A417 Missing Link
TR010056

6.4 Environmental Statement Appendix 2.1 Environmental Management Plan (EMP)

Planning Act 2008

APFP Regulation 5(2)(a)
Infrastructure Planning (Applications: Prescribed Forms and Procedure) Regulations 2009

Volume 6

May 2021

Infrastructure Planning

Planning Act 2008

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

A417 Missing Link

Development Consent Order 202[x]

6.4 Environmental Statement
Appendix 2.1 Environmental Management Plan (EMP)

Regulation Number:	5(2)(a)
Planning Inspectorate Scheme Reference	TR010056
Application Document Reference	6.4
Author:	A417 Missing Link

Version	Date	Status of Version
C01	May 2021	Application Submission

Table of Contents

Table of Tables

1 Introduction and background to the project

1.1 Purpose of the report

1.1.1 This document is the design stage (first iteration) Environmental Management Plan (EMP (design) for the A417 Missing Link (hereafter referred to as "the scheme"). Powers to construct, operate and maintain the scheme are being sought by Highways England through the application for a Development Consent Order (DCO) a draft of which is available as part of the application (Document Reference 3.1).

1.1.2 An Environmental Impact Assessment (EIA) has been undertaken for the scheme and an Environmental Statement (ES) (Document Reference 6.1 to 6.4) has been prepared in accordance with the Infrastructure Planning (Environmental Impact Assessment) Regulations 2017 (the 'EIA Regulations'). In accordance with the requirements of the EIA Regulations, the ES contains the assessment of the likely significant effects on the environment that may be caused during construction, operation and maintenance of the scheme and describes proposed mitigation measures (Document Reference 6.2).

1.1.3 This EMP is based on the design for which the DCO is being sought. It has been prepared in accordance with the Design Manual for Roads and Bridges (DMRB) LA 120 *Environmental management plans*[1] and GG 182 *Major schemes: Enabling handover into operation and maintenance*[2]. In accordance with LA 104 *Environmental assessment and monitoring*[3], the results of monitoring would be used to update the EMP during construction and handover stages.

1.1.4 This EMP (design) has been produced at an appropriate level of detail for the preliminary design stage. The EMP (design) would be developed into a more detailed EMP (construction) by the contractor once the scheme detailed design has been finalised, subject to the DCO being granted.

1.1.5 Upon completion of construction of the scheme the EMP (construction) must be converted into the EMP (end of construction). The EMP (end of construction) must be submitted to the Secretary of State for approval within 28 days of the opening of the scheme for public use. The scheme must be operated and maintained in accordance with the EMP (end of construction).

1.1.6 The EMP sets out the measures, commitments and actions needed to manage environmental effects identified within the ES during construction and operation of the scheme.

1.1.7 The predicted environmental effects of the scheme are identified in the ES, and the related actions and mitigation measures are listed in the Register of Environmental Actions and Commitments (REAC) contained in section 3 and Table 3-2 of this document; these have formed the basis of this EMP.

1.1.8 The main purpose of the EMP is to provide clear and concise information which states how the mitigation and management of environmental effects would be delivered and maintained.

1.1.9 The EMP provides details of how the environmental effects of the scheme would be managed during construction and operation by:

- Ensuring all identified actions and mitigation measures contained in the REAC are implemented.
- Ensuring the relevant DCO Requirements[4] are met.

- Ensuring compliance with environmental legislation.
- Ensuring best practice measures are implemented.

1.1.10 Measures within the EMP include design, construction and operational mitigation, which has been defined in part by that shown to be required through the technical assessments presented in the ES (Document Reference 6.2). The ES takes into account measures within the EMP as 'embedded mitigation' and 'essential mitigation'. These mitigation measures can also be seen on the ES Figure 7.11 Environmental masterplan (Document Reference 6.3).

1.2 Definitions

1.2.1 In this EMP (design), the following definitions apply:

- The **Secretary of State** is the Secretary of State for Transport. Unless otherwise stated within the EMP, the Secretary of State will approve the EMP and other management plans appended to the EMP, in consultation with the relevant planning authority.
- The **contractor** means any contractor appointed by Highways England to deliver the construction works (and also includes any subcontractors appointed by the contractor to carry out any part of the construction works).

1.3 EMP stages

1.3.1 The EMP sets out the measures for control of environmental effects through all lifecycle stages from the design stage in accordance with Table 1-1.

Table 1-1 Delivery schedule and updates of the EMP

Project stage	EMP iteration	Produced/refined
Design	First iteration of EMP (formerly outline EMP) produced during the design stage for the preferred option.	Produced
Construction (refined for the consented project)	Second iteration of EMP (formerly construction EMP) refined during the construction stage for the consented project, in advance of construction.	Refined
End of construction	Third iteration of EMP (formerly handover EMP) building on the construction EMP refined at the end of the construction stage to support future management and operation.	Refined

1.3.2 The EMP is a living document and it is anticipated that each iteration of the EMP would be revised as necessary (at least every six months), in line with the principles of this EMP and ensuring the revisions would not give rise to any materially new or worse adverse environmental effects in comparison with those reported in the ES.

1.3.3 No part of the scheme is to commence until the EMP (construction) has been prepared in consultation with the relevant planning authority and the local highway authority and submitted to and approved in writing by the Secretary of State. The scheme must be constructed in accordance with the approved EMP (construction).

1.3.4 Upon completion of construction of the scheme the EMP (construction) must be converted into the EMP (end of construction). The EMP (end of construction) must be submitted to the Secretary of State for approval within 28 days of the opening of the authorised development for public use.

1.3.5 The scheme must be operated and maintained in accordance with the EMP (end of construction).

1.3.6 This EMP would be refined and updated when additional information comes to light to capture any necessary alterations to the proposed mitigation and management of environmental effects. Such additional information or alterations can include:

- New or updated survey data.
- Changes in the physical characteristics of the scheme.
- Changes in the design and mitigation assumptions.
- Changes in the level of understanding of the current state of the environment and the potential effects of the development (e.g. due to greater data availability).
- Changes in legislation, policy and guidance/advice relating to any environmental topic.
- Changes in response to stakeholder consultation.

1.3.7 The EMP (construction) and EMP (end of construction).would be prepared and authorised by competent experts and will:

- Provide a clear audit trail outlining the modifications made from any previous iteration.
- Identify roles and responsibilities.
- Identify risks, their associated control measures, compliance, and corrective actions.
- Establish procedures for communication, monitoring, audit mechanisms and reporting of control measures. Control measures should include a date of completion.

1.3.8 The EMP (construction) and EMP (end of construction).would also include:

- A description of the main difficulties encountered in delivery of measures to mitigate and manage the environmental effects.
- The main uncertainties involved in the forecasting of measures to mitigate and manage the environmental effects.

1.3.9 The EMP (construction) would work alongside the contractors International Organisation for Standardisation (ISO) 14001 accredited Environmental Management System (EMS).

1.3.10 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.

1.3.11 The EMP (end of construction).will be periodically reviewed and updated by Highways England. This is explained in more detail in Section 7 of this Annex, Monitoring and evaluation. 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. 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.

1.4 Objectives of this EMP

1.4.1 The overall objectives of this EMP are as follows:

- To document all environmental actions and commitments that are required to manage and reduce environmental effects of the scheme as identified in the ES.
- To reduce the risk of any type of pollution incident or other form of unauthorised discharge.
- To reduce any nuisance to the nearby receptors.
- To maintain communication between Highways England, the project manager and relevant third parties, with assignment of any specific and / or statutory reporting duties to third parties, where these are to remain their statutory duty.
- To be compliant with statutory legislation and contract specifications.
- To provide an outline for the second and third iterations of the EMP – the EMP (construction) and EMP (end of construction).
- To 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

1.4.2 This EMP takes due consideration of the documents submitted to the Planning Inspectorate, as well as the DCO for the scheme. It identifies mitigation and environmental issues associated with the following phases of construction:

- Demolition.
- Prior to construction (for example preparatory works)).
- During construction.
- Commissioning.
- Post construction (including mitigation and defects period).
- Management and operation.

1.4.3 Throughout the EMP, specific references are made to Requirements and Protective Provisions[5] within the draft DCO (Document Reference 3.1) relating to relevant matters either prior to, during, or after construction.

1.4.4 Following finalisation of the DCO for the scheme, the EMP (construction) will be reviewed to ensure that references to specific Requirements relating to the various phases of construction remain correct.

1.5 Structure of the EMP (Design)

1.5.1 The remainder of this document is structured as follows:

- Section 2: Roles and responsibilities. This section defines the roles which a contractor will identify within the EMP, to deliver the environmental commitments.
- Section 3: Register of Environmental Actions and Commitments (REAC) tables. This section identifies the environmental commitments to address the environmental effects of the works, including commitments to certain key items of embedded mitigation and essential mitigation in Table 3-2. The EMP (construction) developed by the contractor would be developed in accordance with the principles set out in Table 3-2.
- Section 4: Consents and permissions. This section provides a summary of anticipated consents/permissions required to deliver the EMP.
- Section 5: Environmental asset data and as built drawings. Provides a description of submission arrangements for providing as built drawings and environmental asset data to Highways England, and a list of species surveys obtained to date.

- Section 6: Details of maintenance and EMP monitoring activities. This section provides procedures for monitoring and reviewing compliance with the EMP and procedures for rectification of breaching or failings of EMP measures.
- Section 7: Induction, training, and briefing procedures for staff. This section provides a description of construction staff training procedures.
- Section 8: Glossary.

1.5.2 This EMP includes the following annexes:

- Annex A Environmental Constraints Plan.
- Annex B Construction Traffic Management Plan.
- Annex C Detailed Archaeological Mitigation Strategy and Overarching Written Schemes of Investigation.
- Annex D Landscape and Ecological Management Plan.
- Annex E Materials Management Plan.
- Annex F Public Rights of Way Management Plan.
- Annex G Ground and Surface Water Management Plan.
- Annex H Site Waste Management Plan.

1.5.3 The EMP (construction) would include further management plans to support the construction of the scheme. These are detailed in section 4.3 EMP (construction) Management Plans.

1.6 The scheme

Need for the scheme

1.6.1 Together, the A417 and A419 make up one of the south-west's most important road corridors. They link the M5 at Gloucester (Junction 11A) to the M4 at Swindon (Junction 15). They help south-west businesses connect with markets and opportunities in the Midlands and North, and they attract investment for Gloucestershire and its neighbours by linking them to London and the south east.

1.6.2 Most of the A417/A419 route is dual-carriageway, but the section between the Brockworth bypass and Cowley roundabout is single carriageway. This restricts the flow of traffic causing pollution and congestion. Delays of 20 minutes or more are not unusual, which results in some motorists diverting onto local roads to avoid tailbacks, causing difficulties for neighbouring communities. Poor visibility and challenging gradients also mean that a disproportionately high number of collisions are seen along this stretch of road.

1.6.3 Upgrading this section of A417 to dual-carriageway would help improve safety, support the economy, ease congestion and reduce pollution. On this stretch of road alone, there were 42 personal injury collisions between July 2014 and June 2019, nine of which were fatal. It would also support the predicted growth in jobs and housing in the Gloucestershire area by improving this key road connection. This would bring significant benefits for road users, local communities and businesses.

