas of work within watercourses it may be possible to isolate an area of the bed using straw bales and/or sand bags (although the latter present greater risk of sediment pollution). Works to the banks may also be undertaken on scaffolding. However, scaffolding should be lifted from the channel at the end of the working shift and any temporary dams created by straw bales or sand bags partially breached to ensure the full channel is available for flows.

4.3.4 The PC should co-ordinate any works in the channel to periods when low flows are expected by monitoring weather forecasts on a monthly, weekly and daily basis.

4.3.5 The PC should undertake all works in accordance with the Pollution Control Plan and ensure that this includes measures to alert workers and for removing equipment from the channel when high flows are expected.

4.3.6 If temporary crossings are installed for construction purposes that are not open span, then impermeable and over-long culvert or flume pipes will be used to prevent the ingress of fine sediment that may infiltrate to the watercourse from material used to form the haul road.

4.3.7 An oil boom should be positioned across watercourses downstream of sections of the watercourse to which work is undertaken and monitored on a daily basis.

4.3.8 If required, the PC should ensure that there is equipment on site for the installation of straw bale dams across the watercourses downstream of the works to trap fine sediments. However, this measure is only likely to be necessary if it is not possible to work in the dry or for in channel works that are required for longer periods and which may experience periodic periods of higher flows that are redirected along the main channel rather than via the pumped system.

4.3.9 For works above water, particularly the construction of the River Great Ouse viaduct, debris netting will need to be secured to prevent materials and equipment falling into the channel. Care should also be taken when using chemicals on the viaduct construction to avoid spillages into the channel below.

4.3.10 Scaffolding or debris netting should be installed across the channel prior to the removal of any masonry walls etc. and works to the existing culverts.

4.4 Works affecting navigation along the River Great Ouse

4.4.1 A number of construction activities that would take place over the River Great Ouse would require navigation rights to be suspended. As the works on the structure on the river span are unlikely to be continuous, the PC would require daytime closures while a particular activity is completed. There would then be a break while this activity is completed on other spans of the viaduct that do not require river closures. These works would take place over a period of up to 8 months during which it is estimated that up to 10 weeks of river closures would be required.

4.4.2 These works would generally be undertaken in weekday day shifts and works will be checked and secured at the end of the shift, so the river can be reopened outside of working hours. It is anticipated that the river would be closed for no longer than 24 hours for any one activity to be completed and so this would be the maximum period of delay to river traffic passing the worksite. The planned closures/disruption to river access would be communicated in advance to the local area, and to interested parties, for example local marina owners, operators and hire boats.

4.4.3 The outline methodology for the physical closure of the river is as follows:

a. Temporary mooring buoys or points will be installed in the river on the approach to the proposed closure.

b. A dory type safety boat will be deployed in the river.

c. When the river is to be closed – strings of buoys will be deployed to clearly mark the closed section of the river. The safety boat will pull these buoys across the full width of the navigation and secure these in place – these will be at least 50 metres up and downstream of the extent of the worksite.

d. The dory crew will man the closure at all times and direct the public to the hold station and temporary mooring points and keep the public informed of when the navigation will reopen.

e. During the river closure the adjacent river banks will also be closed to public access with physical barriers and signs displayed to confirm the closure and warn of the hazards.

f. The EA will be consulted during further development of the proposed construction methodology at detailed design stage. The construction methodology for the construction of the River Great Ouse viaduct and associated structures will follow best practice and best practicable methods to minimise the potential for adverse impacts to the River Great Ouse and its nearby minor tributaries, as well as disruption to navigation rights.

4.5 Management of dewatering activities

4.5.1 Works will be implemented in accordance with the construction dewatering strategy (see Section 4.1).

4.5.2 In order to minimise the impact of the dewatering on groundwater and surface water resources, a scheme of groundwater control would be implemented to ensure water levels in adjacent water bodies are maintained and any discharge is of a suitable quality. This would involve a programme of water monitoring and controlled discharges.

4.5.3 It is proposed that monitoring boreholes are drilled adjacent to the western side of the Black Cat junction borrow pit to the west of the junction, and on the borrow pit to the east of the junction.

4.5.4 Gauge boards or a water level logger would be installed on Rockham Ditch and potentially South Brook adjacent to the borrow pits or at a suitable location downstream for at least 12 months before any excavation and dewatering starts at the borrow pit. Water level monitoring should be carried out in all of the boreholes and of the gauge board to establish the natural fluctuations in groundwater, stream and pond levels.

4.5.5 Once dewatering starts in the borrow pits close to Black Cat junction, the water should be discharged following settlement to remove suspended solids, to the closest watercourse (e.g. Rockham Ditch and South Brook) to maintain flows should baseflow be affected by the dewatering works. However, the rate, volume and duration of any discharge, will need to have been agreed with the regulating authority (see Section 4.1)

4.6 Draft action plan

4.6.1 In the event of an incident or emergency where contaminants have entered or are at an imminent risk of entering a watercourse or drain (for example a large chemical spillage on site), the measures set out in this section will be implemented.

4.6.2 The draft action plan sets out the triggers for action in the event that monitoring identifies anomalous or unusual results when compared to the baseline data and/or Environmental Quality Standards. The draft action plan also describes the actions to be followed depending on the level of risk triggered. The final Action Plan will need to be prepared by the PC and agreed with the EA and the local authorities. A map showing the areas of jurisdiction of the various local authorities would be located within the action plan.

4.6.3 It is proposed to align the action plan with the four point risk scale of the National Incident Reporting System where an incident is defined as a specific event or occurrence, in a single location or multiple sites, that has had or has the potential to cause environmental harm, pollution of surface and groundwater, an impact on human health, or nuisance to the local community.

4.6.4 **Table F4-2** presents the four incident categories with a description of the likely effects that may occur. The descriptions of each category are indicative and do not represent specific risks that water receptors would be exposed to from the Authorised Development.

4.6.5 **Table F4-3** presents the draft action plan including monitoring outcomes and proposed actions for each of the four classes of incident.

4.7 Incident and corrective action reporting

4.7.1 All environmental incidents must be reported and investigated.

4.7.2 Significant environmental incidents where water borne pollution is evident must be reported to the EA immediately using their 24 hour incident telephone number 0800 80 70 60. Copies of the incident investigation must be provided to the EA and the local authority.

4.7.3 Where problems are recognised, the corrective action will be identified by the PC in consultation with the EA and relevant local authority and corrective actions undertaken by the PC within a defined time frame.

Table F4-2: Incident categories

Incident category	Indicative incident description
Category 1 – major, serious, persistent and/or extensive impact or effect on the environment, people and/or property	a. Persistent impact on water quality lasting at least 7 days and affecting an extensive area over several kilometres of a watercourse or large area of a water body (for example 1 to 2 km). b. Pollution of a water body by levels of dangerous substance(s) exceeding Maximum Allowable Concentration, Environmental Quality Standards or other standards known to define conditions when serious harm/death to aquatic life or dissolved oxygen levels at critical levels may occur. c. Necessary closure of a strategically important potable water supply to prevent contamination or further contamination. d. Deterioration in ecological status or potential of a water body or prevention of reaching its objective (including physical impacts). e. Damage to a statutorily protected site or species. This may include an impact on SSSI insofar that it may prevent them from reaching or maintaining their favourable conservation status; or damage to a European protected species or its habitat that has a significant adverse effect on reaching or maintaining its favourable conservation status. f. Gross and extensive contamination or coverage of the bed of the watercourse, water column or surface by fungal/bacterial/algal growths, sewage debris or particulate matter. g. Fatality or serious effect on human health from direct contact/exposure to pollutants in surface waters, or through the supply of contaminated potable water following an incident affecting surface water or groundwater. h. Public exposed to concentration levels over a widespread area giving rise to serious and known health risks as a result of contamination of surface waters or groundwater following a pollution or algal incident. i. Supply of contaminated drinking water with levels of pollutants/pathogens exceeding toxicological limits known to cause serious health problems. j. Major adverse effect on an important recreational activity or national event such as the cancellation, partial or full suspension of recreational bathing, fishing activity or an organised water sports event.

Incident category	Indicative incident description
	k. Incidents that cause extensive damage to the physical habitat of a water body that would fall under the Environmental Damage Regulations. l. The destruction of a large or important area of fish habitat (particularly spawning areas), sustained damage to fish spawning, such as by actively digging or removing bed material used by spawning fish, and/or the illegal construction of an obstruction to fish migration (refer to EA Guidance Document Incidents and their classification: the Common Incident Classification Scheme (Ref 37) for details of guidelines on incident class thresholds for numbers of fish mortality and types).
Category 2 – significant impact or effect on the environment, people and/or property	Significant effect on the quality or use of that water but normally localised. Typically include fine sediment (>500 mg/l compared to background levels), low dissolved oxygen levels or high ammonia along hundreds of metres to potentially kilometres of a watercourse or area of a water body. Precautionary closure of a strategically important potable water supply to prevent contamination of source. Necessary closure of a minor un-licensed potable water supply. Significant action / treatment by operator to address deterioration in water quality (for example blending with uncontaminated water). Significant but localised or temporary deterioration in ecological status or potential of a WFD (Ref 6) water body or delaying the water body reaching its ecological objectives (including physical impacts). Damage to a statutorily protected site or species, but no significant effect on favourable conservation status. Significant damage to Biodiversity Action Plan (BAP) species or habitats, which affects the viability of the species locally and/or extensive/significant damage to non-statutory protected site or BAP habitat that affects the nature conservation status of the site or habitat. Gross but localised contamination or coverage of the bed of the watercourse, water column or surface by fungal/bacterial/algal growths, sewage debris or particulate matter. Significant effect on human health from direct contact/exposure to pollutants in surface water or groundwater, or through the supply of contaminated potable water following an incident.

Incident category	Indicative incident description
	Public exposed to concentration levels giving rise to minor health problems due to contamination of surface waters or groundwater following a pollution or algal incident. Supply of contaminated drinking water with levels of pollutants or pathogens known to cause minor health problems. Significant adverse effect on a recreational activity or event appropriate to the surface water body such as the cancellation of a local event or short lived disruption (for example less than one week). Significant but localised destruction of fish habitats, interference with spawning fish by creating disturbance, such as by sustained paddling/moving through a spawning area, and/or incidents involving the illegal obstruction to fish migration, including illegal alteration to a fish pass (refer to EA Guidance Document *Incidents and their classification: the Common Incident Classification Scheme* (Ref 37) for details of guidelines on incident class thresholds for numbers of fish mortality and types).
Category 3 – minor or minimal impact or effect on the environment, people and/or property	Limited and localised effect (around point of discharge but could include lower magnitude effects over a few kilometres) on a water body which has a minimal impact on the quality or use of that water. Precautionary closure of a minor un-licensed potable water supply. Minor action/treatment by operator to address deterioration in water quality (for example blending with uncontaminated water). Very limited or no significant effect on the status or objectives of a *WFD* (Ref 6) water body. Bed, column or surface of watercourse only marginally contaminated around point of discharge or in localised area. Such as a limited growth of sewage fungus around an outfall pipe. Very limited impact upon nature conservation sites. Reversible small-scale, short-term damage to non-statutorily protected sites or BAP habitats or species. Minor effect on human health from direct contact to pollutants in surface waters or groundwater, or through the supply of contaminated potable water following an incident (for example a few individuals with temporary sore throats). Public exposed to concentration levels that present no known or minimal risk to health.

Incident category	Indicative incident description
	Minor impact on amenity value, recreational fishing activity and/or aesthetic quality (for example small amount of litter, thin oil film, non-harmful colour changes). Minor loss of fish habitat and/or interference with spawning fish resulting in localised, limited damage, such as by paddling/moving through a spawning area (refer to EA Guidance Document *Incidents and their classification: the Common Incident Classification Scheme* (Ref 37) for details of guidelines on incident class thresholds for numbers of fish mortality and types).
Category 4 – substantiated incident with no impact.	No measurable adverse impacts.

Table F4-3: Incident category, monitoring evidence and actions

Incident Category	Monitoring Outcomes	Examples	Proposed actions
Categories 1 & 2	Significant pollution incident evident by Visual Inspection and/or water quality monitoring.	Spillage of significant volumes of fuel, construction runoff containing high levels of fine sediment or powder cement into a watercourse.	Fully implement Incident and Emergency Response procedure as described in the Pollution Control Plan. Immediately stop all relevant works (that may reasonably be the source of the pollution) until investigation completed and corrective actions agreed with EA/local authority. Inform EA/local authority immediately and seek advice regarding pollution containment and remediation. Notify any relevant third parties immediately (for example PWS). Prepare Incident and Lessons Learned Report and issue to EA/local authority. Report should detail actual impacts, outcomes of actions taken, and proposals for additional monitoring of affected site and receptors.
Category 3	Visual Inspections and/or water quality monitoring results deviate from baseline or now exceed Environmental Quality Standards.	Moderate elevation in total suspended sediment levels, fine sediment deposits across river bed gravels or some minor evidence of oil sheen / odour on the surface of water.	Investigate likely causes and pause relevant construction works. Confirm Construction Method Statements are being implemented correctly and mitigation measures operating as required. If yes, review Construction Method Statements and adequacy of mitigation measures. Prepare Incident and Lessons Learned Report and issue to EA/local authority to agree any remedial action if required. Consider making additional Visual Inspections and water quality sampling.
Category 4	Water quality monitoring results slightly deviate from baseline.	No obvious visual impacts.	No immediate actions. Continue to monitor in accordance with monitoring plan.

Appendix A Indicative silt management techniques

Fabric silt fences

These are geotextiles installed in the path of sheet flow runoff to filter out sediment. They are often installed around water bodies, below the toe of a cleared slope or around temporary earth stockpiles. Silt fences detain sediment-laden water and promote settlement and may remove 80-90% sand, 50-80% silty loam, and up to 20% silt-clay loam in runoff (CIRIA 648, 2006).

Measures to control rate of temporary discharge

If the rate and energy of temporary discharges are not controlled there is a risk of eroding the bed and banks of the receiving water body. The use of baffle pads or boulders below the outfall are both ways in which the energy of the outfall can be dispersed to avoid bank and bed erosion.

Silt bubble barriers

Bubble barriers are essentially tubes deployed on the bed of the watercourse which emit bubbles. They can control movement of silt with the additional advantage of delivering an oxygen enriched environment. Without this, silt plumes can raise oxygen demand in the waterbody, thereby causing stress to aquatic organisms. They can also be used for general aeration of lakes and ponds.

Silt mats and silt check dams

Silt mats are used to capture sediment as it drops out of suspension and should be located in areas of natural deposition where water energy is low. They are typically staked to the bed and have a natural fibre matrix to contain sediment effectively and prevent resuspension.

Silt check dams are also available (e.g. wood waste filter media or rocks within netting). They are used to reduce speed of flow in ditches and swales, and distribute flows across the channel.

Earth bunds

These are temporary barriers to conveyance of construction runoff and can be used to create temporary storage lagoons or barriers between construction works and water bodies. Care needed as earth bunds may themselves be a source of fine sediment, although this can be minimised by covering with a suitable geotextile or seeding if they are to be in place for a longer period of time and not part of topsoil storage.

Drainage grips (option to include check dams / sumps)

Drainage grips (otherwise known as cut-off or temporary drains) are temporary drains installed to intercept runoff from slopes above construction works to prevent it entering the site or cleared slopes within the site itself. They are an effective way to temporarily manage surface water runoff and convey flows contaminated with fine sediment to storage and treatment areas. Gravel and straw bale check dams can be created at regular intervals to encourage fine sediments to settle out during conveyance.

Pumps, settlement tanks and lamella clarifiers

Pre-treatment of construction site runoff can be provided by first pumping runoff through a settlement tank. These use gravity to encourage fine particulates to settle out and become trapped at the bottom of the tank. Greater levels of treatment can be achieved by using Lamella Clarifiers that include a series of inclined plates to provide a larger effective settling area for a small footprint. There are a range of products depending on application and flow rates and these can also be deployed in series and with chemical dosing tanks, if required.

Chemical treatments and dosing tanks

Chemical dosing tanks provide a way in which high concentrations of metals in runoff can be precipitated out before the treated water is discharged from the site. Chemical dosing tanks are often containerised, partly to reduce the risk of chemical spillage.

Chemical flocculation treatments are also available, often in block form that slowly release into the water. Flocculation is the process by which negatively charged particulates bind together in the presence of a positively charged flocculant.

Tanker for off-site disposal

Where it has not been possible to adequately treat construction site runoff there remains the option to pump the runoff out to a tanker for disposal off-site at a suitably licensed waste facility.

Sand bags / straw bales

Sand bags provide a flexible way to prevent sediment-laden runoff entering a watercourse by creating temporary dams and barriers to runoff. This is most effective on the face of temporary watercourses crossings and short length land depressions where there are preferential flow pathways.

Like fabric silt fences and sand bags, straw bales are a multipurpose way to manage construction site runoff to prevent untreated ingress to water bodies and to support the filtration of fine particulates from runoff.

Vegetated buffer zone

Vegetated buffer zones protect water bodies by provided a separation between the water body and the area of construction works and a means by which any overland flows can be treated before it drains to the water body. When planning the works a Contractor should minimise the area of vegetation clearance, especially around water bodies to maintain natural buffer zones.

Temporary settlement lagoon

Temporary settlement lagoons are an effective way to remove suspended fine particulates from construction site runoff by storing water and allowing the fine particulates to settle out. Where high concentrations are expected, a long retention time is required for significant settlement (due to the very fine nature of the sediment), or space is limited, a series of lagoons may be required with intervening gravel weirs, or the use of a flocculent could be considered. The storage required depends on site requirements, character of fine sediment, and the duration of works.