Location

1.6.4 The preferred route for the scheme was announced by the Secretary of State on the 14 March 2018. The A417/A419 is located along a strategic route between Gloucester and Swindon that provides an important link between the Midlands and south of England. The route is an alternative to the M5/M4 route via Bristol. The section of the A417 near Birdlip, known as the 'Missing Link', forms the only

section of single carriageway along the route and is in the Cotswolds AONB. The location of the scheme is shown in ES Figure 1.1 Location plan (Document Reference 6.3).

1.6.5 The surrounding area of the Existing A417 route contains a mix of agricultural land, woodland and Special Category Land. The nearest village is Birdlip, situated approximately midway between Cowley roundabout to the east and Brockworth bypass to the west. Cowley village is located east of the scheme, between Cockleford and Coberley. Crickley Hill Country Park is situated immediately west of the Air Balloon roundabout.

1.6.6 The scheme involves undertaking works on a Country Park, Open Access Land, registered Common Land and SSSI land. This land is located in the areas surrounding Crickley Hill Country Park and Barrow Wake. This is detailed further in Part 5 of the Book of Reference (Document Reference 4.3) and is shown on the Special Category Land Plans (Document Reference 2.3).

1.6.7 The land likely to be required temporarily or permanently for the construction, operation and maintenance of the scheme is within the DCO Boundary shown on the Land Plans (Document Reference 2.2). It is important to note that the land required may reduce due to the design and construction methodology development. The maximum area of land likely to be required has therefore been assessed in the ES (Document Reference 6) and subject to the EMP.

Outline of proposed works

1.6.8 The scheme would provide 3.4 miles (5.5 km) of new, rural all-purpose dual carriageway for the A417. The new dual carriageway would connect the Existing A417 Brockworth bypass with the existing dual carriageway A417 south of Cowley. The new dual carriageway would be completed in line with current trunk road design standards. The section to the west of the existing Air Balloon roundabout would follow the Existing A417 corridor, but to the south and east of the Air Balloon roundabout, the corridor would be offline, away from the existing road corridor. The scheme would comprise the further key components:

- A new crossing near Emma's Grove for walkers, cyclists and horse riders, including disabled users, which would accommodate the Cotswold Way National Trail.
- A new junction would be incorporated at Shab Hill, providing a link from the A417 to the A436 (towards the A40 and Oxford) and to the B4070 (for Birdlip and other local destinations).
- A new 37m wide multi-purpose crossing to provide essential mitigation for bats and enhancement opportunity for ecology and landscape integration. The public would also further benefit as the crossing would accommodate the Gloucestershire Way and provide an improved visitor experience.
- A new junction would be included near Cowley, replacing the existing Cowley roundabout, making use of an existing underbridge to provide access to local destinations. The use of the existing underbridge would allow for all directions of travel to be made.
- The Existing A417 between the existing 'Air Balloon Roundabout' and 'Cowley Roundabout' would be detrunked for its entire length. Some lengths of the existing road would be converted into a route for walkers, cyclists and horse riders including disabled users. Other sections would be retained as lower-class public roads, maintaining local access for residents. Some of the route would provide common land.

1.6.9 A location plan and aerial photography of the area are shown in ES Figure 1.1 Location plan and ES Figure 1.2 Scheme on aerial photograph respectively (Document Reference 6.3).

1.6.10 A detailed description of the scheme and details of the embedded environmental mitigation measures are provided within ES Chapter 2 The project (Document Reference 6.2).

1.7 Preparatory works

1.7.1 If the DCO is granted, Highways England may be in a position to commence preparatory works in late 2022, subject to the consents and approvals set out in the Consents and Agreements Position Statement (Document Reference 7.2) having been obtained. The details of the preparatory works are described in Table 1.1.

1.7.2 The preparatory works delivered under the DCO would consist of:

- Archaeological investigation and ground investigation works including trial pits.
- Remedial work in respect of any contamination or other adverse ground conditions.
- Ecological surveys and mitigation works.
- Site set up works (including the erection of temporary fencing and provision of access points), top-soil stripping and stockpiling for access points and compounds. The spatial extent of these site set up works would be limited to those areas identified as construction compounds on the General Arrangement Plans (Document Reference 2.6a), and access points to those compounds from the public highway.

1.7.3 The preparatory works would progress in accordance with the controls set by this EMP. Implementation of the measures described in the EMP will ensure that there are no significant environmental effects resulting from preparatory works taking place.

Table 1-2 List of preparatory works

Preparatory works	Envisaged activities
Archaeological investigation	Measures to protect archaeological remains in situ and to record archaeological remains through investigation, prior to the construction of the scheme (refer to ES Chapter 6: Cultural Heritage (Document Reference 6.2) and Annex C Detailed Archaeological Mitigation Strategy and Overarching Written Schemes of Investigation, to this EMP.
Investigations for the purpose of assessing ground conditions	Ground Investigation work potentially including boreholes and trial trenching considered appropriate to determine conditions beneath the scheme.
Remedying ground conditions	Ground Investigation work potentially including boreholes and trial trenching considered appropriate to determine conditions beneath the scheme.
Ecological mitigation works	Undertaking of ecological pre-construction surveys and where applicable ecological works (e.g. ecological clearance, invasive weed treatment or ecological mitigation in advance of main construction works) (refer to ES Chapter 8: Biodiversity (Document Reference 6.2) and Annex D Landscape and Ecology Management Plan, to this EMP.

Preparatory works	Envisaged activities
Site set up works (including the erection of temporary fencing and provision of access points)	Works to enable the establishment of the site compounds and associated access points at: • Ch 0+000, located in the adjacent fields to the west bound carriageway • Ch 5+500, located in the adjacent fields to the proposed Cowley junction on the eastbound carriageway • Other satellite compounds as described in ES Chapter 2 Proposed Scheme (Document Reference 6.2)
Top-soil stripping and stockpiling for access points and compounds	

1.8 Programme

1.8.1 If the DCO is granted, construction is expected to start in early 2023 and the scheme is expected to be open to traffic in 2026. However, Highways England may be in a position to commence preparatory works in late 2022, as discussed above.

1.8.2 A detailed construction programme would be finalised by the contactor in advance of the works. The EMP (construction) would include a detailed programme of construction which highlights the times and durations of works.

1.8.3 The duration of the construction works is currently estimated to be at least 33 months, commencing nine months after the start of preparatory works, giving an overall construction period of 42 months. The scheme is anticipated to be open for traffic 2026.

1.9 Scheme objectives

1.9.1 The scheme vision is for "a landscape-led highways improvement scheme that will deliver a safe and resilient free-flowing road whilst conserving and enhancing the special character of the Cotswolds AONB; reconnecting landscape and ecology; bringing about landscape, wildlife and heritage benefits, including enhanced visitors' enjoyment of the area; improving local communities' quality of life; and contributing to the health of the economy and local businesses".

1.9.2 The scheme vision is underpinned by design principles and four scheme specific objectives and associated sub-objectives as identified in Table 1-3.

Table 1-3 Scheme design principles, objectives and sub-objectives

Scheme design principles			
Any solution involving a new road must ensure that the scheme is designed to meet the character of the landscape, not the other way around. Any scheme should bring about substantial benefits for the Cotswolds landscape and environment as well as people's enjoyment of the area. Any scheme must have substantially more benefits than negative impacts for the Cotswolds AONB.			
Scheme objectives			
Safe, resilient and efficient network: to create a high-quality resilient route that helps to resolve traffic problems and achieves reliable journey times	**Improving the natural environment and heritage:** to maximise opportunities for landscape, historic and natural environment enhancement within the	**Community and access:** to enhance the quality of life for local residents and visitors by reducing traffic intrusion and pollution, discouraging rat-running through villages and	**Supporting economic growth:** to facilitate economic growth, benefit local businesses and improve prosperity by the provision of a free-

between the Thames Valley and West Midlands as well as providing appropriate connections to the local road network.		Cotswolds AONB and to reduce negative impacts of the scheme on the surrounding environment.	substantially improving public access for the enjoyment of the countryside.	flowing road giving people more reliable local and strategic journeys.
Scheme sub-objectives				
1	Road safety would be improved by designing to current standards and better separating strategic and local traffic.	The scheme would have an identity which reflects, conserves and enhances the character of the local landscape.	The scheme would enhance community cohesion by improving local connectivity and accessibility by helping to separate strategic and local traffic.	The scheme would contribute towards national transport policies that support economic growth.
2	The scheme would be designed to provide greater road traffic capacity, improved network resilience and better journey time reliability for strategic and local journeys.	The scheme would improve landscape and ecological connectivity through landscape and habitat restoration and creation.	The scheme would reduce rat-running on local roads through provision of a more reliable strategic route with improved capacity, thereby enhancing the amenity of local settlements.	The scheme would complement Development Plans published by local authorities in the region to support regional and local economic growth and prosperity.
3	The scheme would enhance operational efficiency, improve maintenance safety and support best value whole-life cost benefits.	The horizontal and vertical alignments of the scheme would pay due regard to the nature of the local landform.	The scheme would contribute towards community and recreational opportunities through improved provision for motorised and non-motorised users.	The scheme would contribute to the health of the local visitor economy through improved access and visitor experience of the Cotswolds AONB.
4	The scheme would consider appropriate relaxations or departures from highways standards to reduce the environmental impact of the road without compromising safety.	The siting and form of structures, cuttings, embankments and landscape mounding would reflect local topography and landform.	The scheme would reduce road noise by applying sensitive noise mitigation measures where required.	The scheme would reduce disruption to local economic interests and businesses during both construction and operation.
5		The design of structures would be of lasting architectural quality.	The scheme would reduce light pollution through sensitive structural, junction, and lighting design and sign illumination.	The scheme would restore redundant highways land to agricultural, public access, community or nature benefit uses where appropriate.
6		The scheme would avoid significant interruption to groundwater flows or negative impacts on the aquifer, springs and watercourses.	The scheme would improve air quality by reducing pollution from traffic congestion.	The scheme would support the development and employment of local skills in its construction.
7		The scheme would avoid or, where absolutely	The scheme would improve continuity of	The scheme would seek sustainable

		necessary, reduce the direct loss of National Trust land, other areas owned and managed for conservation, open access land and country parks and at the same time reduce intrusion upon such land.	access to the Public Rights of Way network, the Cotswold Way National Trail and the Gloucestershire Way long distance footpath.	opportunities to use locally sourced construction materials to support the local economy.
8		The scheme would enable enhanced preservation of heritage assets and their settings and adopt designs that reflect and enhance the historic character of the area.		

1.9.3 To ensure that customers and communities are a key consideration in the decision-making process, the following approach will be undertaken throughout the design and delivery stages:

- Understand the needs of all segments of customers (including vulnerable users), stakeholders and partners.
- Respond to those needs, such that the end product delivers an improved customer experience.
- Assess the impact of works on road users and communities from a Customer's perspective, aiming to reduce disruption and deliver appropriate mitigation measures.

2 Project team roles and responsibilities

2.1 Site roles and responsibilities

2.1.1 The project team roles identified in Table 2-1 define the responsibilities associated with the roles for construction that the contractor must establish and maintain. The responsibilities defined in the table include those relating directly to the development and implementation of the EMP and the wider environmental responsibilities. The contractor 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 and the contractor once appointed. The contractor shall 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 EMP. The chart will set out the respective roles and responsibilities with regard to the environment (refer to Table 2-1).

2.1.3 It is anticipated that prior to the commencement of each stage of the scheme, individuals would be identified to fulfil the relevant roles, and that as the EMP is developed for each stage, the roles and responsibilities would be further defined and clarified upon each iteration.

Competent Experts

2.1.4 As part of the ES, this EMP has been prepared by ‘competent experts’ as required by the EIA Regulations (Regulation 14 (4)(a)). The EMP has been prepared by Arup on behalf of Highways England. Arup has been awarded the EIA Quality Mark from the Institute of Environmental Management and Assessment (IEMA) demonstrating competency in ES preparation.

2.1.5 The EIA has been undertaken by competent experts with the relevant and appropriate experience in their respective topics. The EIA co-ordinator and technical leads responsible for preparing this EMP are summarised in ES Appendix 1.2 Competent Expert Evidence (Document Reference 6.4).

2.1.6 Those appointed to the roles identified in Table 2-1, would be appropriately qualified and evidence provided in the EMP (construction).

Table 2-1 Main roles and responsibilities during construction

Role and organisation	Responsibility
Highways England	**EMP (construction) responsibilities:** • Approval of the EMP and management plans and any detailed plans required by this EMP (for example, protected species protection, invasive species management). **Overall responsibilities:** • To monitor the contractors' performance against the contract including any environmental commitments and targets agreed for the scheme.
Contractor Project Manager[1] (PM)	**EMP (construction) Responsibilities:** • Approval of the EMP (construction), prepared by the Environment Manager (EM). • Ensure that all controls specified within the EMP are implemented by employees and sub-contractors. **Overall environmental responsibilities:** Responsible for the delivery of the scheme. Has overall responsibility for the environmental performance of the scheme and all staff. The PM will be required to: • Provide information on contract requirements to the EM following contract award and prior to start of works on site. • Ensure environmental and waste requirements are included on requisitions and in subcontracts and orders. • Ensure that all required consents/licences are in place in line with the relevant project phase. • Log and monitor incidents and non-compliances. Report incidents and non-compliances at the earliest possible opportunity. • Provide an initial point of contact for members of the public/local community who have queries regarding the works. • Ensure employees and sub-contractors receive Induction Training (including environmental) and Toolbox Talks, as appropriate. • Verify actions resulting from non-compliances and observations raised during audits are completed by the deadlines set. • Undertake inspections alongside the EM to ensure that the environmental controls as set out within the EMP are in place and working effectively. • Ensure all records are retained and readily available on site.

[1] 'Project Manager' is here defined as the senior individual (not organisation) performing the senior leadership role for the applicable phase of the project, preparatory works, main works or operation/maintenance as relevant. During 'main works construction', this role might be the 'Construction Manager'.

Role and organisation	Responsibility
Contractor Environment Manager (EM)	**EMP (construction) Responsibilities:** • Update the EMP to produce the EMP (construction) for approval in compliance with DCO Requirement 3. • Undertake site inspections to monitor compliance with the environmental licences/consents for the works and the measures within the EMP. • Prepare any changes to the EMP in consultation with the contractor's PM. • Maintaining and updating the EMP on an ongoing basis as required. • Review and approval of environmental elements of Risk Assessments and Method Statements. • Manage the delivery of the various management plans defined within the Annexes of this EMP, using appropriate technical expertise as required. • Manage the delivery of the monitoring required under the EMP, alongside relevant specialists, and reporting to relevant stakeholders at a frequency to be defined in the EMP. • Prepare the EMP (end of construction) on completion of construction, for handover to Highways England and/or appointed representative. **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 (Document Reference 6.2) throughout the relevant project phase. The EM will be required to: • Provide Toolbox Talks and environmental inductions to all staff involved in the scheme. • Deal with queries and correspondence on environmental issues. • Approve by way of sign off, that the environmental elements of the scheme have been created and maintained in accordance with the EMP to the appropriate standard. • Implement follow-up corrective actions to ensure compliance with UK regulations and legislation. • Keep record of all activities on site, environmental problems identified, transgressions noted, and a schedule of all tasks undertaken. • 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. • Be the main point of contact for regulatory liaison relevant to the scheme.
Ecological Clerk of Works (ECoW)	**EMP (construction) responsibilities:** • Reports to the Contractor Environment Manager. • Input to relevant sections of the EMP. • Responsible for ensuring that all ecological elements of the EMP are complied with. • Updating Annex D Landscape and Ecological Management Plan ((LEMP) of the EMP together with the Landscape Specialist and project ecologist. **Overall responsibilities:**

Role and organisation	Responsibility
	Responsible for ensuring that the scheme complies with all ecological legislation and consents, including the DCO and those arising from the ES (Document Reference 6.2) throughout the relevant project stage. The ECoW will be required to: • Ensure compliance with ecological aspects of DCO Requirement 5 and 6 (Landscaping), 10 (Protected Species). • Undertake watching briefs during site clearance activities including dismantling of Cotswold stone walls, to ensure that any unanticipated discoveries of notable flora and fauna are appropriately dealt with. • Approve by way of sign off, that the ecological elements of the scheme have been created and maintained in accordance with the EMP to the appropriate standard. • Monitor works during construction at sensitive sites, including but not limited to, the Crickley Hill and Barrow Wake Site of Special Scientific Interest (SSSI), Ullen Wood Ancient Woodland and retained veteran trees. • Monitor and provide guidance in respect of the EMP during the creation of habitats. • Give Toolbox Talks, where required, to inform all site personnel of the ecological constraints on site related to both flora and fauna.
Archaeological Clerk of Works (ACoW)	**EMP (construction) Responsibilities:** • Input to relevant sections of the EMP. • Responsible for monitoring all archaeological elements of the EMP during construction. • Review and updates to Annex C Detailed Archaeological Mitigation Strategy and Overarching Written Schemes of Investigation, of the EMP. **Overall responsibilities:** Monitoring contractor compliance with their contractual obligation to ensure that the scheme complies with all archaeological and historic environment legislation and consents, including the DCO and those arising from the ES (Document Reference 6.2) throughout the relevant project phase. The ACoW will: • Monitor and ensure compliance with Annex C Detailed Archaeological Mitigation Strategy and Overarching Written Schemes of Investigation. • Give Toolbox Talks, where required, to inform all site personnel of the archaeological and historic environment constraints on site, the protection measures that are required and their obligations under this EMP and generally to ensure that these are put in place and complied with. • Monitor protection measures to ensure these are in place and maintained appropriately throughout the construction period in compliance with Annex C Detailed Archaeological Mitigation Strategy and Overarching Written Schemes of Investigation. • Liaise and consult closely with the Heritage Team Leader at Gloucestershire County Council on an ongoing basis throughout the construction works and the handover to the operation phase to ensure compliance with all measures set out in the EMP and Annex C Detailed Archaeological Mitigation Strategy and Overarching Written Schemes of Investigation. • Ensure compliance with DCO Requirement 9 (Archaeology).
Contractor Landscape Specialist	**EMP (construction) responsibilities:** • Review of relevant sections of the EMP, when prepared by the EM. • Responsible for ensuring that landscape elements of the EMP are complied with during construction.

Role and organisation	Responsibility
	• Updating Annex D Landscape and Ecological Management Plan (LEMP) of the EMP, together with the ECoW. **Overall responsibilities:** • Monitors and provides guidance in respect of the LEMP during the creation of habitats and landscape features. • Approve by way of sign off, that the landscape elements of the scheme have been created and maintained in accordance with the EMP to the appropriate standard.
Contractor Arboricultural Specialist	**EMP (construction) responsibilities:** • Input to relevant sections of the EMP. • Responsible for ensuring that the elements of the EMP related to tree works are complied with during construction. • Prepares the Arboricultural Mitigation Strategy for the scheme. **Overall responsibilities:** • Monitors and provides guidance in respect of the LEMP during the creation of these habitats, with specific reference to tree establishment. • Approves, by way of sign off, that the areas of tree and scrub planting have been established and maintained in accordance with the EMP to the appropriate standard.
Contractor Traffic Control Officer	**EMP (construction) responsibilities:** • Updating Annex B Construction Traffic Management Plan (TMP) including other detailed plans as required and submitting this for approval. **Overall responsibilities:** The Traffic Control Officer will ensure compliance with the TMP in accordance with the EMP. Additional responsibilities will include: • Management and implementation of traffic management measures identified within the TMP. • Ensuring compliance with all relevant health and safety directives in liaison with the contractors Health and Safety Manager, relating to operations and live traffic. • Management of the layout of site access and egress points for all construction sites and compounds. • Arranging for site inspections at regular intervals, equipment attended to and maintained, and in the case of accidents or incidents having replacement signs, cones, bollards and lights and the like erected without delay. • Maintaining a log of all complaints received in relation to traffic during scheme construction.
Contractor Site Materials and Waste Manager	**EMP (construction) responsibilities:** • Input to relevant sections of the EMP, when prepared by the EM. • Responsible for ensuring that all materials and waste elements of the EMP are complied with during construction. • Updating the Site Waste Management Plan (SWMP) in accordance with Annex H Site Waste Management Plan, to this EMP. • Updating the Materials Management Plan (MMP) in accordance with Annex E Materials Management Plan, to this EMP. **Overall responsibilities:** • Responsible for implementing the MMP throughout the construction of the scheme.

Role and organisation	Responsibility
	• Responsible for implementing the SWMP throughout the construction of the scheme and to ensure that waste is disposed of economically and safely.
Contractor Community Relations Manager (CRM)	**EMP (construction) responsibilities:** • Input to relevant sections of the EMP. **Overall responsibilities:** Communications with the public, non-agricultural landowners, stakeholders and other interested parties, outreach and education, where appropriate. The role will include the following responsibilities: • Responding to any concerns or complaints raised by the public in relation to the works. • Liaising with the PM and EM on community and stakeholder concerns relating to the works and act as the main interface with the community and other stakeholders, alongside any Highways England presence that is required. • Maintain a log of complaints relating to the environment. • Ensuring that the PM and the EM are informed of any complaints relating to the environment. • Keeping the public informed of project progress and any construction activities that may cause inconvenience to local communities. • Engaging with local schools and colleges to inform pupils and students about the scheme, advise on careers within the construction industry and draw attention to the dangers of trespassing on construction sites. • Ensuring that the needs of groups with protected characteristics, as identified within the Equality Act 2010, are considered during the construction process.
Contractor Agricultural Liaison Officer	**EMP (construction) responsibilities:** • Review and action relevant sections of the EMP which to apply to agricultural businesses likely to be affected by the scheme. **Overall responsibilities:** Communications with landowners and occupiers running agricultural businesses likely to be affected by the scheme (owner/occupiers) and their agents. The role will include the following responsibilities: • Coordinating land drainage surveys and sharing pre- and post-construction land drainage schemes with owner/occupiers in advance of finalisation for their consideration. • Coordinating the provision of a detailed pre-construction condition survey to include soil surveys of owner/occupiers' land. • Advising the contractor on risks relating to the translocation of soil diseases and ensuring appropriate protective provisions are implemented. • Ensuring that owner/occupiers are consulted in respect of requirements relating to field entrances and accesses across the construction areas and land-locked or severed land parcels. • Arranging quarterly meetings with agent representatives of owner/occupiers. • Undertaking pre-construction and day-to-day discussions with affected owner/occupiers to minimise disruption, where possible, to existing farming regimes and timings of activities.