Measure: Primary & Secondary Purpose

MEASURE	SOURCE CONTROL	CONVEYANCE	TREATMENT
Fabric silt fences	●	○	○
Earth bunds	●	○	
Sand bags & straw bales	●	○	○
Silt curtains	●		
Temporary discharge control	●	●	
Drainage grips		●	○
Vegetated buffer zones			●
Conveyance swales		●	○
Silt bubble barriers	●		○
Pumps, tanks, lamella clarifiers		●	●
Temporary settlement lagoons			●
Skips in series			●
Silt mats and check dams		○	●
Tanker for off-site disposal	○	○	○
Chemical treatments & dosing tanks			●

● Primary Purpose of Measure
○ Secondary Purpose of Measure

Silt curtains / nets

Floating silt curtains are designed to control and manage sediment flow within standing waters. It consists of a top flotation pocket below which is suspended vertically an impermeable curtain, and then a ballast at set intervals to hold the curtain in place. It is typical for a bespoke curtain to be created for the particular water body (i.e. changes in bathymetry, flow conditions can be taken into account). Similar products exist for use in low river flows, although they are generally less effective than when deployed in calmer water.

Conveyance swale (option to include check dams / sumps)

Similar to drainage grips, conveyance swales provide a way in which construction site runoff can be directed to storage and treatment areas. The wider cross sectional area of a swale when compared to a drain encourages greater settlement of fine particulates. Settlement can be enhanced by the inclusion of check dams and sediment traps, although the build-up of deposited fine material will need to be monitored and regularly cleared out.

Skips in series

Where there are constraints on space that prohibit the use of construction SuDS (i.e. settlement lagoons as described above) an alternative option might be to drain runoff through a series of skips filled with clean aggregate or straw bales to encourage filtration and settlement of suspended fine particulates.

15 Annex G – Energy and resource use management plan

1.1 Background to the plan

1.1.1 This Outline Management Plan (OMP) sets out the generic measures that will be used by the Principal Contractor (PC) to be implemented to manage general measures and techniques that shall be employed during construction of the Scheme to contribute to the aim of reducing the use of energy and resources, which can affect residential occupants, businesses and commercial facilities, users of the road and public rights of way network, users of open space, and sensitive ecological sites and habitats.

1.1.2 This OMP will be updated by the PC into a final Management Plan, as appropriate and necessary, prior to commencement of works in accordance with the Requirements in Schedule 2 of the Development Consent Order (DCO) **[TR010044/APP/3.1]** and must incorporate the requirements of the First Iteration Environmental Management Plan (EMP) and the Second Iteration EMP.

1.2 Responsibilities

1.2.1 In relation to the control and management of energy and resource use, the PC shall establish the appropriate roles and responsibilities for site staff in accordance with the roles and responsibilities set out in Section 2 of this First Iteration EMP.

1.3 Energy and resource efficiency

1.3.1 Opportunities exist to implement measures into the construction of the Scheme to provide more efficient and cost-effective use of energy and resources, and thereby reduce carbon and water footprints.

1.3.2 The following measures and techniques shall be investigated and evaluated by the PC and, where appropriate and feasible, be incorporated into the design and management of construction compounds and working areas on the Scheme:

a. The use of double-glazed windows and efficient insultation within site offices and welfare units to reduce heat loss.

b. Conducting regular site audits to identify opportunities for energy savings and to check that lighting, equipment and facilities are running efficiently.

c. The control of lighting through passive infrared sensors to reduce energy consumption.

d. The control of heating and cooling units individually, allowing areas not in frequent use to be turned down or off when required, to reduce energy consumption.

e. The use of ‘switch off’ labels on electrical switches, lighting and appliances to encourage users to turn apparatus off when not in use, promoted by a ‘switch off campaign’ via a lunch and learn session covering energy and resource efficiency, to reduce energy consumption.

f. The use of rainwater harvesting equipment and greywater recycling equipment to recycle water resources and reduce reliance on mains water supplies.

g. The specification of low-energy or energy star rated appliances and equipment.

h. The use of alternative energy sources for certain appliances, such as solar power for the site accommodation, task and security lighting and hot water to reduce energy consumption.

i. The deployment of toolbox talks to all site operatives to encourage them to switch off construction plant, equipment and machinery, to reduce fuel and energy consumption.

j. The use of green energy tariffs on the main site compound.

k. Undertaking lifecycle costing for construction plant, equipment and machinery, and also the hiring of accommodation, specifying low energy, battery powered and hybrid powered equipment where feasible.

l. Installing sub-metering and regularly recording and reporting on-site energy use to identify areas of high consumption and potential efficiencies.

m. The sustainable use of soil and aggregate materials won from excavation and demolition activities, to minimise greenhouse gas emissions associated with the importation of materials to site and embodied carbon associated with additional materials.

1.4 Water efficiency

1.4.1 Water minimisation techniques shall be implemented and managed during construction through the application of the water hierarchy.

1.4.2 Where practicable, water management shall target techniques and measures at the top of the hierarchy. Where this is not feasible, a combination of options from within the hierarchy shall be applied:

a. **Eliminate** - eliminate water use by identifying if the water-using process or activity is really necessary and/or if there is a cost-effective alternative to using water.

b. **Substitute** - identify and use alternative non-potable sources and eliminate inappropriate use of drinking (potable) water, and assess whether rainwater or greywater can be used for the activity or process.

c. **Reduce** - explore options that improve efficiency e.g. by regular maintenance of water using equipment to ensure they are working to maximum efficiency, metering and monitoring supplies, and the updating of fittings and/or processes.

d. **Re-use** - identify whether water, including greywater, can be treated or filtered for reuse in a process or activity – for example wheel washing.

e. **Recycle** - identify if and where water can be recycled for use off-site.

f. **Disposal** - dispose of excess water legally and responsibly such that there is no flooding, pollution or inconvenience to stakeholders.

1.4.3 Water conservation measures, selected to minimise potable water use, shall be considered for implementation during construction of the Scheme and may include the following:

a. Connections to mains water to be metered to determine consumption levels.
b. Construction of attenuation tanks as early as possible to capture runoff for re-use.
c. Utilisation of groundwater obtained from dewatered excavations.
d. Utilisation of non-potable water.
e. Circulation and treatment of water used for any piling and drilling operations.
f. Utilisation of push taps, waterless urinals and other water-saving devices within welfare facilities.
g. Capturing and re-use of rainwater.

1.5 Environmental champion

1.5.1 The PC shall appoint one or more environmental champion(s) for both the site office and the construction site, who shall be responsible for promoting good environmental practice, ensuring the works run efficiently, and identifying and recording resource savings across the Scheme during construction.

1.5.2 Duties shall include, but not be limited to, the following:

a. The monthly reporting of utilities consumption to inform the site Environmental Management System (EMS).
b. Undertaking lifecycle costing.
c. The tracking of the carbon footprint and related emission streams.
d. Targeting reduction in key materials, waste and fuel during the course of the contract.
e. The tracking of the Scheme's water footprint, encompassing mains water usage, abstraction and beneficial re-use on-site.

1.5.3 All beneficial re-use of materials, as well as resources saving measures and associated cost reductions on site, shall be recorded and monitored.

16 Annex H – Materials management plan

1.1 Background to the plan

1.1.1 This Outline Materials Management Plan (OMMP) sets out the generic measures that will be implemented by the Principal Contractor (PC) to manage materials during construction of the Scheme.

1.1.2 This OMMP will be updated by the PC into a final Materials Management Plan (MMP), as appropriate and necessary, prior to commencement of works, in accordance with the Requirements in Schedule 2 of the draft Development Consent Order (DCO) **[TR010044/APP/3.1]** and must incorporate the requirements of this First Iteration Environmental Management Plan (EMP) and the Second Iteration EMP.

1.2 Purpose of the OMMP

1.2.1 This OMMP provides outline information on the key procedures that will be detailed in the MMP, as required by the following documents:

a. Contaminated Land: Applications in Real Environments (CL:AIRE), *The Definition of Waste: Development Industry Code of Practice (V2)*, March 2011 (DoWCoP) (REF 1-1).

b. *The Environmental Permitting (England and Wales) Regulations 2016* (REF 1-2) (as amended).

1.2.2 This OMMP outlines the procedures and measures that will be adopted and implemented by the PC to classify, track, store, reuse and dispose of the materials that will be encountered during the construction of the Scheme.

1.3 Overview

1.3.1 Under *DoWCoP*, the MMP is prepared based on Scheme specific information, as set out in paragraph 1.3.3. The Scheme specific information is used to set out the tracking system for material movement, contingency arrangements and a verification plan.

1.3.2 The tracking system is a plan for tracking, monitoring and reporting on material use and the quantity of residual waste, including the creation of waste contingent to other on-site activities, for recovery and/or for off-site recovery or disposal.

1.3.3 To satisfy the requirements of an MMP under *DoWCoP*, the following documents will be prepared, where not already available, and used to development the MMP:

a. A Preliminary Sources Study Report or Phase I Geo-environmental and Geotechnical Desk Study to collate and assess the information available for the site. The Phase I Desk Study will also include an initial Conceptual Site Model (CSM).

b. Where the assessment of data and the CSM in the Phase I Desk Study identifies potential risks to human health and/or the environment, a ground investigation is required together with the preparation of a Phase II interpretive report to determine whether the site is affected by contamination. Risk assessment utilising a tiered approach is required whether contamination is present or not, which is then followed by an options appraisal to identify appropriate and effective remediation techniques for the types of contamination (if any) identified at the site.

c. Where the site is affected by contamination, the data collated from the preceding assessments and documents will be used to prepare a Remediation Strategy.

d. Where a site is not affected by contamination, the data collated from the preceding assessment and documents will be used to prepare a Design Statement.

e. The MMP will be prepared using the data and the Remediation Strategy or Design Statement developed for the Scheme (as appropriate).

f. Where validation testing and/or remediation is required, a verification plan, which reviews the information already available and collected during development of the Design Statement or Remediation Strategy, will be developed.

g. On completion of the works, a verification report will then be prepared based on the collated factual information obtained from the works. The verification report will provide an audit trail to show that the materials and wastes have gone to the correct destination.

1.3.4 It is anticipated that the MMP will complement, and be an integral part of, the earthworks for the construction of the Scheme, including the excavation and restoration of the borrow pits. Some of the details to be included in the MMP will be dependent on the Design Statement or the Remediation Strategy, and/or the Earthworks Series 600 Specification Appendices for the Scheme, in terms of excavated materials that will be available for the earthworks at the site. In turn, the MMP and the information provided to support material evaluation will assist with the overall classification of materials and wastes.

1.3.5 This OMMP is based on the information currently available. The PC will prepare the MMP prior to the commencement of works. The PC will be responsible for preparing, updating and implementing the MMP and ensuring that all required authorisations, consents and permissions are obtained.

1.4 Roles and responsibilities

1.4.1 At the time of writing this OMMP the roles and responsibilities for the parties involved in the preparation and implementation of the MMP and the earthworks for the Scheme are set out in **Table H-1.**

Table H-1: Roles and responsibilities

Role	Responsibility	Contact
Site Operator / Land Owner	Highways England	to be confirmed
Planning Authority	The Planning Inspectorate	to be confirmed
Environment Agency	East Anglia Region	to be confirmed
Principal Contractor	To be confirmed	to be confirmed
Designer (Earthworks)	To be confirmed	to be confirmed
Qualified Person (*DoWCoP*)	To be confirmed	to be confirmed

1.4.2 In relation to the control and management of materials, the PC will establish the appropriate roles and responsibilities for site staff in accordance with the roles and responsibilities set out in Section 2 of this EMP.

1.4.3 The PC will ensure that all personnel working on the site, including sub-contractors, are inducted and appropriately trained in the requirements of the MMP.

1.5 Materials classification

1.5.1 All materials that are anticipated to be encountered during the earthworks, won from demolition works or imported onto site to be used in the works will be individually classified and identified. An example is set out in **Table H-2**.

Table H-2: Material identification and classification

Material type	Classification	Anticipated final destination of material
On-site topsoil / subsoil to be stripped	T/S	Reuse as topsoil / subsoil within landscaped areas (following assessment against reuse acceptability criteria)
On-site natural ground	NG	Reuse as general fill (following assessment against reuse acceptability criteria)
On-site made ground	MG	Reuse as general fill (following assessment against reuse acceptability criteria)
Recovered on-site made ground	RMG	Reuse as general fill (following assessment against reuse acceptability criteria)
Site won demolition materials	DM	Reuse as general fill (following assessment against reuse acceptability criteria)

1.5.2 The material classification system will enable the identification of different sources of the same type of material. This will be achieved by designating each source with a unique reference number or letter.

1.5.3 Where a particular material is not suitable for its proposed reuse destination then the material will be reused at an alternative location on-site subject to assessment against the appropriate geochemical and geotechnical reuse acceptability criteria (refer to Section 1.8 of this OMMP).

1.6 Materials tracking and storage

1.6.1 The first stage of the materials tracking process is the identification and classification of the various separate materials.

1.6.2 A system will be put in place to identify and track all material movements including site-won earthworks materials, site-won demolition materials, imported materials, materials for off-site management / disposal and, if assessed to be applicable, material undergoing on-site remediation.

1.6.3 This system will include the creation of a site-specific coordinate grid-system or end-use area system to geographically locate the areas of material excavation and backfilling within the Scheme area. The tracking system will include the facility to identify the excavated materials that are to be temporarily stored separately on-site in designated stockpiling area(s) whilst awaiting the results of testing, waiting to be reused on-site, or waiting for off-site disposal.

1.6.4 The tracking system will be maintained utilising an electronic database (e.g. Excel, Access) and/or a Geographic Information System (GIS). Material movements will be tracked by a combination of Global Positioning System (GPS) and database collation, allowing temporary stockpiles to be easily located and referenced to the applicable testing data for the material. The tracking system will be a dynamic system that will be updated as required.

1.6.5 A material transfer proforma will be developed for use by on-site personnel responsible for moving materials, in order to track material movements around the site efficiently. An example material transfer pro-forma is shown in **Table H-3**.

1.6.6 As part of the database management system, responsibility will be assigned to a specified person(s) for record keeping on-site. The individual will be responsible for acquiring and collating all material movement and site testing data throughout the works.

1.6.7 Where site-won materials that exhibit exceedances of any reuse acceptability criteria (geochemical or geotechnical) have been segregated and deemed suitable for on-site processing or remedial treatment, the tracking system will record the progress of the material through the specific remedial process, including all associated testing required to validate the material as part of that process.

1.6.8 Where site-won materials that exhibit exceedances of any reuse acceptability criteria (geochemical or geotechnical), have been segregated and deemed unsuitable for on-site processing or remedial treatment, the tracking system will record the temporary storage of the material prior to off-site management or disposal including all associated testing and documentation required.

1.6.9 The records of all materials movements on-site and off-site will be kept by the PC in paper and electronic format for a minimum period of two years following completion of the works and a verification report will be produced.

Table H-3: Example site-specific material transfer pro-forma

Requirement	Record
Reference number:	
Place of collection (grid / GPS reference / stockpile reference):	
Date of excavation / collection:	
Description of material being transferred:	
Classification of material:	
Volume / mass of material transported:	
How is the material contained?	Loose:
	Skip:
	Drum:
	Covered lorry:
	Other:
Point of temporary placement (which stockpile):	
Date of temporary placement:	
Date of anticipated future move:	
Anticipated future destination:	
What contaminants (if any are known) are present:	
Additional comments:	
Point of final placement (including depth):	
Date of final placement:	

1.7 Data management

1.7.1 Data will be stored electronically on-site. Data uploads will be undertaken at appropriate intervals during the earthworks. All data will be geo-referenced and all stockpile sample nomenclature will ensure individual identification.

1.8 Verification plan and reporting

1.8.1 A verification plan will be set out in the MMP. It will identify how the placement of materials will be recorded and the quantity of material to be used. It will also state how the use of the materials relates to the design or remediation objectives.

1.8.2 The objectives of the works will be identified in the Design Statement or Remediation Strategy (as appropriate). Initial draft objectives include:

a. To ensure that the materials used are geochemically suitable for the proposed end use.

b. To ensure that the materials used are geotechnically suitable for the proposed end use.

c. To ensure that the works are undertaken in such a way as to prevent potential pollution to the environment.

d. To promote the reuse of site-won materials at the site wherever possible, and minimise off-site disposal.

Demonstrating material geochemical acceptability

1.8.3 Site-won earthworks materials (including materials from areas of cut and borrow pits), site-won demolition materials and any imported earthworks materials, will be subject to a suite of chemical laboratory analysis appropriate to the ground conditions at the site. The results of the analysis will be assessed against the reuse acceptability criteria which will be provided in the Earthworks Series 600 Specification Appendices for the Scheme. The review process will be documented for inclusion in the verification report.

1.8.4 No materials will be used in the works where the results indicate exceedance of the reuse acceptability criteria, which will be developed to be protective of human health and controlled water in respect to the proposed end use.

1.8.5 The review process will classify the material as either suitable for reuse, unsuitable for reuse or that further testing is required.

1.8.6 If the materials are deemed unsuitable for use on the site, the data used for the assessment, or any additional testing identified, will also be used to characterise any waste in line with *Technical Guidance WM3* (REF 1-3), providing the sampling plan meets the requirements of Appendix D of *WM3* (REF 1-3).