Role and organisation	Responsibility
	• Undertaking site inspections during construction to monitor working practices and compliance of the contractor/s with their obligations to owner/occupiers under this EMP. • Liaising on reinstatement measures following completion of the works.
All Site Staff (all contractors)	**EMP (construction) responsibilities:** • Ensure all environmental policies, procedures and rules as set out in the EMP are adhered to. • Organise work to be carried out to the required standard with the aim of minimum risk to the environment. All site personnel to receive instruction on their responsibilities to ensure correct environmental practice in line with the 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: • All staff are to be appropriately trained to carry out their respective tasks. • Adhere to all relevant legislation and, where appropriate, codes of practice and guidance notes relevant to their work.

2.2 Stakeholders

2.2.1 In meeting the requirements of this EMP there are several key stakeholders to be engaged prior to and during construction of the scheme. These include:

- The relevant local planning and highways authorities.
- Gloucestershire County Council.
- Environment Agency.
- Historic England.
- Natural England.
- Cotswold Conservation Board.
- Gloucestershire Wildlife Trust.
- National Trust.

3 Register of Environmental Actions and Commitments (REAC)

3.1.1 The Register of Environmental Actions and Commitments (REAC) identifies the environmental commitments proposed to address the potential environmental effects of the preparatory and main works.

3.1.2 The REAC described in Table 3-2 presents an initial register which has been developed using information presented in the ES and the Habitat Regulations Assessment (HRA). The REAC will be updated by the contractor when preparing the EMP (construction) and then 'as required' as the scheme progresses. Each EMP will be prepared in accordance with the principles of this EMP (design).

3.1.3 The REAC is provided in Table 3-2 includes:

- A clear and specific description of the action.
- The objective of the action.
- How the action is to be implemented/achieved.
- The source of the action, including references for source documentation e.g. ES.
- Naming of the person responsible for the action.
- Achievement criteria and reporting requirements.
- The project stage, date or implementation and achievement.
- Details of any monitoring required and corrective action.

3.1.4 The REAC will be developed during all lifecycle stages from the design stage in accordance with Table 1-1.

3.1.5 The table does not define general legislative requirements. It is assumed that in addition to compliance with the measures in Table 3-2, all activities will comply with applicable legislation and recognised industry good practice.

3.1.6 Table 3-1 provides a summary of the scope of each column within the REAC.

Table 3-1 Explanatory guide to REAC table columns

Column	Explanation
Reference (ref.)	A unique identifier defined within these REAC tables to enable simple reference to individual measures.
Action / commitment	Clear and specific description of the action/commitment is defined, including the specific location. The location for the action is scheme wide, unless otherwise stated.
Assumptions	The assumptions on which the action/commitment is based.
Objective	The objective of the action/commitment, including alignment with Project Objectives in section 1.3. Reference to relevant legislation requirements
How the action/ commitment will be implemented/ secured	How the action is to be implemented/achieved, including details of risk management.

Column	Explanation
Source reference (source ref.)	The source of the action (e.g. mitigation reference in the ES, habitat regulations assessment, equality impact assessment, traffic management plan) including confirmation of commitments agreed with stakeholders. 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).
Responsible person(s)	The person or body responsible for delivery of the action/commitment; this will often be the contractor.
Achievement criteria and reporting requirement (if applicable)	The criteria which define the successful implementation of the action/commitment, such as a document approval which confirms the action has been undertaken.
Project stage	The anticipated project stage, date of implementation or achievement. P = Pre-construction C = Construction O = Operation A = All
Monitoring requirements	Details of any monitoring that is required in relation to the action/commitment (including in relation to likely significant adverse effects).

Table 3-2 Register of environmental actions and commitments

Ref	Environmental action/commitment	Assumptions (on which the action is based)	Objective	How the action/ commitment will be implemented/ secured	Source ref.	Responsible person (s)	Achievement criteria and reporting requirements (if applicable)	Project stage	Monitoring requirements
				General Provision					
GP1	**BS EN 14001:** The contractor shall have an Environmental Management System (EMS) certified to BS EN ISO 14001. The contractor's EMS will define appropriate control measures and monitoring systems to be employed during the planning and construction of the works for all relevant topic areas. The contractor's EMS shall cover the activities of all their sub-contractors. The contractor will also be required to coordinate with other contractors and relevant parties that may affect their works. This will be documented in their EMS, as appropriate. As part of their EMS, the contractor shall commit to planning works in advance to ensure that, in so far as is reasonably practicable, measures to reduce environmental effects are integrated into the construction methods.	The assessment assumes that the EMP (construction) will be implemented throughout the construction of the scheme.	To ensure the EMP is appropriate to the project phase and the scope of works delivered by the Contractor.	DCO Requirement 3 (EMP)	N/A	Contractor	Project EMS certification to ISO 140001, maintained for duration of construction. Highways England approval of the EMP (construction).	A	N/A
GP2	**Environmental Policy:** The contractor shall develop a scheme specific environmental policy, prior to the EMS, and to be included as part of the EMS. This policy will be developed in line with Highways England's environmental policies and the scheme objectives and will set out how the contractor will: • adhere to the requirements of environmental legislation during the works; • commit to mitigating the impacts associated with the works; • commit to good practice in environmental performance throughout the phase of works; and • identify opportunities to improve the scheme's whole life performance in terms of environmental and social implications.	The assessment assumes that the EMP (construction) will be implemented throughout the construction of the scheme.	To ensure the EMP is appropriate to the project phase and the scope of works delivered by the Contractor.	DCO Requirement 3 (EMP)	N/A	Contractor	Production of the policy. Highways England approval of the EMP (construction).	A	N/A

Ref	Environmental action/commitment	Assumptions (on which the action is based)	Objective	How the action/ commitment will be implemented/ secured	Source ref.	Responsible person (s)	Achievement criteria and reporting requirements (if applicable)	Project stage	Monitoring requirements
GP3	**Monitoring of actions**: The contractor's EMS and EMP (construction) shall include procedures to monitor compliance with the scheme's environmental actions and requirements (as set out in this REAC table) together with provisions for any corrective actions required.	The assessment assumes that the EMP (construction) will be implemented throughout the construction of the scheme.	To ensure the EMP is appropriate to the project phase and the scope of works delivered by the Contractor.	DCO Requirement 3 (EMP)	ES Ch4	Contractor	Highways England approval of the EMP (construction).	A	N/A
GP4	**Preparation of an EMP (construction)**: The contractor shall prepare an EMP (construction), in accordance with this EMP , prior to the commencement of the relevant project phase.	The assessment assumes that the EMP (construction) will be implemented throughout the construction of the scheme.	To ensure the EMP is appropriate to the project phase and the scope of works delivered by the Contractor.	DCO Requirement 3 (EMP)	ES Ch2	Contractor	Highways England approval of the EMP (construction).	A	N/A
GP5	**Management Plans:** The contractor shall prepare Management Plans for certain environmental topic areas as the detailed design is developed, to include at least developing the plans Annexed to this EMP, and the following plans: • Emergency Preparedness and Response Plan. • Pollution Prevention and Control. • Air Quality Management Plan. (including dust) • Noise and Vibration Management Plan. • Soils Management Plan. • Woodland Management Plan. These plans shall be appended to the EMP as appropriate. The plans shall be prepared in consultation with the relevant regulatory organisation, relevant planning authority and the local highway authority and submitted to and approved in writing by the Secretary of State.	The assessment assumes that the EMP (construction) will be implemented throughout the construction of the scheme.	To ensure the EMP is appropriate to the project phase and the scope of works delivered by the Contractor.	DCO Requirement 3 (EMP)	ES Ch5 ES Ch8 ES Ch11 ES Ch13	Contractor	Highways England approval of the EMP (construction).	A	N/A

Ref	Environmental action/commitment	Assumptions (on which the action is based)	Objective	How the action/ commitment will be implemented/ secured	Source ref.	Responsible person (s)	Achievement criteria and reporting requirements (if applicable)	Project stage	Monitoring requirements
GP6	**Environmental Method Statements** The contractor shall prepare Environmental Method Statements for environmental topic areas at detailed design (for example site clearance) for construction and operation, as required.	The assessment assumes that the EMP (construction) will be implemented throughout the construction of the scheme.	To ensure the EMP is appropriate to the project phase and the scope of works delivered by the Contractor.	DCO Requirement 3 (EMP)	ES Ch5 ES Ch6 ES Ch7 ES Ch8 ES Ch9 ES Ch10 ES Ch11 ES Ch12 ES Ch13 ES Ch14	Contractor	Highways England approval of the EMP (construction).	A	N/A
GP7	**Cotswold District Council (CDC)** CDC request that a code of practice shall be developed by the Contractor for construction works which should include the following considerations: • The parking of vehicles for site operatives and visitors. • The loading and unloading of plant and materials. • The storage of plant and materials used in constructing the development. • The erection and maintenance of security hoarding including decorative displays. • Wheel washing facilities. • Measures to control the emission of dust and dirt during construction (see AQ1 – AQ12). • A scheme for recycling/disposing of waste resulting from demolition and construction works (see MAW1 – MAW26).	The assessment assumes that the EMP (construction) will be implemented throughout the construction of the scheme.	To prevent statutory nuisance.	DCO Requirement 3 (EMP)	Statement of statutory nuisance	Contractor	Highways England approval of the EMP (construction).	A	N/A
Air quality									
AQ1	Minimisation of areas to be stripped of vegetation.	Vegetation stripping has the potential to result in the creation of dust.	Reduce the total surface area of exposed earth and material that could be mobilised to dust by weather and construction movements.	DCO Requirement 3 (EMP) Air Quality Management Plan	ES Ch5	Contractor	N/A	P, C	N/A
AQ2	Dampening down of dust generating activities and materials, including site roads, during dry weather or covering loads transported offsite.	Some on site activities have the potential to generate dust which could be transported offsite.	Limit the mobilisation of dust by construction vehicles.	DCO Requirement 3 (EMP) Air Quality Management Plan	ES Ch5 ES Ch9	Contractor	N/A	C	Monitoring should be carried out to assess the effectiveness of measures to prevent dust and air pollutant emissions during construction.

Ref	Environmental action/commitment	Assumptions (on which the action is based)	Objective	How the action/ commitment will be implemented/ secured	Source ref.	Responsible person (s)	Achievement criteria and reporting requirements (if applicable)	Project stage	Monitoring requirements
AQ3	As far as possible temporary roads should be hard surfaced to reduce dust generation.	Unsurfaced roads have the potential to generate dust.	Limit the mobilisation of dust by construction vehicles.	DCO Requirement 3 (EMP) Air Quality Management Plan	ES Ch5	Contractor	N/A	C	N/A
AQ4	Road sweeping to be carried out on access roads and local roads to remove any material tracked out of the site.	Construction vehicles have the potential to carry dust.	Limit the mobilisation of dust by construction vehicles.	DCO Requirement 3 (EMP) Air Quality Management Plan	ES Ch5	Contractor	N/A	C	Monitoring should be carried out to assess the effectiveness of measures to prevent dust pollutant emissions during construction.
AQ5	Management of stockpiled materials with the potential to generate dust by rolling, covering and/or revegetating as soon as appropriate.	Stockpiled materials have the potential to generate and carry dust.	Reduce the total surface area of exposed earth and material that could be mobilised to dust by weather and construction movements.	DCO Requirement 3 (EMP) Air Quality Management Plan	ES Ch5	Contractor	N/A	C	N/A
AQ6	Cover, seed (with appropriate species agreed with ecologist) or fence stockpiles.	Stockpiled materials have the potential to generate dust.	Reduce the total surface area of exposed earth and material that could be mobilised to dust by weather and construction movements.	DCO Requirement 3 (EMP) Air Quality Management Plan	ES Ch5	Contractor	N/A	C	N/A
AQ7	Undertake periodic on-site inspections, where receptors are nearby, to monitor dust, record inspection results, and make the log available to the relevant planning authority when asked.	Dust generating activities have the potential to impact on ecological receptors identified within 200m of the DCO Boundary.	Minimise impacts on ecological receptors identified within 200m of the DCO Boundary.	DCO Requirement 3 (EMP) Air Quality Management Plan	ES Ch5 Habitats Regulations Assessment (HRA)	Contractor	N/A	C	Visual checks
AQ8	Impose and signpost a maximum-speed-limit of 15mph on surfaced and 10mph on un-surfaced haul roads and work areas (if long haul routes are required these speeds may be increased with suitable additional control measures provided).	Construction vehicles have the potential to generate and carry dust.	Limit the mobilisation of dust by construction vehicles.	DCO Requirement 3 (EMP) Air Quality Management Plan	ES Ch5	Contractor	N/A	C	N/A
AQ9	All construction plant would use fuel equivalent to ultra-low sulphur diesel (ULSD) where possible.	Construction plant has the potential to result in emissions to air.	Minimise pollutant emissions to air.	DCO Requirement 3 (EMP) Air Quality Management Plan	ES Ch5	Contractor	N/A	C	N/A

Ref	Environmental action/commitment	Assumptions (on which the action is based)	Objective	How the action/ commitment will be implemented/ secured	Source ref.	Responsible person (s)	Achievement criteria and reporting requirements (if applicable)	Project stage	Monitoring requirements
AQ10	The contractor shall manage dust, air pollution and exhaust emission during the construction works in accordance with Best Practicable Means (BPM). Specific measures shall be based upon industry good practice, including the measures listed in the Institute of Air Quality Management's (IAQM) Guidance on the Assessment of Dust from Demolition and Construction.	N/A	To manage dust, air pollution and exhaust emission during the construction works.	DCO Requirement 3 (EMP) Air Quality Management Plan	ES Ch5	Contractor	N/A	C	N/A
AQ11	At sensitive locations (to be agreed in AQMP), monitoring should be carried out to assess the effectiveness of measures to prevent dust and air pollutant emissions during construction. Monitoring should be continued until the site is deemed to be low risk (i.e. higher risk activities have ceased).	N/A	To manage dust, air pollution and exhaust emission during the construction works. To track which activities and events are generating the most dust and actively manage the implementation of any additional mitigation requirements.	DCO Requirement 3 (EMP) Air Quality Management Plan	ES Ch5	Contractor	N/A	C	Monitoring should be continued until the site is deemed to be low risk (i.e. higher risk activities have ceased).
AQ12	At sensitive locations (including designated sites and ancient woodland)(to be agreed in AQMP), further good practice standard mitigation measures should be employed, which could include: (a) Display the name and contact details of person(s) accountable for air quality and dust issues on the construction site boundaries. (b) Record any exceptional incidents that cause dust and/ or air emissions, either onsite or offsite, and the action taken to resolve the situation in the log book. (c) Plan site layout so that machinery and dust causing activities are located away from receptors, as far as is possible.	N/A	To manage dust, air pollution and exhaust emission during the construction works	DCO Requirement 3 (EMP) Air Quality Management Plan	ES Ch5	Contractor	N/A	C	N/A

Ref	Environmental action/commitment	Assumptions (on which the action is based)	Objective	How the action/ commitment will be implemented/ secured	Source ref.	Responsible person (s)	Achievement criteria and reporting requirements (if applicable)	Project stage	Monitoring requirements
Cultural heritage									
CH1	The contractor shall undertake the archaeological works, at all times, in accordance with EMP Annex C Detailed Archaeological Mitigation Strategy and Overarching Written Schemes of Investigation.	This action assumes that it will not be possible to preserve buried archaeological remains in situ, and that they will be removed by the construction of the scheme	The objective is to ensure that archaeological remains are investigated in detail, recorded, analysed and the results published. This will mitigate the loss of the remains by ensuring that archaeological knowledge is enhanced and disseminated to the academic community and the general public	DCO Requirement 3 (EMP) EMP Annex C Detailed Archaeological Mitigation Strategy and Overarching Written Schemes of Investigation. DCO Requirement 9 (Archaeology)	ES Ch 6	Contractor	Compliance with EMP Annex C Detailed Archaeological Mitigation Strategy and Overarching Written Schemes of Investigation.	P, C, O	Regular on-site monitoring by: •Highways England's Archaeological Representative •Gloucestershire County Council Historic Environment team • Historic England Inspector of Ancient Monuments and Regional Scientific Advisor Monitoring by these parties will continue during the post-excavation, analysis and publication phases
CH2	'Preservation by record' would take place. This is the investigation of archaeological remains prior to construction, and the analysis of artefacts and publication of results following the construction of the scheme.	Buried archaeological remains will be removed by construction activity.	To ensure that a record is made of archaeological deposits that will be removed by the scheme, and that the results of these investigations are published, in accordance with the National Policy Statement for National Networks (NPSNN) 5.120, 5.142	DCO Requirement 3 (EMP) EMP Annex C Detailed Archaeological Mitigation Strategy and Overarching Written Schemes of Investigation DCO Requirement 9 (Archaeology)	ES Ch6	Contractor	Site specific Written Schemes of Investigation (WSI) will detail type and location of mitigation required and will be agreed with Gloucestershire County Council (GCC) Archaeological Officer. Post excavation assessment report will be produced once site works are completed. Full technical and non-technical reports will be published.	P, C, O	Regular (weekly) monitoring by GCC Archaeological Officer, Historic England (as appropriate), and Highways England Archaeological advisor.
CH3	A non-designated milestone is located close to the entrance to Crickley Hill Farm. This will be demarcated or fenced during construction to avoid accidental damage. If necessary, it will be removed under archaeological supervision, stored, and replaced as close as possible to its original location at the end of the construction phase.	Milestone has the potential to be damaged or removed by construction activity.	To ensure that the asset is protected from accidental damage or loss during construction, in accordance with NPSNN 5.120.	DCO Requirement 3 (EMP) EMP Annex C Detailed Archaeological Mitigation Strategy and Overarching Written Schemes of Investigation DCO Requirement 9 (Archaeology)	ES Ch6	Contractor	Milestone re-instated.	P, O	N/A

Ref	Environmental action/commitment	Assumptions (on which the action is based)	Objective	How the action/ commitment will be implemented/ secured	Source ref.	Responsible person (s)	Achievement criteria and reporting requirements (if applicable)	Project stage	Monitoring requirements
CH4	The Air Balloon public house would be demolished as part of the scheme. Prior to demolition, a detailed record will be made by means of photographic and measured survey. The specific level of detail for the recording will be agreed as part of the overarching WSI.	The Air Balloon public house will be demolished in advance of construction.	To ensure that a record is made of the historic structure of the building prior to its demolition, in accordance with NPSNN 5.120.	DCO Requirement 3 (EMP) EMP Annex C Detailed Archaeological Mitigation Strategy and Overarching Written Schemes of Investigation DCO Requirement 9 (Archaeology)	ES Ch6	Contractor	Historic building recording to be completed, and report issued to GCC archaeological officer and approved.	P	N/A
CH5	Emma's Grove scheduled monument will be fenced off clearly during construction to ensure that no accidental damage occurs during construction.	Construction will impact on Emma's Grove.	To ensure that the scheduled monument is protected from accidental damage or loss during construction, in accordance with NPSNN 5.120	DCO Requirement 3 (EMP) EMP Annex C Detailed Archaeological Mitigation Strategy and Overarching Written Schemes of Investigation DCO Requirement 9 (Archaeology)	EMP Annex C Detailed Archaeological Mitigation Strategy and Overarching Written Schemes of Investigation	Contractor	Fencing proposals must be approved by Historic England, and implementation of fencing must be approved by Historic England on-site.	P, C,	The condition of the fencing should be monitored by the contractor on a weekly basis, and be repaired when required. Photos of condition will be sent to Historic England weekly.
CH6	Emma's Grove scheduled monument will have selective vegetation clearance carried out following arboricultural and ecological inspection. The method statement will be agreed with Historic England.	Emma's Grove requires selective vegetation clearance.	To remove it from Historic England's heritage at risk register.	DCO Requirement 3 (EMP)	ES Ch6	Contractor	Agreement from Historic England that Emma's Grove scheduled monument can be removed from the heritage at risk register.	C	N/A
CH7	Shab Hill Farm (which includes the Grade II listed Shab Hill barn) shall be provided noise mitigation in the form of a 1.2m stone wall along the B4070 (from Shab Hill Farm access road to Shab Hill junction).		To reduce the noise impact.	DCO Requirement 13 (Noise Mitigation)	ES Ch6	Contractor	N/A	C	N/A
Landscape and visual									
L1	The contractor will update the Landscape and Ecological Management Plan (LEMP) (EMP Annex D), developing it in accordance with current industry good practice.	Best practice process can change over time.	To ensure current best practice is used.	DCO Requirement 3 (EMP) EMP Annex D Landscape and Ecological Management Plan	ES Ch7	Contractor	Landscape and Ecological Management Plan (LEMP)	C	N/A

Ref	Environmental action/commitment	Assumptions (on which the action is based)	Objective	How the action/ commitment will be implemented/ secured	Source ref.	Responsible person (s)	Achievement criteria and reporting requirements (if applicable)	Project stage	Monitoring requirements
L2	The contractor will ensure that landscape works are carried out in accordance with the approved landscape scheme.			DCO Requirement 3 (EMP) DCO Requirement 6 (Implementation and maintenance of landscaping) ES Figure 7.9 Environmental masterplan (Document Reference 6.3)	ES Ch7	Contractor	Implementation of environmental masterplan	C, O	EMP and LEMP
L3	Integrate the Cowley and Shab Hill junctions into the landscape using a combination of woodland planting with landscape earthworks to help visually screen the road infrastructure.	Road infrastructure will be visible for the first 5-10 years post completion.	Shab Hill integrated into the landscape to reduce adverse landscape and visual effects.	DCO Requirement 3 (EMP) EMP Annex D Landscape and Ecological Management Plan DCO Requirement 5 (Landscaping) and 6 (Implementation and maintenance of landscaping) ES Figure 7.9 Environmental masterplan (Document Reference 6.3)	ES Ch7	Contractor	Implementation of environmental masterplan	C, O	EMP and LEMP
L4	All earthworks to be soft engineered slopes to gently tie into existing topography, constructed from excavated materials. Grading out of embankments to allow the land to be returned to agricultural use. Also refer to GS13.	Engineered slopes can appear at odds with the natural landscape.	Landscape earthworks to blend in with existing landform and not be incongruous, engineered features.	DCO Requirement 3 (EMP) EMP Annex D Landscape and Ecological Management Plan ES Figure 7.9 Environmental masterplan (Document Reference 6.3)	ES Ch7	Contractor	Implementation of environmental masterplan	P, C	N/A
L5	Where practicable, structures would be designed to be sympathetic to the character of the Cotswolds AONB, using suitable facing materials such as locally sourced materials to fit existing vernacular and exposed rock faces. Facings may also include areas for colonisation with local species to visually break up the surfaces.	Materiality of structures can have long lasting effects on the local landscape character.	Proposed structures to harmonise with the landscape character of the Cotswolds AONB.	DCO Requirement 3 (EMP) EMP Annex D Landscape and Ecological Management Plan	ES Ch7	Contractor	Implementation of environmental masterplan	P, C	N/A