Demonstrating material geotechnical acceptability

1.8.7 Site-won earthworks materials (including materials from areas of cut and borrow pits), site-won demolition materials, and any imported earthworks materials, will be subject to geotechnical laboratory analysis. The results of the analysis will be assessed against the material classification criteria and reuse acceptability criteria. The review process will be documented for inclusion in the verification report.

1.8.8 Compacted material will also be subject to in-situ and laboratory geotechnical testing to determine the achieved level of compaction. No material will be allowed to remain in place where, following comprehensive review, the results indicate the achieved level of compaction does not meet the required standard.

Demonstrating effectiveness of treatment

1.8.9 Where materials have been identified as unsuitable and have been removed from the works, they will be either designated for off-site disposal or on-site processing or remedial treatment.

1.8.10 Where materials are subject to remedial treatment, the specific treatment approach will be monitored via field measurements and laboratory sampling of the materials. The testing will be carried out by the PC providing the processing or remediation process within the terms of the (Mobile) Environmental Permit and Site Specific Working Plan.

1.8.11 The results of the laboratory testing and field measurements will provide lines of evidence to allow validation of the remediation works, in addition to comparison of determined concentrations against the specified reuse acceptability criteria. Where materials cannot be validated as having been treated to the required standard it will either be resentenced for treatment or, if this is impractical, the material will be sent for off-site management or disposal.

1.8.12 The results of all field and laboratory testing and the acceptability assessment will be documented per batch of remediated material.

Demonstrating effective removal of unsuitable materials

1.8.13 Materials that are surplus to requirements on-site or are assessed as being unsuitable for use in the works, may need to be removed from site as waste.

1.8.14 The waste classification of the material will be determined prior to removal from site. The guidance in *WM3* (REF 1-3) and *dispose of waste to landfill* (REF 1-4) will be followed and includes:

a. An assessment, based on chemical analysis data, to determine whether the material is hazardous waste, or not. Reuse acceptability criteria testing can be used providing the approach to sampling matches the requirements of *WM3* (REF 1-3), which the sampling plan should be designed to ensure.

b. Preparation of basic waste characterisation including, identifying the source, origin and composition of the waste, and the relevant waste code.

c. Identification of appropriate pre-treatment of waste, registered waste carrier(s) and destination of the waste materials.

d. Where wastes are to be disposed of to landfill, undertaking Waste Acceptance Criteria (WAC) testing to identify the type of landfill that the waste can be sent to and to enable landfill operators to determine whether they can accept it.

1.8.15 All of the above will be documented for inspection by the Regulator and included in the verification report.

Demonstrating protection of controlled waters

1.8.16 The environmental monitoring will include sampling of groundwater and surface water to provide evidence that the works are not mobilising contaminants in groundwater which may also impact surface waters. The results of all monitoring rounds will be documented.

Verification reporting

1.8.17 Upon completion of the works and subsequent monitoring (where deemed necessary) a verification report will be produced which will bring together all the "as built" information and geochemical laboratory testing results to provide a narrative to the development earthworks.

1.8.18 The verification report for the Scheme will include the following information relating to the geochemical and geotechnical assessment of materials:

a. A general description of the works and earthworks.
b. Details of all excavated material classifications including site location references and volumes.
c. Details of all exposed (at base or sides of excavations) material classifications including site location references and volumes.
d. Details of all visual inspections of material.
e. Details of all imported material classifications and volumes.
f. Results of all geochemical and geotechnical testing relating to all imported and treated materials.
g. The results of the assessments of material acceptability.
h. Details of all geochemical remedial treatment undertaken (including process details, volumes, specific materials undergoing treatment, results of the treated material).
i. Details of the final placement of excavated, treated and imported materials (linked to the assessment of material acceptability).
j. Details of the achieved levels of compaction of earthworks materials.
k. Details of any geotechnical remedial measures that have been undertaken (e.g. Lime modification).
l. Details of the materials sent for off-site disposal; including waste classification, volumes and disposal location.
m. Results of all WAC testing.
n. All waste transfer documentation for the materials disposed of off-site.
o. Details of any discharge consents (Environmental Permits) required for the works.
p. The Environmental Permit details for the landfill operators accepting wastes from site or relating to any on-site remedial treatment processes.

q. The monitoring records and laboratory analysis results for all monitoring.

r. Details of any alterations / amendments made to the Design Statement or Remediation Strategy (as appropriate).

s. Details of any contingency measures undertaken during the works.

t. Details of all correspondence with the regulatory authorities during the works.

u. As-built drawings showing surveyed original ground levels, levels of base of temporary excavations, temporary side slopes of excavations, positions of samples and tests carried out, and the MMP grid system.

v. As-built drawings showing surveyed finished ground levels and positions of point-of-placement samples and tests carried out.

17 Annex I – Contaminated land management plan

1.1 Background to the plan

1.1.1 This Outline Management Plan (OMP) sets out the generic measures that will be used by the Principal Contractor (PC) to be implemented to manage the arrangements for undertaking risk assessments of potential areas of contaminated land, the storage and disposal of contaminated materials, the remediation of contaminated land and measures to be undertaken to avoid or reduce the potential for the contamination of geological and soils resources during construction of the Scheme, which can affect residential occupants, businesses and commercial facilities, users of the road and public rights of way network, users of open space, and sensitive ecological sites and habitats.

1.1.2 This OMP will be updated by the PC into a final Management Plan, as appropriate and necessary, prior to commencement of works in accordance with the Requirements in Schedule 2 of the Development Consent Order (DCO) **[TRO10044/APP/3.1]** and must incorporate the requirements of this First Iteration Environmental Management Plan (EMP) and the Second Iteration EMP.

1.2 Responsibilities

1.2.1 In relation to the control and management of potential areas of contaminated land, the PC must establish the appropriate roles and responsibilities for site staff in accordance with the roles and responsibilities set out in Section 2 of this First Iteration EMP must be established by the PC.

1.3 Legislation and best practice

1.3.1 Under the voluntary CL:AIRE: The Definition of Waste: Development Industry Code of Practice (Ref 1-1), a Materials Management Plan (MMP) must be produced for the Scheme, together with a declaration from a registered Qualified Person.

1.3.2 The CL:AIRE Code of Practice (Ref 1-1) serves the following purposes:

a. It sets out good practice for the development industry to use when assessing on a site-specific basis whether excavated materials are classified as waste or not, and determining on a site-specific basis when treated excavated waste can cease to be waste for a particular use.

b. It describes an auditable system to demonstrate that the code has been adhered to.

1.4 Encountering unanticipated contaminated land

1.4.1 Potential exists for previously unidentified contamination to be present within the ground in areas associated with the Scheme.

1.4.2 Potentially contaminated land may be identified by way of observation of any unusual physical, visual or olfactory characteristics of impacted soil or groundwater, such as changes in colour, texture, visual evidence, or odour.

1.4.3 Unexpected finds may include unexpected discovery of hazardous building materials, such as asbestos containing materials, or the unexpected discovery of

contaminants in addition to the types already identified on-site, such as surface or buried material with visual or olfactory evidence of contamination.

1.4.4 To address the potential risk from encountering unexpected contamination a watching brief must be maintained across all areas where excavation works are to be undertaken.

1.4.5 The person assigned to undertake the watching brief must be vigilant and suitably qualified in identifying potential indicators of contamination.

1.4.6 Where contamination is encountered during excavation works, in accordance with best practice, work in the area of concern will be halted until a suitably qualified specialist (in consultation with the relevant local authorities) is able to make an assessment. Further, in accordance with Requirement 8 of the DCO, as soon as reasonably practicable after finding the unexpected contamination, the qualified specialist will report this to the Secretary of State for Transport, the Environment Agency and the relevant planning authority.

1.4.7 The assessment may involve the sampling and testing of the suspected contaminated material, as deemed necessary by the qualified specialist.

1.4.8 Upon completion of this assessment, if remediation is considered necessary, then, in accordance with requirement 8 of the DCO for the Scheme, a remediation method statement will be produced, which will need to be submitted to and agreed with Secretary of State for Transport, following consultation with the Environment Agency and the relevant local authorities. Following completion of the measures outlined within the remediation method statement, a verification report must be prepared, which is subject to the approval in writing of the relevant local authorities.

1.4.9 Where identified contaminated materials have been, or are to be, disturbed, the following measures must be adhered to:

a. The provision of Personal Protective Equipment (PPE) to construction personnel. PPE shall be proportionate to the risk and may include items such as gloves, barrier cream, overalls, dust masks and respirators to minimise direct contact exposure with contaminated materials. The precise PPE requirements will be identified following an appropriate hazard assessment.

b. The provision of suitable hygiene facilities and clean welfare facilities for all construction site workers.

c. The monitoring of confined spaces for the potential accumulation of ground gases, and the restricting of access to confined spaces to suitably trained personnel and use of specialist PPE where necessary. These measures must also be implemented where concentrations of ground gases have been recorded above long term and/or short-term workplace exposure limits.

1.4.10 Any temporary on-site storage of contaminated material must be in designated areas on impermeable sheeting, covered with adequate perimeter leachate collection drains to minimise the potential for leachate and run off from the stockpiled material to be generated and migrate.

1.4.11 The disposal of soil waste, contaminated or otherwise, to landfill sites will be avoided or reduced by minimisation of the overall quantities of waste generated during construction, and by ensuring that excavated material consigned to landfill cannot, as an alternative, be put to use on elsewhere on the site or at an alternative off-site location.

1.5 Mitigation plan

Procedure for contaminated land encountered

1.5.1 Should contamination be identified during excavation works, the following mitigation procedures must be implemented and adhered to:

a. Works within the area of concern should be stopped immediately and made secure to prevent the spread of contamination.

b. Report the discovery to the Secretary of State for Transport, the Environment Agency and the relevant local authority, the site management team, who must then inform and seek expert advice from a suitably qualified environmental consultant.

c. Notify other construction workers in adjacent working areas to prevent their contact with the contaminated materials.

d. Undertake a risk assessment to minimise the risk to health and safety of site workers, including the identification of suitable PPE to mitigate any potential exposure and acceptable working methods.

e. Undertake an assessment of the contaminated material via laboratory testing of the material in order to characterise the material for off-site disposal.

f. Contaminated materials that cannot be re-used on-site must be disposed off-site. A hazardous waste assessment must be undertaken to first classify the waste material in accordance with the Environment Agency (EA) published Technical Guidance WM3: Waste Classification – Guidance on the classification and assessment of waste (Ref 1-2). Once classified, further Waste Acceptance Testing will be undertaken, as required, to assist landfill operators determine if they can accept the waste. The disposal of contaminated materials must comply with all prevailing and relevant waste management regulations.

g. Should remediation be required, a written remediation method statement must be produced outlining the appropriate methodology in order to remediate the affected area. This must be agreed in advance with the Secretary of State for Transport in consultation with the relevant local authorities and the Environment Agency.

h. Inform the landowner and occupier of the identification of contamination.

i. The location of any such contamination encountered shall be recorded, including the results of chemical testing, the volumes sentenced for treatment by remediation, the validation data showing compliance with the relevant Re-use Acceptability Criteria, and the location of the area of use of any remediated material within the Scheme.

Measures to protect geological and soils resources

1.5.2 Potential impacts on geological and soils resources from contaminated land and materials will be avoided or minimised through the implementation of the following measures during construction of the Scheme:

a. The routine testing of soils during the ground works phase, in order to confirm suitability for their re-use and to identify potentially contaminated materials.

b. The sheeting of lorries when transporting ground materials off-site and the use of dust suppression equipment on site, to reduce potential migration dust that might contain potentially contaminated materials.

c. The provision of adequate fuel/chemical storage facilities, such as bunded tanks, hardstanding and associated emergency response/spillage control procedures.

d. The temporary on-site storage of contaminated material in designated areas, with materials placed on impermeable sheeting and covered to minimise the potential for leachate and run-off from stockpiles being generated.

e. Employing good construction working practices and the correct re-use or disposal of contaminated arisings, in order to minimise the creation of pollution pathways.

f. The use of protective measures to prevent pathways between contaminants and groundwater and surface water bodies.

g. The chemical testing of materials to be used in earthworks, including comparison of chemical test results against scheme-specific soil re-use acceptability criteria.

18 Annex J – Archaeological management plan

1.1 Background to the plan

1.1.1 This Outline Management Plan (OMP) sets out the summary measures that will be used by the Principal Contractor (PC) to be implemented to manage archaeological mitigation and appropriate methodologies for the recording of any archaeological resources to be undertaken during construction of the Scheme, within the Order Limits.

1.1.2 This OMP will be updated by the PC into the Second Iteration Environmental Management Plan (EMP), as appropriate and necessary, prior to commencement of works in accordance with the Requirements in Schedule 2 of the Development Consent Order **[TR010044/APP/3.1]**.

1.1.3 Archaeological works to be undertaken as part of the Scheme will be governed by Site Specific Written Schemes of Investigation (SSWSIs), as detailed in the Archaeological Mitigation Strategy **[TR010044/APP/6.12]**.

1.1.4 The SSWSIs will be written by a suitably qualified archaeologist, the content of which will be agreed with the relevant authorities prior to their implementation.

1.1.5 An Archaeological Control Plan will be prepared for the Scheme which will reflect the SSWSIs and will set out the timing of archaeological works, a copy of which will be included here once developed.

1.2 Responsibilities

1.2.1 In relation to the control and management of archaeological resources, the PC will establish the appropriate roles and responsibilities for site staff in accordance with the roles and responsibilities set out in Section 2 of the First Iteration EMP.

1.3 Mitigation Strategy

1.3.1 A summary of the Archaeological Mitigation Strategy **[TR010044/APP/6.12]** is presented within this archaeological management plan.

1.3.2 To assist with identifying sites for targeted excavations, sites have been divided into four categories:

a. Sites with intrinsic value (i.e. those so important they need to be excavated fully and with increased sampling)

b. Sites with group value (those which, taken with other sites, have increased value. For example, these examine different types of Iron Age enclosures, and the string settlements) and key sites (sites that require full excavation where their investigation is key to understanding a period or site type)

c. Sampling (sites that only need further investigation into certain elements, such as structures or for environmental information)

d. Sites where no further work is required (including those that can be fenced off).

1.3.3 A range of archaeological mitigation requirements are proposed, taking into account the form and significance of archaeological remains or other heritage

assets that would be impacted by the Scheme. The principal techniques to be used are:

a. Excavation.

b. Archaeological excavation and sampling.

c. Geoarchaeological assessment.

d. Preservation of archaeological remains (i.e. fencing).

1.3.4 A total of 41 sites have been identified that require archaeological mitigation:

a. Five sites have intrinsic value and will require detailed excavation (Sites 3, 4, 7, 15 & 22). The methodology for detailed excavation is outlined in Section 8 of the Archaeological Mitigation Strategy **[TR010044/APP/6.12]**.

b. Eighteen sites are considered to be of group value and key sites. They will require excavation or further sampling (Sites 5, 9, 10, 11, 13, 14, 17, 18, 29, 30, 31, 32, 33, 34, 36, 37, 38 & 39). The methodology is presented in Section 9 of the Archaeological Mitigation Strategy **[TR010044/APP/6.12]**.

c. Thirteen sites will require further sampling, including geoarchaeological assessment (Sites 1, 2, 8, 16, 19, 20, 23, 24, 26, 27, 28, 35 & 41). The methodology is presented in Sections 9 and 10 of the Archaeological Mitigation Strategy **[TR010044/APP/6.12]**.

d. Five sites have been identified that require preservation of archaeological remains (Sites 6, 12, 21, 25 & 40). The methodology for preservation of archaeological remains is outlined in Section 11 of the Archaeological Mitigation Strategy **[TR010044/APP/6.12]**.

1.3.5 Additionally, 12 sites have been identified as requiring no further work, the details of which are detailed in the Archaeological Mitigation Strategy **[TR010044/APP/6.12]**.

1.3.6 Work will also be required to mitigate effects on the following built heritage assets:

a. Brook Cottages, a Grade II listed building, will be demolished as a result of constructing the Scheme. It is proposed to fully record this building prior to its demolition.

b. Three Grade II listed milestones and one non-designated milestone will be impacted by the Scheme. These will be removed, stored and reinstated as close as possible to their original location, and in accordance with the requirements of a written scheme for their protection which will be submitted to, and approved by, the relevant local planning authorities in consultation with Historic England.

c. The existing Black Cat sign located at the Black Cat roundabout will be removed, stored and reinstated at an appropriate location at the new Black Cat junction.

1.3.7 Details for each site requiring archaeological mitigation are outlined in **Table J-1**.

Table J-1: Archaeological mitigation sites

Site number	Field number	Size (Hectares)	Summary of archaeology	Mitigation Requirements
1	3	0.1	Part of a Romano-British enclosure system.	c. Sampling Further sampling of linear features (209107, 211603, 211609), as identified in Appendices 6.66.8 **[TR010044/APP/6.3]**) and preservation under bund. Management of access – any tracks to be stoned up or using bog mats.
2	5	0.9	Post-medieval kilns and quarry pit. Possible early medieval enclosure.	b. Group value/key site Targeted excavation of medieval and post-medieval features in Trenches 2112, 2136 and 2108, as identified in Appendices 6.66.8 **[TR010044/APP/6.3]**.
3	9	2.29	Multiple sub-square enclosures on the south of a larger rectilinear settlement. Late Iron Age to Roman.	a. Intrinsic Full excavation. Advance works.
4	34 & 35	2.85 1.6 excavation 1.25 fenced off	Late Bronze Age roundhouse and undated linear boundary.	a. Intrinsic Full excavation. Advance works and second phase during construction. d. No further work Area to be fenced off
5	34	1	Settlement complex of Iron Age to Roman date.	b. Group value/key site Excavation.
6	35	0.18	Rectilinear Roman enclosure.	d. No further work Fence-off.