Ref	Environmental action/commitment	Assumptions (on which the action is based)	Objective	How the action/ commitment will be implemented/ secured	Source ref.	Responsible person (s)	Achievement criteria and reporting requirements (if applicable)	Project stage	Monitoring requirements
L6	Footpath link across the Cotswold Way crossing to be realigned keeping the Cotswold Way National Trail close to its original route. The crossing will form part of the Cotswold Way National Trail and would be designed to allow views out in places to the Cotswolds AONB landscape.	Severance to the landscape and recreational routes.	Positive contribution to the user's landscape experience of the Cotswolds AONB	DCO Requirement 3 (EMP) EMP Annex D Landscape and Ecological Management Plan EMP Annex F Public Rights of Way Management Plan ES Figure 7.9 Environmental masterplan (Document Reference 6.3)	ES Ch7	Contractor	Compliance of mitigation measures in EMP and LEMP	P, C	EMP and LEMP. PROW Management Plan.
L7	Gloucestershire Way crossing designed to cater for walkers and other users of the Gloucestershire Way long distance footpath, to integrate the scheme into the landscape, improving connectivity and provides quieter areas to facilitate wildlife corridors.	Severance to the landscape, recreational routes, field pattern and field boundaries.	Landscape integration and positive contribution to the users' landscape experience of the Cotswolds AONB	DCO Requirement 3 (EMP) EMP Annex D Landscape and Ecological Management Plan EMP Annex F Public Rights of Way Management Plan ES Figure 7.9 Environmental masterplan (Document Reference 6.3)	ES Ch7	Contractor	Compliance of mitigation measures in EMP and LEMP	P, C	EMP and LEMP
L8	Gloucestershire Way crossing planting to feature a mosaic of habitats including calcareous grassland, groundcover shrub and small tree/ scrub as two distinct native species-rich hedgerows at least 2m high to support wildlife movement. Vegetation on bridge to be managed and maintained to ensure it thrives.	Severance to landscape, field pattern and field boundaries.	Landscape integration and positive contribution to reconnect habitat	DCO Requirement 3 (EMP) EMP Annex D Landscape and Ecological Management Plan DCO Requirement 5 (Landscaping) ES Figure 7.9 Environmental masterplan (Document Reference 6.3)	ES Ch7	Contractor Landscape specialist and/or ECoW.	Compliance of mitigation measures in EMP and LEMP	P, C, O	EMP and LEMP

Ref	Environmental action/commitment	Assumptions (on which the action is based)	Objective	How the action/ commitment will be implemented/ secured	Source ref.	Responsible person (s)	Achievement criteria and reporting requirements (if applicable)	Project stage	Monitoring requirements
L9	Hedgerow(s) on Stockwell and Cowley overbridges. Vegetation on bridge to be managed and maintained to ensure it thrives.	Severance of landscape features within the Cotswolds AONB as a result of Existing A417 road infrastructure.	Link existing and proposed landscape features across the proposed development.	DCO Requirement 3 (EMP) EMP Annex D Landscape and Ecological Management Plan DCO Requirement 6 (Implementation and maintenance of landscaping) ES Figure 7.9 Environmental masterplan (Document Reference 6.3)	ES Ch7	Contractor and operator	Compliance of mitigation measures in EMP and LEMP	C, O	EMP and LEMP
L10	Detrunked sections of the A417 are to be repurposed to a ‘purpose-designed’ width for footpath, bridleway and cycle access, with areas of restored landscape. Former road to be resurfaced with locally appropriate toppings, such as crushed stone.	Severance of landscape features within the Cotswolds AONB as a result of Existing A417 road infrastructure.	Placemaking in the A417 detrunked section	DCO Requirement 3 (EMP) EMP Annex D Landscape and Ecological Management Plan EMP Annex F Public Rights of Way Management Plan DCO Requirement 5 (Landscaping) and 6 (Implementation and maintenance of landscaping) ES Figure 7.9 Environmental masterplan (Document Reference 6.3)	ES Ch7	Contractor	Compliance of mitigation measures in EMP and LEMP	C	EMP and LEMP

Ref	Environmental action/commitment	Assumptions (on which the action is based)	Objective	How the action/ commitment will be implemented/ secured	Source ref.	Responsible person (s)	Achievement criteria and reporting requirements (if applicable)	Project stage	Monitoring requirements
L11	Linear tree planting to be extended across the demolished section of the Existing A417 road to connect landscape features, increase biodiversity and create additional wildlife habitat.	Restore severed landscape features within the Cotswolds AONB as a result of Existing A417 road infrastructure.	Reconnect landscape features and habitat across the detrunked A417	DCO Requirement 3 (EMP) EMP Annex D Landscape and Ecological Management Plan DCO Requirement 5 (Landscaping) and 6 (Implementation and maintenance of landscaping) ES Figure 7.9 Environmental masterplan (Document Reference 6.3)	ES Ch7	Contractor Landscape specialist and/or arboricultural specialist	Compliance of mitigation measures in EMP and LEMP	P, C	EMP and LEMP
L12	Levels of the old A417 alignment are to be rationalised in places through infilling using excavated materials to restore land to original grades.	Restore topography and severed landscape features within the Cotswolds AONB as a result of Existing A417 road infrastructure.	Reduce landscape impact of existing section of A417 to be detrunked.	DCO Requirement 3 (EMP) DCO Requirement 5 (Landscaping) and 6 (Implementation and maintenance of landscaping) ES Figure 7.9 Environmental masterplan General Arrangement and Section Plans (Document Reference 2.6)	ES Ch7	Contractor	Compliance of mitigation measures in EMP and LEMP	P, C	N/A
L13	Undertake arboricultural walkover survey and tree survey, taking due regard to the guidance in British Standard 5837:2012, to identify any significant constraints posed by trees. Protect and retain existing trees and woodland.	Loss of trees and woodland would have a detrimental effect of the landscape character of the Cotswolds AONB.	Reduce the amount of woodland and vegetation lost to the scheme.	DCO Requirement 3 (EMP) EMP Annex D Landscape and Ecological Management Plan DCO Requirement 5 (Landscaping)	ES Ch7	Contractor Landscape specialist and/or arboricultural specialist	Confirmation on trees lost at end of construction and confirmation to adherence to tree protection plan in ES Appendix 7.6 Arboricultural Impact Assessment (Document Reference 6.4).	P, C	EMP and LEMP

Ref	Environmental action/commitment	Assumptions (on which the action is based)	Objective	How the action/ commitment will be implemented/ secured	Source ref.	Responsible person (s)	Achievement criteria and reporting requirements (if applicable)	Project stage	Monitoring requirements
L14	Create a mix of new Cotswold drystone walling and hedgerows to field boundaries affected by the road infrastructure. Cotswold walls to be built in accordance with local practices and skills.	Integrate the proposed road infrastructure into the landscape, reducing its effect on the character of the Cotswolds AONB.	To create a continuous pattern of Cotswold stone walls to field structures affected by the scheme.	DCO Requirement 3 (EMP) EMP Annex D Landscape and Ecological Management Plan DCO Requirement 5 (Landscaping) ES Figure 7.9 Environmental masterplan (Document Reference 6.3)	ES Ch7	Contractor	Implementation of the design	C, O	EMP and LEMP
L15	New tree planting to take place across the wider site to complement the local character using local province and climate change resilient species. Planting will pick up on existing local features such as avenues, groves, coppices and hanging woodland. Tree species sourcing to be submitted by contractor and agreed by landscape specialist and/or arboricultural specialist and the local council, liaising with project stakeholders.	Directly replace and compensation for tree loss as a result of the proposal development and safeguard proposed planting from the effects of climate change.	Replace lost vegetation and create climate resilient planting to the scheme.	DCO Requirement 3 (EMP) EMP Annex D Landscape and Ecological Management Plan DCO Requirement 5 (Landscaping) DCO Requirement 6 (Implementation and maintenance of landscaping) ES Figure 7.9 Environmental masterplan	ES Ch7	Contractor Landscape specialist and/or arboricultural specialist	Acceptance of tree species order by landscape architect	C, O	EMP and LEMP
L16	Landscape works undertaken should be maintained to ensure successful establishment of the proposed landscape design. Maintenance should be undertaken in accordance with the Series 3000 appendices (to be produced at further design/construction) and LEMP to ensure the establishment and continued growth of new plant stock. This would ensure the proposed mitigation planting meets its objectives as presented in the Environmental Masterplans. Soft landscape works to be undertaken by the Contractor. Management throughout aftercare period	Ensure thriving planting on completion of the proposed construction works.	To limit impacts upon both landscape and visual amenity during operation	DCO Requirement 3 (EMP) EMP Annex D Landscape and Ecological Management Plan DCO Requirement 6 (Implementation and maintenance of landscaping) ES Figure 7.9 Environmental masterplan (Document Reference 6.3)	ES Ch7	Contractor	Successfully implement Ecological Mitigation and Landscape Design.	C, O	As per instructed in the EMP and LEMP, and subsequent contractor's renditions.