Site number	Field number	Size (Hectares)	Summary of archaeology	Mitigation Requirements
7	44	2.22	Multi-phase Iron Age and Roman farmstead and enclosure complex.	a. Intrinsic Full excavation. Advance works.
8	47 & 48	0.8	Small oval Iron Age enclosure and pits.	c. Sampling Sampling of enclosure and boundaries to north & south in Field 47, and pits in Trenches 1072 and 1071, as identified in Appendices 6.6-6.8 **[TR010044/APP/6.3]** of the Environmental Statement, in Field 48.
9	49	3.4	Straggling arrangement of ditches date to the Iron Age. A ring ditch was located at the eastern end, which contained a human skull. Potential for Romano-British deposits.	b. Group value/key site Excavation of features in centre of field.
10	53	1.23	Oval Iron Age enclosure.	b. Group value/key site Excavation. Sampling of colluvium and palaeochannel along beck. Mapping of ridge and furrow alignment.
11	54 & 56	1.48	Large oval Iron Age enclosure and a cluster of Middle to Late Iron Age features.	b. Group value/key site Excavation.
12	56	0.09	Middle to Late Iron Age features.	d. No further work Fence-off.
13	58	2.5	A sub-square Iron Age/Roman enclosure.	a. Intrinsic Full excavation.
14	59	1.46	Wintringham Site 2 – trackway and Iron Age features.	b. Group value/key site Excavation.

Site number	Field number	Size (Hectares)	Summary of archaeology	Mitigation Requirements
15	64 & 65	4.86	A developed Romano-British complex.	a. Intrinsic Full excavation. No works to take place along footpath to west. This should be fenced off.
16	66	1.17 0.25 excavation 0.92 fenced off	An enclosure complex of Late Iron Age to Roman date.	c. Sampling d. No further work Area to be fenced off with the exception of affected linear feature. This and a possible second feature will be sampled.
17	69 & 70	3.49	Bronze Age roundhouse and late Saxon – early Norman trackway with associated enclosures, possibly part of the Wintringham Deserted Medieval Village (DMV).	b. Group value/key site Excavation of Bronze Age features. Saxon-Norman remains will be stripped and excavated solely to establish feature relationships and association with the DMV. Mapping of ridge and furrow alignment. Record relationship of the ridge and furrow to medieval settlement activity.
18	73 & 74	7.57	Two small Iron Age enclosures and a Roman site.	b. Group value/key site Excavation.
19	58 &62	4.21	Soil build-up in Field 58 south of Hen Brook. Palaeochannel recorded in Field 62 to the north.	c. Sampling Geoarchaeological and palaeoenvironmental assessment.
20	75 & 76	1.08	Iron Age ditches and enclosure.	c. Sampling Sample ditch and excavate enclosure. Trial trench across existing track.
21	59	4.58	Wintringham Site 1.	d. No further work

Site number	Field number	Size (Hectares)	Summary of archaeology	Mitigation Requirements
				No impact from Scheme. Areas to be fenced off.
22	77	2.72	Roman settlement site.	a. Intrinsic Full excavation. Management of woodland removal. Comparison of Roman bedding trenches against the alignment of the ridge and furrow.
23	80	0.44	Unenclosed Iron Age roundhouse and burial.	c. Sampling Sampling around roundhouse.
24	83 & 84	1.68	Two associated Middle Iron Age enclosures. String settlement. Deposits understood and only part of the system is within the Scheme boundary	c. Sampling Sample to compare with other examples.
25	85	0.54	High Hayden Farm (site of).	d. No further work Fence off.
26	86	0.34	Southern half of an Iron Age curvilinear feature.	c. Sampling Sampling around Iron Age enclosure.
27	88	0.06	Iron Age pit and undated ditches.	c. Sampling Sampling around the pit.
28	90	1.52	Middle to Late Iron Age enclosure and boundary ditch – part of a string settlement.	c. Sampling Sample to compare with other examples.
29	92	2.38	Two small Iron Age enclosures – a string settlement.	b. Group value/key site Excavation
30	92	3.9	Enclosure and boundaries.	b. Group value/key site Excavation

Site number	Field number	Size (Hectares)	Summary of archaeology	Mitigation Requirements
31	93	0.9	Medieval mill.	b. Group value/key site Excavation.
32	94	1.19	Three sub-circular Iron Age enclosures.	b. Group value/key site Selected and targeted excavation.
33	94	0.37	Iron Age enclosure.	b. Group value/key site Selected and targeted excavation.
34	95	1.55	Romano-British farmstead.	b. Group value/key site Strip area and sample of features. Southern part of Field 96 will be fenced off – no impact.
35	69 & 70 West	0.5	Area of brook and a possible Roman road alignment. Geoarchaeological potential.	c. Sampling Sampling and geoarchaeology.
36	97	1.29	Iron Age enclosures (Areas 2 & 3)	b. Group value/key site Excavation.
37	97	0.69	Iron Age unenclosed roundhouse and linear features (Area 5)	b. Group value/key site Excavation.
38	97	1.42	Iron Age enclosure (Area 1).	b. Group value/key site Excavation.
39	97	1.41	Iron Age possible rectilinear enclosure (Area 4)	b. Group value/key site Excavation
40	99	0.76	Iron Age enclosure.	d. No further work Fence-off.
41	26	1.2	Prehistoric pits, Iron Age triple ditch boundary and Roman settlement.	c. Sampling Sampling

Site number	Field number	Size (Hectares)	Summary of archaeology	Mitigation Requirements
*Note: Further information regarding the 'Sites' and 'Areas' referenced in the entries within the summary of archaeology column of this table are provided in the Archaeological Mitigation Strategy **[TR010044/APP/6.12]**.*				

1.3.8 Prior to the start of the archaeological works, procedures will be developed within the Second Iteration EMP and adopted to ensure that sites of archaeological interest are protected. These procedures will involve fencing for sites to be retained and clear notices on site fences, and the delivery of Toolbox Talks by the Archaeological Clerk of Works and/or the Archaeological Contractor.

1.3.9 The Toolbox Talks will:

a. Inform all site personnel of the archaeological and historic environment constraints on site, the protection measures that are required and their obligations under the Archaeological Mitigation Strategy **[TR010044/APP/6.12]** to ensure that these are put in place and complied with.

b. Identify sensitive areas/sites that must not be disturbed until investigation is completed and the site signed-off to construction, or where long-term protection is required.

Unexpected finds

1.3.10 If unexpected finds (sites, artefacts, environmental remains or ecofacts, monuments or features) are made during the works, a site consultation meeting(s) will be convened between the Archaeological Contractor, the Archaeological Clerk of Works, the relevant planning authority archaeologist and, if required, Historic England, to consider the significance of the find.

1.3.11 Depending on the outcome of the consultation meeting, an addendum to the SSWSI or a new SSWSI will be prepared by the Archaeological Contractor in consultation with relevant planning authority archaeologist.

1.3.12 The procedure for dealing properly with any unexpected finds during the construction process will be set out in each approved SSWSI and recorded within the Second Iteration EMP.

19 Annex K – Construction compound management plan

1.1 Background to the plan

1.1.1 This Construction Compound Management Plan details the practical measures to be implemented by the Principal Contractor (PC) in relation to the management of the Scheme's main site compounds and satellite compounds, such that the social and environmental effects which may occur as a result of activities can be appropriately mitigated and controlled.

1.1.2 Construction of the Scheme involves the formation of three main site compounds which accommodate welfare facilities, materials handling, and storage and production facilities:

a. Main project compound – located at Wintringham.

b. Western compound – located to the south-east of the existing Black Cat roundabout.

c. Eastern compound – located to the north-east of the existing Caxton Gibbet roundabout.

1.1.3 Construction of the Scheme also involves the formation of a number of smaller satellite compounds. These comprise of smaller compounds located in close proximity to key civil engineering works, for example bridge structures, and accommodate small scale welfare and office facilities specific to the works being carried out.

1.1.4 Both the main construction compounds and satellite compounds are used for the localised storage and laydown for construction materials and fabrication.

1.1.5 The general requirements for the main site compounds set out at Section 1.2 to 1.6 will also apply, where applicable, to the satellite compounds.

1.1.6 The PC will adhere to all applicable and relevant national health and safety guidance during the construction phase.

Construction details

1.1.7 **Chapter 2, The Scheme** of the Environmental Statement **[TR010044APP/6.1]** details the approach to Scheme construction, including the phasing and location of works and activities, and the associated programme.

Site roles and responsibilities

1.1.8 **Table 2.1** of the First Iteration Environmental Management Plan (EMP) **[TR010044APP/6.8]** defines the responsibilities associated with the roles for construction workers that the PC must establish and maintain.

1.1.9 The defined responsibilities include those relating directly to the development and implementation of the Second Iteration EMP and final Management Plans and the wider environmental responsibilities. The PC will be required to delegate responsibilities to onsite personnel within key areas of the main site and satellite compounds. The delegation of responsibility must be clearly identified within relevant documents and site files.

1.1.10 Individual names and contact details must be confirmed and inserted into this Plan where applicable by Highways England and the PC, once roles are appointed for each construction compound.

1.1.11 The PC must establish a management structure that includes an organisational chart encompassing all staff responsible for delivery of environmental mitigation measures and must include this chart within the Second Iteration EMP. The chart will set out the respective roles and responsibilities with regard to the environment.

1.1.12 Prior to the commencement of each stage of the Scheme, individuals must be identified to fulfil the relevant roles and, as the Second Iteration EMP and relevant final Management Plans are developed and, ultimately, as the Third Iteration EMP is produced, the roles and responsibilities would be further defined and clarified upon each iteration.

1.2 General requirements

Main site compound facilities

1.2.1 The primary function of the main site compounds are to provide office buildings and welfare facilities for staff during the construction phase of the Scheme. The main site compounds will be the locations from which key activities ancillary to the core construction works will be carried out. Whilst some construction related activities may be carried out within the main site compounds, this is not the principal function of the site.

1.2.2 The key activities and facilities to be contained within the main site compounds include:

a. Office and administration centre for the Scheme with office and welfare units comprising changing and drying rooms, toilet facilities and canteen.

b. Staff and visitor car parking and internal access roads.

c. Site stores compound, including subcontractor material storage yards and plant yards and laydown areas.

d. Materials testing laboratory facilities.

e. Concrete batching plant.

f. Precast concrete manufacturing yard, with crane platform and service crane(s).

g. Asphalt batching plant.

h. Bulk material processing plant.

i. CCTV traffic control facility.

j. Vehicle free recovery unit and storage, with customer care centre.

k. Waste management and segregation areas.

1.2.3 The following section sets out further details regarding the practical measures that will be undertaken in relation to the main site compound and satellite compounds, where applicable.

1.3 Construction site layout and good housekeeping

1.3.1 To reduce the likelihood of an environmental incident or nuisance occurring, the following measures will be used, where required:

a. Treatment of perimeters, cleanliness on site, provision of staff facilities, waste management.

b. Effective preventative pest and vermin control and prompt treatment of any pest and vermin infestation, including arrangements for disposing of food waste or other attractive material, if an infestation occurs, the contractor will take action to eliminate the infestation and to prevent further occurrence.

c. Prohibition of open fires, and a requirement to take measures to minimise the likelihood of fires.

d. Removal or stopping and sealing of drains and sewers taken out of use.

e. No discharge of site run-off to ditches, watercourses, drains, sewers or soakaways without the agreement of the appropriate authority.

f. Maintenance of wheel-washing facilities or other containment measures.

g. Siting of materials stockpiles to, where practicable, minimise visual impact.

h. Location of storage, machinery, equipment and temporary buildings to minimise environmental effects and, where practicable, outside flood risk areas.

i. The use of less intrusive noise alarms that meet the particular safety requirements of the site, such as broadband reversing warnings, or proximity sensors to reduce the requirement for traditional reversing alarms.

j. Controls on lighting/illumination to minimise visual intrusion or any adverse effects on sensitive ecology.

k. The location of site offices to avoid overlooking residential properties.

l. Management of staff congregating outside the site prior to commencing or leaving work.

m. Security measures, including closed circuit television (CCTV) – the location and direction of view of security cameras or blocking software to prevent intrusion into residential properties will be considered.

n. Avoidance of the use of loudspeaker or loudhailer devices.

o. Containing and limiting the visual intrusion of construction sites, as far as reasonably practicable.

p. Provision of maps showing sensitive areas and buffer zones where no pollutants are to be stored or used.

q. Adequate welfare facilities for staff.

r. Smoking areas at site offices/compounds or worksites equipped with containers for smoking wastes – these would not be located at the boundary of working areas or adjacent to neighbouring land.

s. The implementation of a construction workers travel plan to encourage use of public transport by project staff and control off-site parking.

t. Site office and other facilities within the main project compound (located at Wintringham) to be finished in a recessive colour to blend into the local landscape and immediate surroundings.

1.3.2 Where reasonably practicable, access on footpaths/cycle paths and public rights of way (and any diversions to such routes) will be maintained for walkers and where necessary, cyclists and horse riders, affected by construction of the Scheme, including reasonable adjustments to maintain or achieve inclusive access.

1.3.3 Where reasonably practicable, inclusive access (including for people with reduced mobility) will be maintained to services and buildings where they have been temporarily disrupted during the works. Where a need is identified (for example through stakeholder engagement with relevant local organisations or community liaison processes), the PC will review access and routes. These reviews will indicate where additional measures or reasonable adjustments may be required for the purposes of ensuring accessibility by disabled or mobility-impaired people.

1.4 Site lighting

1.4.1 Site lighting and signage will be provided to enable the safety and security of the compounds. It will be at the minimum luminosity necessary and use low-energy consumption fittings. If appropriate, lighting to site boundaries where the public will be able to pass will be provided and illumination will be sufficient to provide a safe route. In particular, precautions will be taken to avoid shadows cast by the site hoarding on surrounding footpaths, roads and amenity areas. Where appropriate, lighting will be activated by motion sensors to prevent unnecessary usage. It will comply with relevant professional lighting guides published by the Institute of Lighting Professionals (Ref 1), and the provisions of *BS 5489-1:2020 Design of road lighting. Lighting of roads and public amenity areas. Code of practice* (Ref 2), where applicable.

1.4.2 Lighting will also be designed, positioned and directed so as not to unnecessarily intrude on adjacent buildings, ecological receptors, structures used by protected species and other land uses to prevent unnecessary disturbance, interference with local residents, railway operations, passing motorists, or the navigation lights for air or water traffic. This provision will apply particularly to sites where night working will be required.

Controlling construction traffic and visual intrusion

1.4.3 Where appropriate, barriers around site perimeters will be provided to contain the works and reduce visual impact of the site in available views, and to provide site security against theft and vandalism.

1.4.4 Site parking and delivery areas will be clearly marked up within the site compounds, and traffic deliveries will be co-ordinated to reduce potential disruption on the road network and within local communities in proximity to the works.

1.4.5 A Traffic Management Plan will be developed and communicated to all subcontractors and suppliers, detailing the measures to be implemented in respect of managing construction traffic to minimise disruption and nuisance within the site compounds.

1.5 Site security

1.5.1 The PC will have a duty to prevent unauthorised access to all site compounds.

1.5.2 The following measures will be used by the PC, where required, to prevent unauthorised access to the site compounds:

a. Use of high perimeter fencing or hoarding, but only where necessary for site security and public safety.

b. Site lighting at site perimeters (subject to the conditions set out in Section 1.4).

c. Adequate security guards and patrols.

d. CCTV and infra-red surveillance and alarm systems where required.

e. Consultation with neighbours on site security matters.

f. Immobilisation of plant out of hours, removing or securing hazardous materials from site, securing fuel storage containers and preventing unauthorised use of scaffolding to gain access to restricted areas and neighbouring properties.

1.6 Hoardings, fencing and screening

1.6.1 The following measures will be applied to the construction compounds, as appropriate:

a. Use and maintenance of adequate fencing and hoardings to an acceptable condition to prevent unwanted access to the site, to provide noise attenuation, screening and site security where required – this will include the need to provide viewing points at relevant locations, if appropriate.

b. Painting the side of hoardings facing away from the site, and to keep them free of graffiti or posters.

c. Providing site information boards with out-of-hours contact details.

d. Displaying notices on site boundaries to warn of hazards on site, such as deep excavations and construction access.

e. Providing signage to indicate re-routed pedestrian/cycle paths and public rights of way (if applicable).

f. Displaying notices confirming that businesses whose access or view may be affected by construction works remain open, with directions for how to access them.

g. Maintenance of protective fencing and/or specialist fencing (e.g. reptile fencing) to protect environmentally sensitive features during construction.

h. Retaining existing walls, fences, hedges and earth banks for the purpose of screening as far as reasonably practicable.

1.6.2 Where hoarding is required, its height and locations will be agreed with the local authority in advance of installation, if necessary to enhance its acoustic performance for specific locations.

1.6.3 Temporary fences may be used in certain areas, such as for short-term occupation of sites or at more remote satellite compound locations.

1.6.4 Clear sight lines will be maintained around hoardings and fencing with no hidden corners in order to avoid, where reasonably practicable, opportunities for anti-social behaviour and crime and to ensure the safety of vehicles.