Ref	Environmental action/commitment	Assumptions (on which the action is based)	Objective	How the action/ commitment will be implemented/ secured	Source ref.	Responsible person (s)	Achievement criteria and reporting requirements (if applicable)	Project stage	Monitoring requirements
L17	The introduction of new woodland blocks and/or hedgerow planting as appropriate will create new field boundaries that would provide visual screening of the road. New planting areas will link with existing woodland and hedgerows to unify and link landscape features and habitats in the area.	Directly replace and compensation for tree/hedgerow/woodland loss as a result of the proposal development. Link up fragmented landscape features.	Woodland blocks and hedgerow planting to create a visual barrier to the scheme and link landscape features.	DCO Requirement 3 (EMP) EMP Annex D Landscape and Ecological Management Plan DCO Requirement 5 (Landscaping) DCO Requirement 6 (Implementation and maintenance of landscaping) ES Figure 7.9 Environmental masterplan (Document Reference 6.3)	ES Ch7	Contractor Landscape specialist and/or arboricultural specialist	Implementation of the design. Implementation of detailed site-specific EMP	P, C, O	As per instructed in the EMP and LEMP, and subsequent contractor's renditions.
L18	False cuttings to screen the road and help reduce visual impacts of road infrastructure and traffic movements on the surrounding landscape by including soft engineered slopes (using excavated materials).	Visual presence of the road would have significant visual effects on the Cotswolds AONB.	False cuttings to act as visual and acoustic screening.	DCO Requirement 3 (EMP) EMP Annex D Landscape and Ecological Management Plan ES Figure 7.9 Environmental masterplan (Document Reference 6.3) General Arrangement and Section Plans (Document Reference 2.6)	ES Ch7	Contractor	Implementation of design	P, C	N/A

Ref	Environmental action/commitment	Assumptions (on which the action is based)	Objective	How the action/ commitment will be implemented/ secured	Source ref.	Responsible person (s)	Achievement criteria and reporting requirements (if applicable)	Project stage	Monitoring requirements
L19	Construction to be carried out using industry best practice, this would include: • Lighting associated with the construction phase would be designed to minimise light pollution at night, whilst being consistent with the requirements of site safety and security. Luminaires should be chosen which are directional and minimise up lighting and skyglow. • Existing trees to be retained to be protected during construction with protective fencing where necessary, in accordance with BS5837:2012; Site should be kept tidy with materials delivered on an 'as needed' basis where possible. • Works should be undertaken in daylight hours wherever possible. • The lighting levels for the construction compounds should be kept directional and as low as possible to reduce night-time effects.	Impact likely during dark skies and local visual amenity of uses of the Cotswolds AONB.	To limit impacts upon both landscape and visual amenity during construction	DCO Requirement 3 (EMP) EMP Annex D Landscape and Ecological Management Plan ES Figure 7.9 Environmental masterplan (Document Reference 6.3) General Arrangement and Section Plans (Document Reference 2.6)	ES Ch7	Contractor	Implementation of design	C	N/A
L20	Undertake an Arboricultural Impact Assessment (AIA) and produce an Arboricultural Method Statement (AMS). The AIA will need to be carried out for the site to identify, evaluate and possibly detail mitigation for any direct and indirect impacts on existing trees. This will include identifying the requirements for tree works (either felling or pruning) to facilitate the construction of the Scheme. This would also include temporary protective fencing to protect all trees marked for retention during construction works. It is possible that many of the trees on site will require a detailed methodology to be produced for construction works occurring in close proximity. The details of the protection required would be agreed with a qualified arboriculturist and recorded in an AMS. The AMS would provide a methodology for implementation of any site layout that has the potential to result in loss or damage to a tree.	Protect trees during construction and operation of the proposed scheme.	Limit impact on exiting vegetation.	DCO Requirement 3 (EMP) EMP Annex D Landscape and Ecological Management Plan ES Figure 7.9 Environmental masterplan (Document Reference 6.3) ES Appendix 7.8 Arboricultural Impact Assessment (Document Reference 6.4)	ES Ch7	Contractor and arboriculturist	Prevention of damage to any vegetation to be retained in line with the AMS (to be produced at further design/construction)	P, C	On completion of the development, it is recommended that an arboriculturist should inspect the retained trees to identify any, signs of intolerance to the change in conditions and/or the effect of the development, and, accidental damage that may have occurred during construction.

Ref	Environmental action/commitment	Assumptions (on which the action is based)	Objective	How the action/ commitment will be implemented/ secured	Source ref.	Responsible person (s)	Achievement criteria and reporting requirements (if applicable)	Project stage	Monitoring requirements
L21	Bridges and structures to be of high architectural quality, finished in locally sourced material and other materials suitable to the local vernacular.	To reflect the local character and vernacular of buildings/structures within the Cotswolds AONB.	Proposed structures to harmonise with the Cotswolds landscape	DCO Requirement 3 (EMP) EMP Annex D Landscape and Ecological Management Plan	ES Ch7	Contractor	Implementation of design	P, C	N/A
L22	Provide refined environmental masterplans at the detailed design stage.	N/A	Provide suitable replacement planting and meet biodiversity objectives.	DCO Requirement 3 (EMP) EMP Annex D Landscape and Ecological Management Plan ES Figure 7.9 Environmental masterplan (Document Reference 6.3)	ES Ch7	Contractor	Implementation of design	P	N/A
L23	Land required for construction compounds would be returned to its original use and condition as per before the works. The majority of that land will be agricultural use. As such, crop loss will aim to be reduced by giving advanced warning to enable farmers to plan ahead. Also refer to GS13.	N/A	To help ensure that long-term impacts from temporary works are mitigated.	DCO Requirement 3 (EMP) General Arrangement and Section Plans (Document Reference 2.6)	ES Ch 12	To be implemented by the Contractor and the scheme Landscape Architect.	Completion record	C	Post Construction checks
L24	Landscape bunding to better integrate the scheme into the undulating character of the landscape	Visual presence of the road would have significant visual effects on the Cotswolds AONB.	Landscape integration and positive contribution to Cotswolds AONB.	DCO Requirement 3 (EMP) EMP Annex D Landscape and Ecological Management Plan ES Figure 7.9 Environmental masterplan (Document Reference 6.3)	ES Ch7	Contractor	Implementation of design. Compliance of mitigation measures in EMP and LEMP	P, C	N/A
L25	Woodland planting to integrate the attenuation basins at Ullenwood junction, within the grounds of National Star College and screen the new junction from sensitive users of the college.	Visual presence of the road would have significant visual effect on National Star College.	Landscape integration and positive contribution to the users' landscape experience of the Cotswolds AONB.	DCO Requirement 3 (EMP) EMP Annex D Landscape and Ecological Management Plan ES Figure 7.9 Environmental masterplan (Document Reference 6.3)	ES Ch7	Contractor	Implementation of design. Implementation of design. Compliance of mitigation measures in EMP and LEMP.	P, C	N/A

Ref	Environmental action/commitment	Assumptions (on which the action is based)	Objective	How the action/ commitment will be implemented/ secured	Source ref.	Responsible person (s)	Achievement criteria and reporting requirements (if applicable)	Project stage	Monitoring requirements
L26	Cowley (Ch 4+040) and Stockwell (Ch 4+725) overbridges would be positioned low in the landscape, reducing their visual effect, and helping to integrate them into the surrounding landform	Visual presence of the road would have significant visual effects on the Cotswolds AONB.	Landscape integration and positive contribution to Cotswolds AONB.	DCO Requirement 3 (EMP) EMP Annex D Landscape and Ecological Management Plan ES Figure 7.9 Environmental masterplan (Document Reference 6.3)	ES Ch7	Contractor	Implementation of design. Implementation of design. Compliance of mitigation measures in EMP and LEMP.	P, C	N/A
				Biodiversity					
BD1	Pre-construction surveys for badgers (activity and setts).	Badgers and badger setts are known to be present on site, and immediately adjacent to the site, works would affect them.	To update the baseline information and ensure that badgers and their setts in the receiving environment and within 30 metres of the works are mapped prior to commencement of works to inform mitigation measures such as sett closure and Natural England Licence application which are time limited.	DCO Requirement 3 (EMP) EMP Annex D Landscape and Ecological Management Plan	ES Ch8	Contractor EcoW	Badger activity and sett surveys to be undertaken by a suitably experienced ecologist and results to be mapped.	P	Monitoring of setts identified within the site or within 30 m for 21 days to check their activity status in order to inform whether closure is required.
BD2	Pre-construction surveys for bats (built structures, stone walls and trees) prior to any demolition of buildings, walls or felling of trees. Following pre-construction surveys, any trees where the potential for roosting bats could not be ruled out after survey would be soft-felled.	Assumption that bats may be present on site in suitable habitat (trees and buildings), and works would affect them	To update the baseline information and ensure that bat habitats in the receiving environment are mapped prior to works in order to inform mitigation measures.	DCO Requirement 3 (EMP) EMP Annex D Landscape and Ecological Management Plan	ES Ch8	Contractor EcoW	Bat roost surveys to be undertaken by a licensed ecologist and results to be mapped.	P	N/A

Ref	Environmental action/commitment	Assumptions (on which the action is based)	Objective	How the action/ commitment will be implemented/ secured	Source ref.	Responsible person (s)	Achievement criteria and reporting requirements (if applicable)	Project stage	Monitoring requirements
BD3	Pre-construction monitoring for Wildlife and Countryside Act 1981 Schedule 9 and The Invasive Alien Species (Enforcement and Permitting) Order 2019 Schedule 2 listed invasive plant species both terrestrial and aquatic. Supervision to be undertaken by a suitably experienced ecologist.	Assumption that invasive plant species may be present on site, and works may cause the spread on and off site without correct biosecurity.	To update the baseline information and ensure that invasive plants in the receiving environment are mapped prior to works and avoided during works or correctly disposed of and avoid further propagation.	DCO Requirement 3 (EMP) EMP Annex D Landscape and Ecological Management Plan	ES Ch8	Contractor EcoW	Implementation of detailed Invasive Species Management Plan (if shown as required through measures in LEMP). Compliance of mitigation measures in LEMP.	P	N/A
BD4	Pre-construction surveys for otters (activity and holts) within 50 metres of a watercourse. Otter surveys to be undertaken by a suitably qualified ecologist and results to be mapped.	Assumption that otter may be present on site in suitable habitat, and that works could affect them	To update the baseline information and ensure that the otter habitats in the receiving environment are mapped prior to works in order to inform mitigation measures.	DCO Requirement 3 (EMP) EMP Annex D Landscape and Ecological Management Plan	ES Ch8	Contractor EcoW	Compliance of mitigation measures in LEMP.	P	To be determined by results of pre-construction survey.
BD5	A pre-construction survey for Wildlife and Countryside Act 1981 Schedule 1 birds including roosting or nesting barn owl will be undertaken in all suitable habitat and previously identified roosts and potential roosts within at least 100 metres of the scheme. Disturbance distances would be species specific and advice would be sought from a suitably qualified ecologist to ensure damage or disturbance that could be deemed an offence would not occur. Barn owl surveys to be undertaken by a barn owl licensed ecologist and results to be mapped.	Assumption that breeding barn owl (schedule 1 species) may be present on site in suitable habitat (trees and buildings), and that works could affect them as a result of disturbance.	To update the baseline information and ensure that the breeding barn owl in the receiving environment are mapped prior to works in order to inform mitigation measures.	DCO Requirement 3 (EMP) EMP Annex D Landscape and Ecological Management Plan	ES Ch8	Contractor EcoW	Compliance of mitigation measures in LEMP.	P, C	Monitoring of any identified roosts during construction to ensure no disturbance.
BD6	Pre-construction fish surveys (tributary of Norman's Brook only) and fish translocation prior to realignment of tributary of Norman's Brook. Brook to be realigned under relevant guidance and EA permits. Construction activities to be sensitively timed.	Assumption that works would affect fish assemblage	To ensure that the fish assemblage in the receiving environment are protected during works.	DCO Requirement 3 (EMP) EMP Annex D Landscape and Ecological Management Plan Environment Agency Licence FR2 Section 27	ES Ch8	Contractor EcoW	Environment Agency Licence FR2 Section 27 Implementation of detailed site-specific EMP.	P	Post-translocation monitoring by a suitably experienced ecologist.