1.6.5 Fencing and hoarding will, as far as is reasonably practicable, be located such that it does not damage sensitive habitats, trees or hedgerows.

20 Annex L – Landscape and Ecology Management Plan

1.1 Background to the plan

1.1.1 This Outline Landscape and Ecology Management Plan (LEMP) provides a framework for delivering the landscape strategy for the A428 Black Cat to Caxton Gibbet improvements Scheme (the Scheme). The aim of the landscape strategy and this Outline LEMP is the successful integration of the Scheme within the landscape, and also mitigating effects identified within the Environmental Statement (ES). The Outline LEMP accommodates the aspirations of the Scheme to deliver a net gain for biodiversity. It has been developed in line with:

a. Road Investment Strategy 2: 2020 – 2025 (REF 1.1).

b. Highways England Strategic Business Plan 2020 – 2025 (REF 1.2).

c. Highways England Delivery Plan 2020 – 2025 (REF 1.3).

d. Highways England Environment Strategy (REF 1.4).

e. Highways England Biodiversity Plan 2015 (REF 1.5).

1.1.2 The Outline LEMP sets out the short and long-term measures and practices that will be implemented by the Principal Contractor (PC) and Highways England to establish, monitor and manage landscape and ecology mitigation and enhancement (biodiversity gain) measures incorporated into the design. The latter will be achieved through habitat creation over and above that used for habitat mitigation. The Outline LEMP should be read in conjunction with the following:

a. Environmental Masterplan (REF 1.6).

b. Illustrative Cross-Sections (REF 1.7).

c. Highways England LD 117 Landscape Design (REF 1.8).

d. Highways England LD 118 Biodiversity Design (REF 1.9).

e. Highways England Routine and Winter Service Code (REF 1.10).

f. Highways England Network Management Manual (REF 1.11).

1.1.3 This plan is a live document, the content of which will continue to be updated, refined and (where necessary) added to, based on ongoing discussions between Highways England and statutory bodies and organisations including Natural England and relevant Local Planning Authorities. It will be updated by the PC into a final Landscape and Ecology Management Plan (LEMP) prior to the commencement of works in accordance with the Requirements contained in Schedule 2 of the draft Development Consent Order (DCO) **[TR010044/APP/3.1]**.

1.1.4 The overarching objectives of the Outline LEMP are to:

a. Promote the conservation, protection and improvement of the physical, natural and historic environment within the Scheme and its setting, and to ensure the Scheme is appropriately integrated. The landscape framework should be seen as an integral part of the of the surrounding landscape.

b. Diversify ecological value through the retention of existing habitats (woodlands blocks which the Scheme has been designed to go around, the viaduct over the River Great Ouse, to remove the need for bridge parapets in the river bed and the veteran tree the Scheme has been designed to avoid) and to enhance these through restoration and creation of diverse habitats with high distinctiveness.

c. Guide the design and management of landscape and biodiversity components that respond to and enhance the character of the landscape, local distinctiveness and sense of place.

1.1.5 This document begins by setting out the responsibilities and arrangements for delivery of the plan. It explains the overarching landscape strategy and design principles for the Scheme. The remaining sections explain how proposed habitats will be established and managed.

1.2 Responsibilities

1.2.1 Highways England will establish the appropriate roles and responsibilities for site staff as set out in Section 2 of this Environmental Management Plan.

1.2.2 The Ecological Clerk of Works (ECoW) will be responsible for ensuring construction environmental mitigation measures are correctly implemented, monitored and maintained. These measures will include, but not be limited to, vegetation clearance, species identification and exclusion (protected or otherwise).

1.2.3 The ECoW's role will cover activities that have the potential to impact biodiversity, for example by advising on methods and techniques to prevent or minimise light spill and the delivery of Toolbox Talks prior to the start of works that could potentially affect habitats and species.

1.2.4 The PC will be responsible for establishing, managing and monitoring the implementation and establishment of landscape and ecological mitigation within the five-year establishment aftercare period. Highways England as the Overseeing Organisation will inspect and report on the success of establishment during this period.

1.2.5 The long-term biodiversity monitoring and management requirements will be set out by the PC in a Third Iteration EMP (formally Handover EMP) in accordance with the Requirements contained in Schedule 2 of the DCO **[TR010044/APP/3.1]**.

1.2.6 At the end of the five-year establishment aftercare period, the responsibility for long term maintenance and management will transfer to Highways England to ensure they achieve their intended long-term environmental functions and objectives.

1.2.7 The Third Iteration EMP will be periodically reviewed and updated by Highways England. This is explained in more detail in Section 7 of this Annex, Monitoring and evaluation.

Landscape and ecological context of the Scheme

1.3 Introduction

1.3.1 The PC shall satisfy themselves as to the location and extent of the following sensitive landscape, ecology and arboricultural features and designations and ensure that the necessary protection measures and permits are in place prior to the commencement of any works.

1.4 Landscape

1.4.1 The Scheme is located within an area influenced by existing infrastructure corridors including the A1, A428 and the East Coast Main Line (ECML) railway and existing settlement. East of the existing Black Cat roundabout and the River Great Ouse the landscape is predominately agricultural. The Scheme does not cross any statutory designated landscapes (e.g. National Parks or Areas of Outstanding Natural Beauty), nor is it within the setting of such designated landscapes.

1.4.2 Predominantly flat land in the west rises to higher ground east of the ECML at Alington Hill. Larger blocks of woodland are more prevalent in this area; these include the ancient replanted woodland known as Sir John's Wood.

1.4.3 There is one Registered Historic Park and Garden (RHPG) within the study area, comprising the Grade II* listed Croxton Park. It is located to the south of the existing A428, which forms its northern boundary. The RHPG is not crossed by the route of the Scheme.

1.4.4 In the east, the non-designated historic estates of Tempsford Hall and Roxton Park retain a strong parkland character with mature trees set within grass, tree and woodland belts around the perimeter. There are remnants of parkland surrounding the derelict New Manor House south of Little Barford.

1.4.5 Sites designated for nature conservation also contribute to the character of the landscape within the study area. These include County Wildlife Sites of the River Great Ouse, Croxton Park and Eltisley Wood.

1.4.6 Several watercourses are either crossed by, or lie in proximity to, the Scheme. The River Great Ouse is the principal watercourse which meanders south to north. The Scheme crosses the low-lying floodplain of the River Great Ouse in the west. Smaller watercourses within the study area, all of which are tributaries of the River Great Ouse, include the River Ivel, Rockham Ditch, Begwary Brook, South Brook, Hen Brook, Wintringham Brook, Fox Brook and Gallow Brook. Each of the watercourses contributes to the landscape character, where the intermitted riparian vegetation forms locally important features.

1.4.7 Large waterbodies are common within the River Great Ouse floodplain. These generally take the form of flooded, former gravel pits; several of these are used for recreational activities including water sports and fishing. There is also an ornamental lake within Croxton Park. Other waterbodies include modern agricultural irrigation reservoirs.

1.4.8 Landscape character has been studied at the national, regional, district and local level. Appendix A summarises how this information has been used to inform the landscape design.

1.5 Ecology

1.5.1 The Scheme passes through a primarily arable agriculture ecosystem, the biodiversity of which has diminished as field sizes have increased and agricultural husbandry has intensified.

1.5.2 The closest site designated nationally for its biodiversity value is Elsworth Wood Site of Special Scientific Interest (SSSI) 1 kilometre distant from the Order Limits. The closest County Wildlife Sites (CWS) to the Scheme are the River Great Ouse over which the Scheme crosses, Sir John's Wood, also an area of Ancient Semi-natural Woodland (250 m distant) and Begwary Brook Pits (300 m distant). The Croxton Park CWS is located adjacent to the Order Limits, relating to a section of the existing A428 which will be detrunked. The closest point to the main works is the southern tip of the Toseland Road Bridge earthworks, 150m to the north. Although the Eltisley Wood CWS contributes to the character of the landscape of the Scheme, it is located 900 m from the Order Limits and has no ecological connectivity. The location of these sites is presented in Figure 1, Designated Sites for Biodiversity in Appendix 8.2 Designated Sites **[TR010044/APP/6.3]**.

1.5.3 Several watercourses are crossed by the Scheme, all of which are tributaries of the River Great Ouse, the principal watercourse which meanders south to north. Otter and American Mink occur in the River Great Ouse corridor and the lower reaches of some tributaries. Those tributaries within the Order Limits draining into the River Great Ouse from the east were found to be in poor condition and were dried out or with very low flows during the summer. In contrast, there are a number of field ponds in the landscape, some of which are close to or within the Order Limits, a proportion of which supported a diversity of aquatic life including Great Crested Newts.

1.5.4 In addition to Sir John's Wood CWS and ancient semi-natural woodland, the Scheme passes other woodlands, typically small in area and widely dispersed in the landscape mainly in the vicinity of Croxton Park CWS. Hedgerows have become of diminishing value in the landscape, the length reducing as field size has increased along with a deterioration in structure and biodiversity value. The location of these sites is presented in Figure 1:Designated Sites for Biodiversity in Appendix 8.2 Designated Sites **[TR010044/APP/6.3]** and the location of other woodland and hedgerows affected by the Scheme are presented on Figure 1:Survey Area Habitat Map in Appendix 8.3 Terrestrial Habitats including Hedgerows **[TR010044/APP/6.3].** Nevertheless, both woodlands and hedgerows

are used by species such as Badger, bats and birds for refuge, foraging and breeding.

1.6 Arboriculture

1.6.1 The tree population within the Order Limits consists of highway embankment trees, a number of field boundary hedges and tree groups aligning existing highways and denoting agricultural field boundaries. There are also pockets of woodland areas, plantation shelterbelt groups and occasional individual trees within agricultural fields.

1.6.2 Collectively the trees range from very low (Category U) to high (Category A) in quality. However, the majority of trees within the Order limits are low (Category C) to moderate (Category B) value. Low value trees are categorised as such primarily due to arboricultural value and ease of replacement. Many of the oak in particular have high value (Category A) when considered as individual trees.

1.6.3 The most significant high value tree included within the survey is an English elm (*Ulmus* procera) which is situated north of the Hen Brook St. Neots river tributary, approximately 350 metres east of the existing A428 route. This tree has numerous characteristics which define it as a tree of veteran status. Characteristics present included a retrenched crown form, a wide trunk with large burrs and a large hollow trunk containing evidence of barn owl (*Tyto alba*). This tree is situated within a field boundary shelterbelt that is dominated by elm species of varying age.

1.6.4 Other notable high value trees include numerous large mature oak trees with exceptional form and with visual prominence in the context of the surrounding landscape. In addition, one of the mature oak trees displays potential current or future veteran characteristics; these include previous lightning damage with a subsequent dead spire form and healing bark growth, evidence of bird nesting and the presence of fungal fruiting bodies. In addition, there is a high-quality group of mature oak trees with a range of veteran features.

1.6.5 A significant volume of trees within the Order limits are elm species with varying degrees of Dutch elm disease (*Ophiostoma novo-ulmi*) damage. In addition, ash is a well-represented species and a smaller number of young ash are exhibiting symptoms characteristic of Ash Dieback (*Hymenoscyphus fraxineus*).

1.6.6 Tree Preservation Order (TPO) trees identified in the Order Limits include:

a. TPO reference 5/84/SC of the South Cambridgeshire District Council TPO database refers to an individual ‘oak’ tree and two tree groups which refers to three ash and a group containing ‘whatever species’.

b. TPO reference 07.84 of the Huntingdonshire District Council TPO database refers to trees and tree groups situated in proximity to Toseland Road. Several tree group references correlated with the identified locations of surveyed trees within this report, however some of the species scheduled were not present and other species were in their place.

1.6.7 The most common tree species identified within the Order Limits include common ash (*Fraxinus excelsior*), pedunculate oak (*Quercus robur*), English elm (*Ulmus minor 'Atinia'*) and common hawthorn (*Crataegus monogyna*). There is also a vast mix of less frequently occurring species including crack willow (*Salix fragilis*), horse chestnut (*Aesculus hippocastanum*), common alder (*Alnus glutinosa*), field maple (*Acer campestre*), hazel (*Corylus avellana*), blackthorn (*Prunus spinosa*), elder (*Sambucus nigra*), goat willow (*Salix caprea*), wild cherry (*Prunus avium*), sycamore (*Acer pseudoplatanus*), false acacia (*Robinia pseudoacacia*), common walnut (*Juglans regia*), Scot's Pine (*Pinus sylvestris*), blue Atlas cedar (*Cedrus libani subsp. atlantica 'Glauca'*), silver birch (*Betula pendula*), white poplar (*Populus alba*), Lombardy poplar (*Populus nigra 'Italica'*), cypress (*Chamaecyparis sp.*), maple (*Acer sp.*) and damson (*Prunus domestica*).

Landscape strategy

1.6.8 The landscape strategy and defined landscape objectives for the Scheme were established early on in the development of the project as an essential part of the design process.

1.7 Good road design

1.7.1 Highways England's 'The Road to Good Design' (REF 1.12) outlines ten design principles for roads. The section on connecting places is most relevant to the design and management of the landscape and for ecology. This includes three design principles on "Connecting Places". Design principle no.4 – 'fits in context' states:

"The aesthetic quality of a road and its design in relation to the places through which it passes, is integral to its function and the experience of those that use it. Good road design demonstrates sensitivity to the landscape, heritage and local community, seeking to enhance the place while being true to structural necessities. It builds a legacy for the future."

1.7.2 Design principle no.5 – 'is restrained' states:

"Functional, but responding positively and elegantly to the context, good road design allows for the expression of the character and identity of the places and communities through which a road passes. Good road design can enhance a sense of place and add to what we have inherited, particularly through the use of appropriate materials and traditions, but does not make unnecessary superficial or superfluous visual statements."

1.7.3 Design principle no.6 – 'is environmentally sustainable' states:

"Making an important contribution to the conservation and enhancement of the natural, built and historic environment, good road design seeks to achieve net environmental gain. It is multi-functional, resilient and sustainable, allowing for future adaptation and technical requirements, while minimising waste and the need for new materials."

1.8 Landscape design vision and principles

1.8.1 The landscape design vision and principles for the Scheme, developed in the context of the Road to Good Design, were presented to the design team in July 2018. This included the design aspirations to ensure that the Scheme can achieve its full potential through planning, design, construction and management. The vision is for the best possible integration of the Scheme with the surrounding landscape. The vision, objectives and principles and their application with respect to the landscape design have also been informed by:

a. National Infrastructure Commissions 'Design Principles for National Infrastructure' (REF 1.13).

b. Landscape Institute's 'Infrastructure Technical Guidance Note 04/20' (REF 1.14)

c. Consultation with Local Planning Authorities through workshops.

Introduction

1.8.2 This section sets out general design principles which are common to all Landscape Elements (LE), which will be applied at the detailed design stage. LE are defined in LD 117 Landscape Design (REF 1.8) and described in more detail in Appendix B of this Annex. Those which form part of the landscape and ecology design for the Scheme are as follows:

1.8.3 Grassland habitat

a. LE1.1 Amenity grass areas

b. LE1.3 Species rich grassland

c. LE1.6 Open grassland

1.8.4 Woodland habitat

a. LE2.1 Woodland

b. LE2.2 Woodland edge

c. LE2.4 Linear belt of shrubs and trees

d. LE2.5 Shrubs with intermittent trees

e. LE2.6 Shrubs

f. LE2.8 Scrub

1.8.5 Hedgerow habitat

a. LE4.3 Native species hedgerows

b. LE4.4 Native hedgerows with trees

1.8.6 Trees

a. LE5.1 Individual trees

1.8.7 Wetland habitat

a. LE6.2 Banks and ditches

b. LE6.3 Reed beds

c. LE6.4 Marsh and wet grassland

General design principles

1.8.8 The landscape design principles have been developed to address a range of design scenarios. These scenarios are summarised below. These scenarios were used to illustrate best practice landscape design approaches required to deliver the landscape design and mitigation strategy. The scenarios and related design objectives and landscape design principles are set out in more detail in Appendix C of this Annex.

Integration with rural landscapes

1.8.9 Local character should be understood and reflected in the soft estate, with existing features continued across the road. Planting and other features should not emphasise the line of the road by reinforcing its linear character.

Crossing the grain/landform and alignment

1.8.10 Route selection should minimise changes to landform and the introduction of large earthworks. Integration with the existing landform can best be achieved by grading out cuttings and embankments to slopes which reflect the surrounding topography. The borrow pits would be subject to the same design principles.

Follow the contours

1.8.11 As far practicable, the Scheme will be designed to follow the lower ground and rise up at the shallowest gradients.

Crossing valleys – rural viaduct and valley

1.8.12 Careful consideration will be given to the suitability of viaducts, which can help important views and biodiversity corridors, or earthworks, which can allow for planting, when crossing valleys.

Retention of significant features

1.8.13 Retaining existing features, including vegetation, can play an essential part in reinforcing landscape character and sense of place. As far as practicable, trees and other vegetation identified as being of value within the footprint of the Scheme will be retained and protected and integrated within the landscape design.

Junctions

1.8.14 Major grade-separated junctions will be at grade and screened by landform and existing vegetation wherever possible. Particular care will be taken with earthworks between carriageway levels to maximise opportunities for planting and landscape integration.

Integration with urban fringe landscape

1.8.15 The landscape design will integrate with the existing green infrastructure framework to deliver social, environmental and economic and health benefits. Underpinning the vision is the concept of multi-functionality: the integration and interaction of different activities on the same parcel of land to:

a. Integrate with wider walking and cycling networks.

b. Seek opportunities to restore fragmented landscapes.

c. Enhance local landscape character and visual amenity.

d. Provide visual connections and celebrate views to and from settlements and local landmarks to reinforce sense of place.

1.8.16 These principles have informed the preliminary landscape design, as shown on the Environmental Masterplan within Volume 2 of the Environmental Statement **[TR010044/APP/6.2].**

Temporary landscape

1.8.17 The temporary landscape will respond to local landscape character and be visually pleasing whilst mitigating the visual, acoustic and environmental impact of the construction works associated with the Scheme. It could also foster local community involvement.

Integrated design

1.8.18 The design of the landscape will engage and involve the local community to assist in understand features and characteristics of value which should be reinforced and enhanced in the design. The promotion of local and long-distance walking and cycling networks shall increase access and mobility to the countryside.

Bridges and structures

1.8.19 The successful integration of bridges and structures requires a detailed understanding of the character of the site as landscape. This will help establish parameters for placement, mass, scale and height and appearance. In some cases, it might be appropriate for new structures to form landmarks in their own right.

Implementation

1.9 Introduction

1.9.1 This section describes how new habitats illustrated on the Environmental Masterplan within Volume 2 of the Environmental Statement **[TR010044/APP/6.2]** will be implemented by the PC during construction. It specifies the objectives of the proposed planting and sets out the indicative species mix, which will be further developed by the PC at the detailed design stage.

1.10 Landscape element types

Grassland

1.10.1 There are three grassland LE types proposed across the Scheme comprising amenity grassland (LE 1.1), species-rich grassland (LE 1.3) and open grassland (LE 1.6). The proposed location of these areas is illustrated on the Environmental Masterplan for the Scheme Volume 2 of the Environmental Statement **[TR010044/APP/6.2].**

1.10.2 The PC will develop a specification for the three grassland types with reference to the indicative species and percentages presented in **Table L-1, Table L-2** and **Table L-3** below. All areas to receive grass seeing will be prepared according to the type of grassland to be established and free of weeds and debris prior to seeding being carried out.

LE1.1 Amenity grassland

1.10.3 Amenity grassland will be established by the PC mainly on highway verges, visibility splays and roundabouts. An appropriate seed mix (e.g. A18 Road Verge and Embankments or similar approved) will be broadcast evenly across the area at a rate of 35g/m^2, with two equal sowings at right angles to each other and diagonally to main axis. The areas will be raked level and rolled to ensure good seed to soil contact.

Table L-1: Indicative amenity grassland mix

Common name	Latin name	Percentage
Corail strong creeping red fescue	*Festuca rubra rubra*	40.0 %
Tetris smooth stalked meadow grass	*Poa pratensis*	20.0 %
Calico perennial ryegrass	*Lolium perenne*	12.5 %
Highnote chewings fescue	*Festuca rubra* subspecies *commutata*	10.0 %
Zurich perennial ryegrass	*Lolium perenne*	10.0 %
Highland browntop bentgrass	*Agrostis castellana*	5.0 %
Aberace (small) w clover	*Trifolium repens*	2.5 %

LE 1.3 Species rich grassland

1.10.4 As noted above, much of the area through which the Scheme will pass is agricultural, comprising generally improved, nutrient rich soils. Species rich grassland establishes best on soils with lower available nutrients (REF 1.15).

1.10.5 Species rich grassland will be established by the PC:

a. Along Roxton Road link road.

b. Within the quarry restoration area.

c. East of the River Great Ouse.

d. Along the proposed footpath south of the walkers, cyclists and horse riders bridge.

e. West of Cambridge Road junction.

1.10.6 The objective is to establish a diverse sward of grasses and herbs, comprising nine or more species per m^2, including species found locally. Seed will be broadcast at $4g/m^2$ over exposed and scarified subsoil with two equal sowings at right angles to each other and diagonally to main axis. The areas will be raked level and rolled to ensure good seed to soil contact.

Table L-2: Indicative species rich grassland mix (neutral grassland)

Common name	Latin	Percentage
Herb Species		**20 %**
Yarrow	*Achillea millefolium*	
Common Knapweed*	*Centaurea nigra*	-
Ox - eye daisy*	*Leucanthemum vulgare*	-
Bird's - foot trefoil*	*Lotus corniculatus*	-
Lady's Bedstraw*	*Galium verum*	-
Common Sorrel	*Rumex acetosa*	-
Yellow Meadow Vetchling*	*Lathyrus pratensis*	-
Meadow Buttercup	*Ranunculus acris*	-
Ribwort Plantain	*Plantago lanceolata*	-
Cowslip*	*Primula veris*	-
Common Cat's Ear	*Hypochaeris radicata*	-
Tufted Vetch*	*Vicia cracca*	-
Ragged robin*	*Lychnis flos-cuculi*	-
Common centaury	*Centaurium erythraea*	-
Lesser stitchwort*	*Stellaria graminea*	-
Grass Species		**80 %**
Crested Dog's – Tail	*Cynosurus cristatus*	-

Common name	Latin	Percentage
Quaking Grass*	*Briza media*	-
Sweet Vernal Grass	*Anthoxanthum odoratum*	-
Yellow Oat – Grass*	*Trisetum flavescens*	-
Red Fescue	*Festuca rubra*	-
Common Bent	*Agrostis capillaris*	-
* species that are considered typical of neutral grasslands		

LE 1.6 Open grassland

1.10.7 Open grassland will be established by the PC mainly on embankments and cutting slopes and areas with poor access. An appropriate seed mix (e.g. A4 Low Maintenance Areas or similar approved) will be broadcast evenly across the area at a rate of 35g/m^2, with two equal sowings at right angles to each other and diagonally to main axis. The areas will be raked level and rolled to ensure good seed to soil contact.

Table L-3: Indicative open grassland mix

Common name	Latin	Percentage
Common Bent	*Agrostis capillaris*	12.5 %
Meadow Foxtail (w)	*Alopecurus pratensis*	1.25 %
Sweet Vernal-grass (w)	*Anthoxanthum odoratum*	3.75 %
Quaking Grass (w)	*Briza media*	1.25 %
Crested Dogstail	*Cynosurus cristatus*	32.5 %
Slender-creeping Red-fescue	*Festuca rubra*	30 %
Meadow Barley (w)	*Hordeum secalinum*	1.25 %
Smaller Cat's-tail	*Phleum bertolonii*	5 %
Smooth-stalked Meadow-grass	*Poa pratensis*	12.5 %

1.10.8 The following steps and working methods will be undertaken by the PC as part of grassland seeding:

a. Where practicable, seed will be obtained from a local source for the purpose of maintaining continuity with the existing grasslands.

b. Seeding will be completed in either autumn or spring and only once the receiving soils have been tilled and adequately prepared.

c. Seeding and rolling will be carried out in dry weather and access will be prohibited to seeding areas until seed has germinated and a sward has established (see establishment maintenance section below).

1.10.9 The PC will further develop the above methods and agree the final grassland mixes with relevant stakeholders as part of the detailed design.

Native planting

1.10.10 This comprises the following LEs:

a. LE2.1 Woodland.

b. LE2.2 Woodland edge.

c. LE2.4 Linear belt of shrubs and trees.

d. LE2.5 Shrubs with intermittent trees.

e. LE2.6 Shrubs.

f. LE2.8 Scrub.

g. LE4.3 Native species hedgerows.

h. LE4.4 Native hedgerows with trees.

1.10.11 Native species will typically make up the larger proportion of a planting mix within the soft estate. This is because the longer a tree species has been present in the British Isles the wider the range of other species it can support to maximise biodiversity.

1.10.12 The Ecological Site Classification Decision Support System (ESC-DSS) is a helpful starting point (REF 1.16) in selecting species which are well-suited to the environment of the planting site. ESC-DSS helps to:

a. Select ecologically suited species to sites.

b. Match key site factors with the ecological requirements of different tree species and woodland communities.

c. Work out options for tree species and native woodland communities on individual sites using a grid reference and detailing the soil type.

1.10.13 Current Forest Research guidance stresses the need for species resilience and adaptability for an unpredictable future climate (REF 1.17). A mix of provenances is therefore recommended:

a. 1/3 of seed from same local seed source as the site.

b. 1/3 of seed from source up to 2º of latitude south of the site.

c. 1/3 of seed from slightly warmer climate sources from 2 to 5° of latitude south of the site.

1.10.14 Species diversity is important as a diverse range of plants can help cope with warmer climates and limit the damage caused by pest and disease outbreaks, enhancing biosecurity. English Elm (*Ulmus procera*) and small-leaved elm (*Ulmus minor*) are under consideration as part of the planting mix, predominantly for hedgerows. These elms were once prolific in the Cambridgeshire landscape, but were decimated by Dutch Elm Disease in the 20th century. They are important for the diversity associated with them, primarily invertebrates as opposed to the species as part of floral diversity *per se*. They are important in the study area, but rarely grows beyond 5 metres in height before succumbing to the disease. If these elms are to be included, they need to be grown from locally sourced

material and propagated from either seed or more likely from cuttings from selected stands. Further advice on selecting appropriate species at the detailed design stage is contained within the following documents:

a. Tree species and provenance, Forest Research (REF 1.18);

b. Tree Species Selection for Green Infrastructure: A Guide for Specifiers (REF 1.19);

c. The Right Trees for Changing Climate Database (REF 1.20); and

d. The Urban Tree Manual (REF 1.21).

Planting density and layout

1.10.15 The success of establishment of nursery stock is influenced by the quality of plants and robust processes for plant procurement.

1.10.16 Seed should be collected in accordance with the Forest Reproductive Material Regulations (REF 1.22) and provenance certificates should be provided to demonstrate this.

1.10.17 Recommendations for the procurement of trees are set out in British Standard 8545: From the nursery to independence in a landscape setting (REF 1.23). It is important that plant stock is checked by a suitably qualified professional at the nursery before lifting, and on arrival at site to ensure it meets the requirements for condition and quality.

1.10.18 Contract growing may be an option for larger contracts where plant requirements are known, and where budgets are established at least a year in advance of planting. JCLI Practice Note 11 provides guidance on this (REF 1.24).

1.10.19 LE 2.1 Woodland, woodland edge, LE2.4 linear belt of trees and shrubs, shrubs with intermittent trees (LE 2.5), shrubs (LE 2.6) and scrub (LE 2.8)

1.10.20 These elements will be established by the PC across the Scheme to provide landscape integration and visual screening functions and as mitigation / compensation for habitats and vegetation lost.

1.10.21 The proposed locations for these LEs are illustrated on the Environmental Masterplan for the Scheme Volume 2 of the Environmental Statement **[TR010044/APP/6.2],** the objectives of which are to:

a. Integrate the Scheme into the receiving landscape pattern and provide visual screening of elements of the Scheme through the creation of wooded areas and ground cover.

b. Mitigating the loss of local woodland habitats by delivering an overall increase in woodland coverage which will form a functional element of local ecological networks.

c. Achieve and retain a balance of species reflective of adjoining woodland and other vegetation.

1.10.22 The PC will develop a specification for planting mixes, based on the indicative species, sizes and percentages presented in **Tables 4 to 9**. These species are reflective of the species present in existing woodlands in the local area.

Table L-4: Indicative woodland mix (LE 2.1)

Latin Name	Common Name	Form and Girth/CM	Size/cm	Root*	Percentage
Acer campestre	Field maple	Transplant	40-60	BR	20%
Alnus glutinosa	Alder	Transplant	40-60	BR	5%
Betula pendula	Silver birch	Transplant	40-60	BR	25%
Corylus avellana	Hazel	Transplant	40-60	BR	10%
*Populus tremula**	Aspen	Transplant	40-60	BR	5%
Prunus avium	Bird cherry	Transplant	40-60	BR	10%
Quercus robur	Oak	Transplant	40-60	BR	25%
Rosa canina	Dog rose	Transplant	40-60	BR	10%
Salix alba	White willow	Transplant	60-80	BR	5%
Sorbus aria	Whitebeam	Transplant	40-60	BR	5%

Table L-5: Indicative woodland edge mix (LE 2.2)

Latin Name	Common Name	Form and Girth CM	Size/cm	Root*	Percentage
Acer campestre	Field maple	Transplant	40-60	BR	10%
Crataegus monogyna	Hawthorn	Transplant	40-60	BR	15%
Ligustrum vulgare	Wild privet	Transplant	40-60	BR	15%
Ilex aquifolium	Holly	2L	30-40	C	10%
Prunus spinosa	Blackthorn	Transplant	40-60	BR	20%
Rosa canina	Dog rose	Transplant	40-60	BR	10%
Sambucus nigra	Elder	Transplant	60-80	BR	5%
Viburnum opulus	Guelder-rose	Transplant	40-60	BR	15%

Table L-6: Indicative linear belt of trees and shrubs mix (LE 2.4)

Latin Name	Common Name	Form and Girth CM	Size (cm)	Root*	Percentage
Alnus glutinosa	Common alder	Transplant	40-60	BR	10%
Acer campestre	Field maple	Transplant	40-60	BR	10%
Betula pendula	Silver birch	Transplant	40-60	BR	2.5%
Crataegus monogyna	Hawthorn	Transplant	40-60	BR	15%
Quercus robur	Oak	Transplant	40-60	BR	20%
Populus tremula	Aspen	Transplant	40-60	BR	5%
Prunus avium	Bird cherry	Transplant	40-60	BR	5%
Prunus spinosa	Blackthorn	Transplant	40-60	BR	7.5%
Corylus avellana	Hazel	Transplant	40-60	BR	10%
Rosa canina	Dog rose	Transplant	60-80	BR	5%
Salix alba	White willow	Transplant	60-80	BR	5%
Sorbus aria	Whitebeam	Transplant	40-60	BR	5%

Table L-7: Indicative shrubs with intermittent trees mix (LE 2.5)

Latin Name	Common Name	Form and Girth CM	Size/cm	Root*	Percentage
Acer campestre	Field maple	Transplant	40-60	BR	10%
Alnus glutinosa	Common alder	Transplant	40-60	BR	5%
Corylus avellana	Hazel	Transplant	40-60	BR	15%
Crataegus monogyna	Hawthorn	Transplant	40-60	BR	15%
Fagus sylvatica	Beech	Transplant	40-60	BR	5%
Ligustrum vulgare	Wild privet	Transplant	40-60	BR	10%
Prunus spinosa	Blackthorn	Transplant	40-60	BR	10%
Quercus robur	English oak	Transplant	40-60	BR	10%
Rosa canina	Dog rose	Transplant	60-80	BR	10%
Sorbus aucuparia	Rowan	Transplant	40-60	BR	5%
Viburnum opulus	Guelder-rose	Transplant	40-60	BR	5%

Table L-8: Indicative shrub mix (LE 2.6)

Latin Name	Common Name	Form and Girth CM	Size/cm	Root*	Percentage
Acer campestre	Field maple	Transplant	40-60	BR	20%
Corylus avellana	Hazel	Transplant	40-60	BR	15%
Crataegus monogyna	Hawthorn	Transplant	40-60	BR	20%
Ligustrum vulgare	Wild privet	Transplant	40-60	BR	7.5%
Prunus spinosa	Blackthorn	Transplant	40-60	BR	15%
Rosa canina	Dog rose	Transplant	60-80	BR	7.5%
Viburnum opulus	Guelder-rose	Transplant	40-60	BR	15%

Table L-9: Indicative scrub mix (LE 2.8)

Latin Name	Common Name	Form and Girth CM	Size/cm	Root*	Percentage
Acer campestre	Field maple	Transplant	40-60	BR	10%
Corylus avellana	Hazel	Transplant	40-60	BR	15%
Crataegus monogyna	Hawthorn	Transplant	40-60	BR	15%
Ligustrum vulgare	Wild privet	Transplant	40-60	BR	15%
Prunus spinosa	Blackthorn	Transplant	40-60	BR	10%
Rosa canina	Dog rose	Transplant	40-60	BR	15%
Salix caprea	Goat willow	Transplant	40-60	BR	10%
Salix cinereal	Grey willow	Transplant	60-80	BR	10%

1.10.23 The following steps and working methods will be undertaken by the PC:

a. Areas identified for planting will be clearly marked out with the Landscape Clerk of Works (LCoW) in advance.

b. Planting will take place in the first available planting season and at a time of the year appropriate to the species being planted.

c. Plants will be inspected by the LCoW at the nursery and on delivery to site prior to planting.

d. Planting will be timed to avoid periods of frost, drought or other inclement weather, as far as practicable.

Bare ground

1.10.24 Some areas within proposed grassland will be left bare to colonise naturally. These areas will be in locations determined by slope, drainage and aesthetics to avoid erosion and creating unsightly areas until natural colonisation has been achieved, under the direction of the project ecologist.

Trees

Individual trees (LE 5.1)

1.10.25 Individual trees (LE 5.1) are illustrated on the Environmental Masterplan for the Scheme (and will be finalised in Figure 2.4.1 to 2.4.14 Volume 2 of the Environmental Statement **[TR010044/APP/6.2]**), the objectives of which are to:

a. Provide an additional layer of vegetation and structure within the landscape.

b. Provide a diverse habitat for birds, bats and insects.

c. Respond to local landscape character.

d. Provide visual interest and a sense of height and maturity within the landscape.

e. Restore and enhance parkland character in appropriate locations.

Table L-10: Indicative individual trees mix

Latin Name	Common Name	Form and Girth CM	Size/cm	Root*	Percentage
Acer campestre	Field Maple	Standard (8-10)	250	RB	5%
Alnus glutinosa	Common alder	Heavy standard (12-14)	350	RB	10%
Betula pendula	Silver birch	Heavy standard (12-14)	350	RB	5%
Carpinus betulus	Hornbeam	Heavy standard (12-14)	350	RB	7.5%
Fagus sylvatica	Common beech	Heavy standard (12-14)	350	RB	5%
Populus tremula	Aspen	Heavy standard (12-14)	350	RB	7.5%
Prunus avium	Bird Cherry	Standard (8-10)	250	RB	7.5%
Quercus robur	Oak	Heavy standard (12-14)	350	RB	20%
Salix caprea	Goat willow	Feathered	150	BR	5%
Salix Alba	White willow	Feathered	150	BR	10%
Sorbus aria	Whitebeam	Heavy standard (12-14)	350	RB	7.5%
Tilia x *europaea*	Common lime	Heavy standard (12-14)	350	RB	10%

1.10.26 The following steps and working methods will be undertaken by the PC:

a. Areas identified for planting will be clearly marked out with the LCoW in advance.

b. Planting will take place in the first available planting season and at a time of the year appropriate to the species being planted.

c. Plants will be inspected by the LCoW at the nursery and on delivery to site prior to planting.

d. Planting will be timed to avoid periods of frost, drought or other inclement weather, as far as practicable.

e. Trees will be staked to protect against wind-rock.

Hedges

2 Proposed native species hedgerows (LE 4.4) and native hedgerows with trees (LE 4.4)

2.1.1 Hedgerows will be planted by the PC across the Scheme, the objectives of which are to:

a. Maintain and improve the existing resource of hedgerows through replacement planting.

b. Optimise connectivity with retained hedgerows or other habitats, for example woodlands and ponds.

c. Integrate the Scheme into the receiving landscape pattern and provide visual screening of elements of the Scheme.

d. Retain a balance of species reflective of adjoining woodland and other vegetation, and maximising their structural diversity for the benefit of wildlife

e. Mitigate and/or compensate for hedgerow loss by using species that reflect the composition of existing hedgerows as far as practicable.

Retained hedgerows

2.1.2 The PC will protect existing hedgerows to be retained during construction.

2.1.3 Measures to be employed will include, but not be limited to, the use of clearly defined stand-offs, managing the structure and integrity of retained hedgerows, and undertaking any trimming outside of the bird breeding season.

Native species hedgerow planting

2.1.4 The proposed locations for new hedgerows are illustrated on the Environmental Masterplan presented in Figure 2.4.1 to 2.4.14 Volume 2 of the Environmental Statement **[TR010044/APP/6.2]).**

2.1.5 The PC will develop a specification for hedgerows, based on the indicative species, sizes and percentages presented in **Table L-11**.

Table L-11: Indicative hedgerow (LE 4.3) planting mix

Latin Name	Common name	Form and Girth/CM	Size/cm	Root*	Percentage
Acer campestre	Field maple	Transplant	40-60	BR	10%
Corylus avellana	Hazel	Transplant	40-60	BR	5%
Crataegus laevigata	Midland hawthorn	Transplant	40-60	BR	10%
Crataegus monogyna	Hawthorn	Transplant	40-60	BR	40%
Ligustrum vulgare	Wild privet	Transplant	40-60	BR	5%
Prunus spinosa	Blackthorn	Transplant	40-60	BR	25%
Sambucus nigra	Elder	Transplant	40-60	BR	5%

Table L-12: Indicative hedgerow with intermittent trees (LE 4.4) planting mix

Latin Name	Common Name	Form and Girth CM	Size/cm	Root**	Percentage
Acer campestre	Field maple	Transplant	40-60	BR	10%
Corylus avellana	Hazel	Transplant	40-60	BR	5%
Crataegus monogyna	Hawthorn	Transplant	40-60	BR	40%
Ligustrum vulgare	Wild privet	Transplant	40-60	BR	5%
Prunus spinosa	Blackthorn	Transplant	40-60	BR	25%
Quercus robur	Oak	Transplant	40-60	BR	10%
Sambucus nigra	Elder	Transplant	40-60	BR	5%

Wetland

3 Banks and ditches (LE6.2), reedbeds (LE 6.3) and marsh and wet grassland (LE 6.4)

3.1.1 The design of the Scheme incorporates sustainable drainage and attenuation features to control and treat road runoff prior to its discharge. The form, type and location of these features are illustrated on the Environmental Masterplan presented in Figure 2.4.1 to 2.4.14 Volume 2 of the Environmental Statement **[TR010044/APP/6.2]),** the objectives of which are to:

a. Control the rate of discharge of runoff from the road to receiving watercourses containing habitats.

b. Provide treatment for pollutants to prevent adverse impacts on habitats.

3.1.2 The PC will develop planting specifications and management measures for water related elements incorporated into the Scheme, based on the following outline prescriptions and techniques.

Ditches and watercourses

3.1.3 The restoration of sections of watercourses, primarily the brooks, within the Order Limits will introduce a more natural form along these sections of brooks including in-channel structures, habitats and sediment type as well as riparian vegetation.

3.1.4 The PC will establish ditches and other watercourses in a manner that achieves a dense and even sward using species including perennial ryegrass (*Lolium perenne*), creeping bent (*Agrostis stolonifera*) and rushes (species of *Juncus spp.*) which are tolerant to salt, wet conditions and periodic inundation.

3.1.5 Seeding to establish vegetation will be carried out by the PC early in the construction period as soon as soils are ready and within appropriate season – ideally late summer (August – September).

3.1.6 Where required, the PC will employ geotextiles to prevent erosion or as a temporary measure in advance of seeding.

Wetland Areas

3.1.7 Wetland species will include reed canary-grass (*Phalaris arundinacea*), amphibious bistort (*Persicaria amphibia*), Pedulous Sedge (*Carex pendula*) and rush (*Juncus inflexus* and *Juncus effusus*).

3.1.8 Bankside species will include perennial ryegrass (*Lolium perenne*), creeping bent (*Agrostis stolonifera*) and rushes (*Juncus*) species.

Establishment maintenance

4.1 Introduction

4.1.1 This section sets out principles and outline prescriptions for maintenance of planting proposed within the Scheme in the first five years following implementation. This maintenance will be the responsibility of the PC with oversight from the LCoW.

4.1.2 A detailed plan for the establishment of planting within the first five years post completion of the Scheme will be developed by the PC based on the following principles and outline prescriptions. This will include a schedule of site inspections, which will be recorded in a site inspection report. These reports will be provided to the PC, Overseeing Organisation and landscape officers of relevant Local Planning Authorities. An annual review report will be published at the end of each growing season (September/October), which will include a summary of plants which have failed to thrive and will be replaced in the subsequent planting season, referred to as the beat-up (November to end of March).

4.2 Habitat types

Grassland

Amenity grassland (LE 1.1)

4.2.1 Management will be appropriate to the location and intended maintenance regime of that area of the Scheme and will be established to achieve a uniform grass sward over at least 95% of the relevant area with no scrub.

a. Amenity grassland areas will be allowed to establish to a height of 75mm before the first establishment cut.

b. Amenity grassland areas will be subsequently maintained to an appropriate height through regular cutting sufficient to maintain visibility splays.

c. All litter (including fallen leaves) will be removed from grassed areas prior to mowing as far as practicable.

d. Mowers and strimmers will not be used within 100mm of any tree stem, shrub or hedgerow to prevent damage.

e. Arisings from cuts will be left *in situ*.

f. The use of a selective herbicide to suppress injurious weeds, or other plants that are detrimental to the establishment of the grassland, using appropriate application techniques to achieve die-back followed by removal off-site.

g. Bare areas and areas of dead grass where establishment has failed will be rectified by over-seeding in appropriate conditions, although not for those areas that have been left deliberately bare.

Species rich grassland (LE 1.3)

4.2.2 The principal aim will be to encourage the development of biodiversity interest over time, based on the following principles and outline prescriptions:

a. Immediately after sowing, the ground will be left undisturbed and un-watered to allow the grassland to establish naturally.

b. Mowing will be carried out once annually with arisings raked into piles and left *in situ* for seven days before collection and removal to an off-site green waste composting facility.

c. Visual inspections will be made during the growing season.

d. Control of undesirable species (e.g. Arable weeds) and injurious weeds will be undertaken to prevent colonisation and domination of the grassland through the use of a selective herbicide.

4.2.3 Botanical surveys will be carried out in late spring to confirm that the establishment species-rich grassland has been successful in achieving its intended aims and objectives. Spot checks will be undertaken at locations within each grassland area by a suitably qualified ecologist during years 1, 3 and 5, the purpose being to record plant species, their distribution and the overall condition of the grassland. Other relevant indicators relating to the sward that may require remedial action during the contract period or in the future will also be recorded.

Open grassland (LE 1.6)

4.2.4 Management will be focussed on achieving the following measures:

a. Open grassland areas will be allowed to establish to a height of 100mm before the first establishment cut.

b. Open grassland areas will be subsequently cut twice per year; once in summer and once in early autumn.

c. All litter (including fallen leaves) will be removed from grassed areas prior to mowing as far as practicable.

d. Mowers and strimmers will not be used within 100mm of any tree stem, shrub or hedgerow to prevent damage.

e. Arisings from cuts will be left *in situ*.

f. A selective herbicide will be used to suppress injurious weeds, or other plants that are detrimental to the establishment of the grassland, using appropriate application techniques to achieve die-back followed by removal off site.

g. Bare areas and areas of dead grass where establishment has failed will be rectified by over-seeding in appropriate conditions, although not for those areas that have been left deliberately bare.

Native planting

Woodland (LE 2.1), woodland edge (LE 2.2), linear belt of trees and shrubs (LE 2.4), shrubs with intermittent trees (LE 2.5), shrubs (LE 2.6) and scrub (LE 2.8)

4.2.5 A detailed plan for the establishment of planting will be developed by the PC. The aim of establishment maintenance will be to support the early stages of growth to encourage the canopy to close, reducing future management requirements to address competition from weeds. This is based on the following principles and outline prescriptions:

a. Watering of new plants to minimise failures in periods of drought.

b. Maintenance of 1 metre weed free circles around each plant through chemical and mechanical control.

c. Fitting of individual recycled plastic spiral or mesh guards around trees, shrubs and hedgerow plants selected appropriate to species and growth habit, should be sufficient to protect them from strimming activities and damage from animals.

d. Quarterly checking of plants to record their growth and condition, including adjustments and replacement of faulty or poorly positioned tree guards and stakes as necessary.

e. Removal of non-desirable woody species and the cutting of scrub growth to avoid suppression of newly planted material.

f. Replacement of any dead, damaged or diseased plants with matching species of the same size during the next planting season after failure.

g. Removal of litter and debris from planted areas (fallen branches and leaf litter to be retained), as far as practicable.

h. Re-firming of soil around roots to ensure plants are supported and upright.

4.2.6 Monitoring of newly planted areas will be undertaken during the contract period by the LCoW to ensure successful establishment and to record the health and condition of plants. This will involve quarterly walk-overs through each planting plot with results recorded in field notes.

Hedgerows

5 Proposed native species hedgerows (LE 4.3) and native hedgerows with trees (LE 4.4)

5.1.1 A detailed plan for the establishment and management of hedgerows will be developed by the PC, based on the principles and outline prescriptions identified for other types of planting (e.g. trees, shrubs and scrub) within the contract period.

5.1.2 Additional maintenance specific to hedgerows will be developed and incorporated into the plan. This will include weed control to the base of the hedgerow until the canopy has closed. Cutting of hedgerows is not anticipated in the establishment phase.

5.1.3 The PC will be responsible for developing a set of criteria against which the success of hedgerows can be measured during the contract period.

Individual trees

Individual trees (LE 5.1)

5.1.4 A detailed plan for the establishment of planting will be developed by the PC, based on the following principles and outline prescriptions:

a. Check trees remain upright and the root ball is secure.

b. Check tree ties and stakes.

c. Report on health and vigour, including any remedial action required to remove deadwood, for example.

5.1.5 A detailed plan for the management of planting within the contract period will be developed by the PC, based on the following principles and outline prescriptions:

a. Re-firm plants following high winds or prolonged periods of frost.

b. Inspect and adjust stakes, guards, irrigation pipes and ties.

c. Apply herbicide to plant circles.

d. Inspect and top-up mulch as required.

e. Formative pruning.

f. Check and record failed or defective plants.

g. Replacement of failed or defective plants.

Wetland

6 *Banks and ditches (LE 6.2), reed beds (LE 6.3) and marsh and wet grassland (LE 6.4*)

6.1.1 Vegetated drainage systems require frequent inspection to ensure they continue to operate as designed. The growth of aquatic and marginal plants will need to be controlled and managed. These operational requirements will be carefully assessed and balanced to avoid damaging habitats, for example by cyclical cutting which leaves at least two-thirds uncut in each rotation.

6.1.2 A detailed plan for the establishment and management of planting within ditches and wetland areas will be developed by the PC. This will be prepared in conjunction with the Drainage Strategy Report (Appendix 13.3 of the Environmental Statement **[TR010044/APP/6.3]**), which outlines the maintenance of sustainable drainage systems.

6.1.3 Monitoring of wetland areas will be undertaken quarterly by the LCoW during the contract period to ensure the successful establishment of the planting and to record the health and condition of plants. Monitoring inspections will inform the need for any remedial measures to be implemented during the contract period, for example slope reinforcement and the reseeding of bare ground.

Long term management

6.2 Introduction

6.2.1 This section sets out outline prescriptions for long term management of planting proposed within the highway boundary. Detailed prescriptions and a programme will be developed by the PC before the Site is handed over to Highways England at the end of the five-year establishment period. The site within the highway boundary will then form part of the wider Strategic Road Network management contracts for the region.

6.3 Habitat types

Grassland

Amenity grassland (LE 1.1)

6.3.1 Long term management of amenity grassland will be the same as identified for the establishment phase above. Monitoring inspections carried out by Highways England will reduce to once annually.

Species-rich grassland (LE 1.3)

6.3.2 Management will be undertaken to maintain a relatively stable grassland community in the long-term, and to avoid areas naturally progressing into tall, dense, grass-dominated areas.

6.3.3 Measures will focus on a forward regime of:

a. Mowing once, annually with arisings raked into piles and left in situ for seven days before collection and removal to an off-site green waste composting facility.

b. Visual inspections during the growing season.

c. Control of undesirable species (e.g. Arable weeds) and injurious weeds to prevent colonisation and domination of the grassland using a selective herbicide.

6.3.4 Meadow margins adjacent to woodland and hedgerows may be left for a year or more between cuts to provide dense ground level cover for fauna, including amphibians, small mammals and invertebrates.

6.3.5 The results of annual monitoring surveys will be used to adjust the management regime to maximise biodiversity.

Open grassland (LE 1.6)

6.3.6 Long term management of open grassland will be the same as identified for the establishment phase above. Monitoring inspections carried out by Highways England will reduce to once annually.

Native planting

Woodland (LE 2.1), woodland edge (LE 2.2), linear belt of trees and shrubs (LE 2.4), shrubs with intermittent trees (LE 2.5), shrubs (LE 2.6) and scrub (LE 2.8)

6.3.7 The long-term management of planting will focus on the following interventions:

a. From year 5 onwards, tree guards and stakes will be removed from plants.

b. Between years 7 and 10, planted areas will be reviewed and thinned out as necessary to remove any poor or weak specimens, which will facilitate other specimens to flourish and provide space for trees to further establish.

c. The understorey of new woodland areas will be coppiced in stages to minimise disturbance to wildlife, as required, as part of good woodland management.

d. Arisings from thinning or other woodland management functions will be retained on site in the form of dedicated brash and wood piles or wind-rows, for the benefit for fungi, lichen and invertebrates.

e. Where necessary, arisings from woodland management will be chipped and placed in dedicated habitat piles.

f. Trees adjacent to public rights of way will be actively maintained and monitored on health and safety grounds, and to maintain access.

Hedgerows

Proposed native species hedgerows (LE 4.3) and native hedgerows with trees (LE 4.4)

6.3.8 The long-term management of hedgerows will focus on the following interventions:

a. Hedgerows will be managed on a three-year rotation with only one side of the hedgerow cut in any one year to help develop the hedgerow structure.

b. Cutting will be carried out at the end of the winter in February, thereby retaining berries through the winter months for wildlife and avoiding the bird breeding season.

c. If managed by traditional techniques such as hedgerow laying, this will be carried out on a rotational basis to retain the structural integrity of hedgerows and maintain connections with other habitats.

d. Overgrowing or overhanging branches will be removed from any pathways to keep them unobstructed.

e. Dead, over-mature or dying hedgerow trees will be subject to removal where they are considered dangerous on health and safety grounds, and in accordance with any protected species constraints.

6.3.9 Monitoring will be undertaken to detect any significant changes in hedgerow health and condition. Checks will be made every three years, using fixed-point photography if necessary.

Individual trees

6.3.10 Individual trees (LE 5.1) will be managed according to best arboricultural practice in accordance with:

a. BS 8545:2014 Trees: from nursery to independence in the landscape.

b. BS3998 is the British Standard for Tree Work – Recommendations.

6.3.11 Tree protection measures will be maintained until they have fulfilled their intended purpose, e.g. guards will be removed once the risk of bark damage from grazing animals has reduced.

Wetland

Banks and ditches (LE 6.2), reed beds (LE 6.3) and marsh and wet grassland (LE 6.4)

6.3.12 The long-term monitoring and management of vegetated drainage systems and wetland features will be carried out in line with the interventions to be implemented during the contract period. Long term management will take into account the Drainage Strategy Report [**Appendix 13.3]**of the Environmental Statement **[TR010044/APP/6.3]** which outlines the maintenance of sustainable drainage systems.

Monitoring and evaluation

6.4 Introduction

6.4.1 Monitoring will be undertaken during implementation and following completion of planting to assess the success of establishment and long-term management of the soft estate.

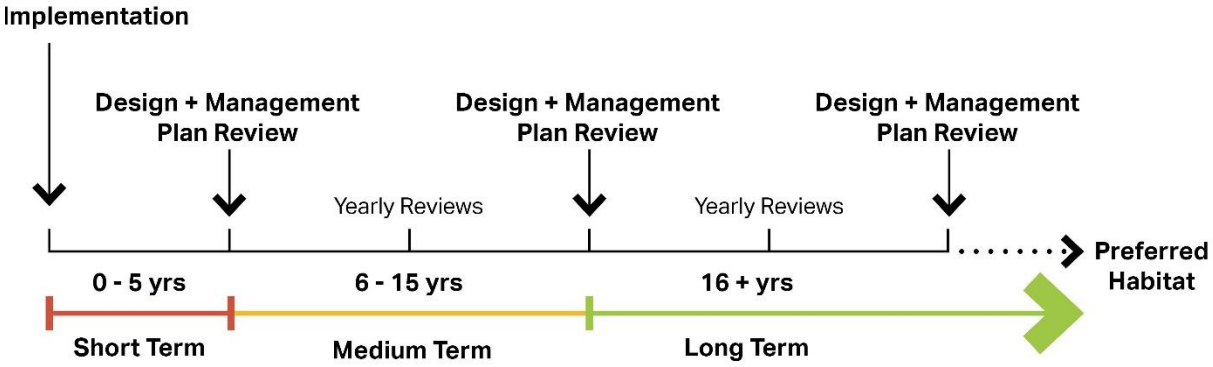


Figure 1: Monitoring and evaluation

6.4.2 Planting will be overseen by the LCoW, who will record progress and highlight and escalate any issues through weekly reports, illustrated with photographs, during the planting season. The PC will facilitate communication and monthly meetings between the LCoW and the landscape contractor.

6.4.3 Inspections of planting during the establishment period will reduce to monthly, undertaken by the LCoW. These inspections will be recorded in the same format as during implementation. Meetings between the PC, landscape contractor and LCoW will be held, so far as practicable, in the second month of each quarter to record actions for the following quarter. An annual review will be carried out and the maintenance schedule for the following year will be adjusted in response to the success of establishment.

6.4.4 A Third Iteration LEMP will be prepared towards the end of the five-year establishment period. This will document the success of establishment, issues which may affect future management and changes to the design. It will set out long-term management objectives and review and update the monitoring and evaluation proposals. At this point Highways England will adopt the soft estate and will be responsible for its long-term management.

6.4.5 It is anticipated that it will be inspected annually in line with the Third iteration LEMP and records updated accordingly. This will include a monitoring visit undertaken at Year 15 by Highways England to each viewpoint identified within **Chapter 7, Landscape and visual effects** of the Environmental Statement **[TR010044/APP/6.1]** predicted to experience significant visual effects. This will be to ensure that the planting has established and is delivering its intended screening and integration objectives. Should the landscape planting be found not to have established as intended or be insufficient to provide the required level of screening and integration, remedial works will be undertaken as necessary by

Highways England. These works could, for example, include establishing further planting within the Order Limits to augment that already in place.

Appendix A: Landscape Character Areas – design considerations

District Landscape Character Area (LCA)	Local Landscape Character Area (LLCA)	Design considerations
Renhold Clay Farmland (LCA1E – Bedfordshire)	LLCA 01: East Renhold Clay Farmland	Retain the large geometric arable field pattern and openness which gives rise to distant views (e.g. east towards Alington Hill). Hedgerow boundaries with trees and occasional, small scattered blocks of woodland. Retain trees along minor watercourses which add to local character
Great Ouse Clay Valley (LCA4A – Bedfordshire)	LLCA 02: Settled Ouse Valley	Reinforce the character of shelterbelts and distinctive clusters of woodland which create a semi-enclosed landscape around the major new grade separated Black Cat junction. Enhance the route of the Ouse Valley Way long distance route and National Cycle Route 12 through planting where it crosses the LLCA.
Great Ouse Clay Valley (LCA4A – Bedfordshire)	LLCA 03: Wyboston and Chawston	Enhance the urban fringe landscape along the A1 corridor with native woodland planting, shelterbelts and hedgerows with trees. Screen major infrastructure with planting to reduce effects on the character and visual amenity of residents of Wyboston and Chawston.
Great Ouse Clay Valley (LCA4A – Bedfordshire)	LLCA 04: Ouse Valley	Reflect the character of riverside vegetation, including mature willow trees, shelter belts and clusters of woodland in the valley of the River Great Ouse. Reinforce the distinction between this landscape and the more open, agricultural and undulating landscape to the east.
Biggin Wood Clay Vale (LCA5F – Bedfordshire) South East Claylands (LCA5 – Huntingdonshire)	LLCA 05: Biggin Wood Clay Vale	West of the ECML, recognise the open character of the existing landscape, balanced against the need to mitigate impacts on views including from Tempsford to the south. Integrate the embankments and ECML overbridge with native planting. Wide verges to local roads, including the realigned Barford Road. Across Alington Hill, introduce blocks of woodland to add variety and enclosure in close range views and reinforce the existing vegetation patterns and carry the landscape across the road in cutting, minimising impacts on noted remoteness of the landscape in this area.
Biggin Wood Clay Vale (LCA5F – Bedfordshire) South East Claylands (LCA5 – Huntingdonshire)	LLCA 06: Alington Hill Clay Farmland	Across Alington Hill, introduce blocks of woodland to add variety and enclosure in close range views and reinforce the existing vegetation patterns and carry the landscape across the road in cutting, minimising impacts on noted remoteness of the landscape in this area.

District Landscape Character Area (LCA)	Local Landscape Character Area (LLCA)	Design considerations
Everton Heaths Greensand Ridge (LCA6C – Bedfordshire)	LLCA 07: Everton Greensand Ridge	No works are proposed in this LLCA. The setting of this LLCA and views and visual amenity will be considered in the design of planting to limit intervisibility, for example from the Greensand Ridge Walk.
South East Claylands (LCA5 – Huntingdonshire)	LLCA 08: Settled Clayland Vale	Retain as far as practicable the subtle variations in topography, feathering out earthworks where possible to assist in integrating the Scheme into the landscape. Introduce new woodland, hedgerows and trees to reinforce vegetation patterns and to connect with existing and proposed green infrastructure to the west and to the east from the new Wintringham development.
Southern Wolds (LCA8 – Huntingdonshire) Ouse Valley (LCA4 – Huntingdonshire) South East Claylands (LCA5 – Huntingdonshire)	LLCA 09: St Neots	Works to de-trunk the existing A428 south of St. Neots will retain existing vegetation patterns.
Southern Wolds (LCA8 – Huntingdonshire) Thurleigh Clay Farmland (LCA1D – Bedfordshire)	LLCA 10: Eastern Wolds	No permanent works are proposed within this LLCA. The area associated with a temporary vehicle recovery area will be restored and returned to its previous use on completion.
South East Claylands (LCA5 – Huntingdonshire) Western Claylands (LCA3 – South Cambridgeshire)	LLCA 11: Wintringham and Weald Clay Farmland	The landscape design will reinforce existing landcover pattern of large-scale arable fields interspersed with blocks of woodland and hedgerows and hedgerow trees where these are common, particularly between Wintringham and Croxton.
Western Claylands (LCA3 – South Cambridgeshire)	LLCA 12: Croxton	The landscape design of the Scheme north of Croxton will reflect and reinforce the parkland character to the south, retaining the large blocks of existing woodland and scattered trees amongst arable farmland.
Western Claylands (LCA3 – South Cambridgeshire)	LLCA 13: Eltisley	Existing vegetation adjacent to the existing A428 will be retained as far as practicable and reinforced with new native planting. Views of the Church of St Pandionia and St John the Baptist enliven the

District Landscape Character Area (LCA)	Local Landscape Character Area (LLCA)	Design considerations
		skyline and are important in views from the A428, local roads and PRoW and will be retained in the design of the Scheme.
Western Claylands (LCA3 – South Cambridgeshire)	LLCA 14: Western Claylands	The openness of the landscape atop this broad plateau will be retained where possible to retain views out from the Scheme, with planting provided to reduce impacts on sensitive views where the existing A428 is not a feature.
Western Claylands (LCA3 – South Cambridgeshire)	LLCA 15: Papworth Everard	No works are proposed in this LLCA. The setting of this LLCA and views and visual amenity will be considered in the design of planting to limit intervisibility.
Western Claylands (LCA3 – South Cambridgeshire)	LLCA 16: Cambourne	No works are proposed in this LLCA. The setting of this LLCA and views and visual amenity will be considered in the design of planting to limit intervisibility.

Appendix B: Description of landscape element types associated with the Scheme

Landscape Element (LE) type	Description
LE1.1 Amenity grass areas	Typically limited to verges and visibility splays where it is necessary to keep grass shorter for safety.
LE1.2 Grassland with bulbs	Native species bulbs interspersed in grassland to provide seasonal interest. Generally included where road speed is slower, for example on roundabouts and slip roads
LE1.3 Species rich (or conservation) grassland	Locally characteristics, native species of wildflowers and grasses on areas with reduced soil fertility to maximize biodiversity and visual amenity. Focused in areas with good access for maintenance and habitat connectivity.
LE1.6 Open grassland	Areas of long grass cut infrequently, generally found on embankments, in cuttings and where access is limited.
LE2.1 Woodland	Generally larger groups of trees and shrubs where landscape integration is a priority.
LE2.2 Woodland edge	Associated with woodland habitat, including a greater proportion and range of scrub and shrub species to provide cover.
LE2.4 Linear belts of shrubs and trees	Typically where a visual screening function is required to mitigate adverse effects on visual receptors.
LE 2.7 Scattered trees	Trees scattered through open grassland, to assist in filtering views and to reflect landscape character.
LE2.8 Scrub	Generally a seral habitat in lowland areas, between grassland and woodland. Dominated by shrub species and small trees and likely to be less than 5m in height. Scrub is an important habitat for a wide range of higher plants, herbivorous insects and birds. Scrub within the Scheme is generally focused in areas identified for nature conservation, for example the River Great Ouse floodplain.
LE4.3 Native species hedgerows	Usually delineates a boundary between the Scheme and neighbouring land uses. Typically comprises a narrow band of shrub species planted at close intervals to establish a stock proof boundary and important linear habitats providing habitat connectivity.
LE4.4 Native hedgerows with trees	As LE 4.3, with the addition of intermittent native species, standard trees to reflect the prevailing landscape character.
LE5.1 Individual trees	Standard trees planted in open grassland to reinforce the prevailing landscape character. Species will reflect context, for example willow and alder in lower-lying areas, oak in parkland setting.
LE6.1 Waterbodies and associated plants	Includes the balancing ponds proposed as part of the Scheme. Generally these will not be planted and will be allowed to naturally colonise from the seedbank and wind-blown seed.
LE6.2 Banks and ditches	Banks and ditches will be seeded as LE 1.6 open grassland. Emerging scrub will be controlled to minimise impacts on water flow.
LE6.3 Reed beds	Reed beds have been included as part of the Breedons Quarry restoration. They will provide habitats for birds and invertebrates without impeding the areas flood storage function.

Landscape Element (LE) type	Description
LE6.4 Marsh and wet grassland	Marsh and wet grassland areas will be planted and maintained so they retain their drainage function.

Appendix C: Landscape design objectives and principles

Design scenario	Objectives	Design principles
Integration with rural landscapes	To recognise and understand the landscape types through which the road passes and to integrate the whole of the roadside landscape from the kerb outwards into its landscape setting. Where appropriate, to restore and enlarge the distinctive landscape character of areas adjacent to the road. To use fencing and walling types marrying in with adjacent ones and to plant and seed species and mixes that integrate visually and with existing vegetation.	Retain the existing landscape features and provide new planting within the Scheme and field on boundaries to carry the landscape character across the line of the road. Enhance local landscape character by reinstatement of hedgerows with species to reflect landscape character and reconnect locally fragmented landscape pattern. Support local economies by sustainable management of woodland. Promote wider walking and cycling network by providing opportunities for recreation in publicly accessible areas
Crossing the grain/landform and alignment	To choose the route least damaging to the landscape; this will be the one that respects existing landform best and avoids as far as practicable disruption of major topographical features. To achieve a balance between horizontal and vertical alignment which minimises earthworks but provides integration with natural landform and the visual screening. To design profiles which reflect existing natural slopes. To retain the least highway land by the return of land to its former use where this does not conflict with the need to provide essential mitigation. To use existing landform to minimise noise and visual intrusion: for example, placing the road in a cutting or behind rising ground to protect settlement.	Minimise earthworks which create features across the skyline and where this cannot be avoided, provide planting to mitigate effects. Excavated material should be used in a sustainable way to integrate the new linear features within the landscape. This can be achieved through grading back embankments and cutting slopes to create the best conditions for mass woodland planting. This will also assist in reducing impacts on the skyline.
Follow the contours	To find an alignment which uses the existing landform to good effect and which minimises the scale of earthworks.	Avoid major earthworks by following the contours high up the valley side. The alignment of the road should follow the lower ground and rise up at the shallowest gradient.

Design scenario	Objectives	Design principles
Crossing valleys – rural viaduct and valley	To choose the appropriate crossing form and its location.	Create a strong landscape setting for viaducts. Scale of integration planting should be designed to match the scale of road infrastructure. Landscape design to respect and reinforce the context and surroundings of each site. Create elegant viaduct structures that enhance the landscape Promote wider walking and cycling networks: Re-connect and create new footpaths to link to wider networks.
Retention of significant features	To retain existing vegetation which can play an essential part in maintaining landscape character and local landmarks. To make the best use of established vegetation.	Avoid removing existing vegetation when selecting the route alignment and safeguard individual trees near the carriageway identified as high value in the Arboricultural Impact Assessment (AIA). Maximise use of existing woodland, trees and hedgerows to improve the landscape setting of the road.

Design scenario	Objectives	Design principles
Junctions	To integrate large scale junctions within the surrounding landscape and minimise the impact of gantries, signs and lighting, as well as the road and traffic.	Minimise as far as practicable the elevation of grade-separated junctions so that the road and traffic are screened by existing landform and vegetation wherever possible All earthworks for grade-separated junctions need to be constructed in line with good practice for slopes and with their potential for planting and seeding in mind. Particular care should be taken with the design of land between carriageway levels. Whenever possible existing vegetation should be retained within the junction. The land take required for grade-separated junctions provides an opportunity for substantial planting and the establishment of species-rich grassland and wetland habitats.
Integration with urban fringe landscape	To integrate the Scheme with the landscape around urban areas and urban fringe. To create multi-functionality green infrastructure which supports different activities on the same parcel of land in and around towns.	Consider how each element of the Scheme contributes to the green infrastructure framework that benefits the social, environmental and economic health of its surroundings. Promote active travel with links to wider walking and cycling networks. Retain views to and from settlements, including views of important landmarks from and in the context of the Scheme. Promote wildlife and habitat creation and create sympathetic features that integrate scheme requirements such as flood mitigation.
Temporary landscape – Earthworks		The temporary landscape shall respond to local landscape character and be visually pleasing whilst mitigating the visual, acoustic and

Design scenario	Objectives	Design principles
		environmental impact of the construction works associated with the Scheme. It could also foster local community involvement.
Integrated design		The detailed design of the landscape shall engage and involve the local community to ensure the sensitive integration and continuation/linking of local ecology and landscape character. The promotion of local and long-distance walking and cycling networks shall enhance access to the countryside.
Bridges and structures		Enhance local landscape character: Incorporate local materials in retaining walls and bridge abutments. Consider a balanced approach to cost and practical application of each material. Connect ecological corridors across the road. Promote habitat creation to connect with existing woodland and hedgerows to enhance existing ecological corridor connections for key species. Consider climate change adaptation and disease resilience in the selection of species and habitat creation.

21 Annex M: Environmental method statement

1.1 Background

1.1.1 This is to be produced prior to construction by the Principal Contractor (PC). This section should include relevant method statements where commitments have been made to do so.

22 Annex N: Emergency procedures and record of any environmental incidents

1.1 Background

1.1.1 This document is to be produced prior to construction by the Principal Contractor (PC).

1.1.2 This document shall include:

Confirmation or procedures in the event of an environmental emergency.

A record of environmental incidents, which if occurred, is to include the following information:

i. Date and location of the incident
ii. Details of the reporting procedure followed
iii. Description of the incident and relevant legislation
iv. Remedial actions
v. Lessons learnt
vi. Details of any contact with enforcing bodies

23 Annex O: Copy of evaluation of change register

1.1 Background

1.1.1 This is to be produced prior to construction by the Principal Contractor (PC).

24 Annex P: Final environmental investigation and monitoring reports

1.1 Background

1.1.1 This document is to be produced prior to construction by the Principal Contractor (PC).

1.1.2 This document shall include:

a. Copies of relevant reports (relating to protected species / habitats, cultural heritage investigations and any environmental monitoring reports) or cross reference to the location of these if easily accessible elsewhere.