Ref	Environmental action/commitment	Assumptions (on which the action is based)	Objective	How the action/ commitment will be implemented/ secured	Source ref.	Responsible person (s)	Achievement criteria and reporting requirements (if applicable)	Project stage	Monitoring requirements
BD7	Implementation of biosecurity best practice described as 'check, clean, dry' to mitigate any potential mobilisation of invasive aquatic plant species, and chytrid fungus which affects amphibians. Supervision to be undertaken by a suitably experienced ecologist.	Assumption that invasive aquatic plants and chytrid fungus may be present within waterbodies that staff and equipment may enter	To avoid the spread of aquatic invasive plants and chytrid fungus.	DCO Requirement 3 (EMP) EMP Annex D Landscape and Ecological Management Plan	ES Ch8	Contractor EcoW	Implementation of detailed Invasive Species Management Plan (if shown as required through measures in LEMP). Compliance of mitigation measures in LEMP	A	Contractor to ensure biosecurity measures are strictly implemented.
BD8	Where land is not required for construction, early habitat creation, habitat translocation, woodlandand hedgerow planting would be undertaken in the first 12 months of the programme, in accordance with the Environmental Masterplan and in agreement with ecologist. Locations include woodland buffer planting at Ullen Wood and Emma's Grove, hedgerow planting and translocation at Grove Farm, grassland creation at reptile and Roman snail receptor sites and Ullen Wood meadow.	Assumption that habitat resource for birds and other wildlife will be lost as a result of site clearance.	To provide functional habitat for protected species that will establish prior to and during construction, thus reducing the time lag between habitat loss and establishment of new habitat.	DCO Requirement 3 (EMP) EMP Annex D Landscape and Ecological Management Plan ES Figure 7.9 Environmental masterplan (Document Reference 6.3) DCO Requirement 5 (Landscaping) DCO Requirement 6 (Implementation and maintenance of landscaping)	ES Ch8	Contractor EcoW	Implementation of detailed site-specific LEMP.	P, C, O	Monitoring of habitats to ensure establishment and target condition met.
BD9	Offsite restoration of existing tufaceous formations in degraded condition (restoration of features such as those identified during the 2020 survey, subject to further detailed consultation with Natural England and consideration of any additional or alternative restoration opportunities identified through this consultation)	Scheme will cause a loss of one tufaceous vegetation feature.	To compensate for loss of tufaceous vegetation elsewhere near the scheme.	DCO Requirement 3 (EMP) EMP Annex D Landscape and Ecological Management Plan	ES Ch8	Contractor EcoW	Implementation of detailed site-specific LEMP.	P, O	Monitoring of habitats to ensure establishment and target condition met.
BD10	Installation of bird boxes in identified retained habitat prior to the nesting season (March to August)	Assumption that habitat resource for nesting birds will be lost as a result of site clearance	To provide replacement nesting opportunities for notable bird species present at the site.	DCO Requirement 3 (EMP) EMP Annex D Landscape and Ecological Management Plan ES Figure 7.9 Environmental masterplan (Document Reference 6.3)	ES Ch8	Contractor EcoW	Implementation of detailed site-specific LEMP.	P	Maintenance checks to be undertaken by suitable experienced ecologist.

Ref	Environmental action/commitment	Assumptions (on which the action is based)	Objective	How the action/ commitment will be implemented/ secured	Source ref.	Responsible person (s)	Achievement criteria and reporting requirements (if applicable)	Project stage	Monitoring requirements
BD11	Provision of bat boxes prior to vegetation clearance or structure demolition works (including stone walls) to be installed in retained trees or mounted on poles where necessary, within the vicinity of the roosts either lost or likely to be disturbed.	Assumption that bats will lose roosting habitat or suffer disturbance in retained roosts	To provide additional roosting opportunities for bats	DCO Requirement 3 (EMP) EMP Annex D Landscape and Ecological Management Plan ES Figure 7.9 Environmental masterplan (Document Reference 6.3) Natural England Mitigation licence	ES Ch8	Contractor EcoW	Natural England Mitigation licence, Licence return report for boxes installed as replacement roosts	P, C	Monitoring checks of boxes (external inspection) to ensure they are adequately maintained throughout the construction phase. Additional monitoring (internal inspection for signs of use by bats) as set out in the mitigation licence.
BD12	European protected species mitigation licence for bats must be obtained from Natural England before any works impacting confirmed bat roosts (trees and buildings). The exclusion of bats (if required) and destruction of roosts and monitoring of new habitat would be undertaken by a suitably experienced ecologist.	Pre- construction update surveys have been undertaken to advise location of bat roosts.	To avoid risk of injury or mortality to roosting bats.	DCO Requirement 3 (EMP) EMP Annex D Landscape and Ecological Management Plan Natural England Mitigation licence	ES Ch8	Contractor EcoW	Natural England Mitigation licence, Licence return report.	P, C	As set out in the mitigation licence.
BD13	Provision of ‘dead hedges’ or equivalent to allow bats to continue to use commuting routes during construction.	Assumption that bats will lose commuting habitat during works	To maintain bat commuting habitat during works	DCO Requirement 3 (EMP) EMP Annex D Landscape and Ecological Management Plan	ES Ch8	Contractor EcoW	Implementation of detailed site-specific LEMP.	P, C	Contractor to ensure ongoing monitoring of conditions laid out in the EMP are adhered to
BD14	Temporary badger fencing to be installed prior to construction works to exclude badgers from working areas including compounds. Badger fencing may be phased as the scheme progresses.	Assumption that badgers are present within the construction footprint and works could results in disturbance, injury or mortality.	To ensure that badgers in the receiving environment are protected from disturbance, accidental injury or death during works	DCO Requirement 3 (EMP) EMP Annex D Landscape and Ecological Management Plan DCO Requirement 7 (Fencing)	ES Ch8	Contractor EcoW	Implementation of detailed site-specific LEMP.	P, C	Monitoring checks of temporary badger fencing to ensure it is adequately maintained throughout the construction phase.

Ref	Environmental action/commitment	Assumptions (on which the action is based)	Objective	How the action/ commitment will be implemented/ secured	Source ref.	Responsible person (s)	Achievement criteria and reporting requirements (if applicable)	Project stage	Monitoring requirements
BD15	Artificial badger setts would be created to mitigate the loss of main setts within 30 metres of the scheme. Artificial setts would be created in suitable habitat and within the current territory of the main sett to be closed (ideally within 250m). The new sett will be created and its use by badgers confirmed by an ecologist at least four weeks in advance of the main sett closure. Key foraging habitat near the artificial sett would be retained.	Assumption that badger setts within the footprint of the scheme will require alternative provisions to be created under licence. Main setts to be confirmed during pre-construction survey.	To ensure that badgers setts within the footprint of the scheme are provided with alternative setts.	DCO Requirement 3 (EMP) EMP Annex D Landscape and Ecological Management Plan ES Figure 7.9 Environmental masterplan (Document Reference 6.3) Natural England badger licence	ES Ch8	Contractor ECoW	Application for badger licence, under advice of a suitably qualified ecologist. Implementation of detailed site-specific LEMP.	P	Monitoring checks of artificial sett to be undertaken by a suitably experienced ecologist to fulfil Natural England badger licence conditions.
BD16	Avoidance of works including tracking of heavy machinery within 30 metres of active badger setts. If this is unavoidable, active setts within or near the construction area that will be affected will be closed under a licence from Natural England, between July and November (inclusive) only, prior to commencement of construction. These setts would be determined following the pre-construction survey. Some setts may be temporarily closed during construction and reopened once works has completed.	Assumption that works would disturb or destroy adjacent active setts.	To ensure that badger setts in the receiving environment are protected from accidental disturbance, damage or destruction during works.	DCO Requirement 3 (EMP) EMP Annex D Landscape and Ecological Management Plan Natural England badger licence DCO Requirement 10 (Protected Species)	ES Ch8	Contractor ECoW	Application for badger licence, under advice of a suitably qualified ecologist. Implementation of detailed site-specific LEMP.	P, C	ECoW or additional surveys may be required if (permitted, low-impact) works take place within 30 metres of a sett. Monitoring checks of sett closure undertaken by a suitably experienced ecologist in accordance with Natural England licence.
BD17	Habitat manipulation techniques to deter barn owls from entering construction areas and road verges, including mowing long grass to reduce foraging potential.	Assumption that construction works would disturb, injure or kill foraging barn owls.	To ensure that barn owls in the receiving environment are protected from disturbance, accidental injury or death during works.	DCO Requirement 3 (EMP) EMP Annex D Landscape and Ecological Management Plan ES Figure 7.9 Environmental masterplan (Document Reference 6.3)	ES Ch8	Contractor ECoW	Implementation of detailed site-specific LEMP.	A	Monitoring checks of habitat manipulation to be undertaken by a suitably experienced ecologist to ensure implementation and effectiveness.

Ref	Environmental action/commitment	Assumptions (on which the action is based)	Objective	How the action/ commitment will be implemented/ secured	Source ref.	Responsible person (s)	Achievement criteria and reporting requirements (if applicable)	Project stage	Monitoring requirements
BD18	Temporary reptile fencing to be installed in identified areas of reptile habitat to be impacted for the purpose of translocation at donor and receptor sites or to protect retained habitat. Reptile fencing will be removed after the completion of construction.	Assumption that reptiles are present within the construction footprint and works could results in disturbance, injury or mortality.	To ensure that reptiles in the receiving environment are protected from disturbance, accidental injury or death during works	DCO Requirement 3 (EMP) EMP Annex D Landscape and Ecological Management Plan ES Figure 7.9 Environmental masterplan (Document Reference 6.3)	ES Ch8	Contractor ECoW	Implementation of detailed site-specific LEMP.	P, C	Monitoring checks of reptile fencing to ensure it is adequately maintained throughout the construction phase.
BD19	Prior to works commencing reptiles will be removed from identified habitat either by displacement to retained habitat using habitat manipulation (directional and phased strimming) or translocation of reptiles from identified reptile sites to suitable receptor sites. Both activities would be overseen by ECoW. Translocation of reptiles will occur within the active period between May and October (weather dependent).	Assumption that works would injure or kill reptiles	To ensure that reptiles in the receiving environment are protected from accidental injury or death during works.	DCO Requirement 3 (EMP) EMP Annex D Landscape and Ecological Management Plan ES Figure 7.9 Environmental masterplan (Document Reference 6.3)	ES Ch8	Contractor ECoW	Agreement with Gloucester Wildlife Trust for off-site translocation areas	P	Monitoring checks of receptor site habitat and reptile populations to be undertaken by a suitably experienced ecologist at one year, three years and five years post construction
BD20	Pre-construction survey for Roman Snail and subsequent translocation from habitats to be cleared or impacted to suitable receptor sites to be undertaken under licence and overseen by the licenced ecologist.	Assumption that works would kill or injure Roman Snails.	To ensure that Roman Snail populations within the footprint of the scheme are not impacted.	DCO Requirement 3 (EMP) EMP Annex D Landscape and Ecological Management Plan ES Figure 7.9 Environmental masterplan (Document Reference 6.3) Natural England Roman Snail licence	ES Ch8	Contractor ECoW	Application for Roman Snail licence, under advice of a suitably experienced ecologist; Implementation of detailed site-specific EMP.	P	ECoW or additional surveys may be required. Monitoring checks of receptor site habitat and Roman snail populations by a suitably experienced ecologist

Ref	Environmental action/commitment	Assumptions (on which the action is based)	Objective	How the action/ commitment will be implemented/ secured	Source ref.	Responsible person (s)	Achievement criteria and reporting requirements (if applicable)	Project stage	Monitoring requirements
BD21	Installation of fencing such as Heras fencing or that specified by arboriculturalists (and following updated arboriculture survey) to implement buffer zones and areas of no deviation to protect retained habitats to include; • Ancient (Ullen Wood) and broadleaved woodland 15m buffer. (if this buffer is not possible in specific locations such as near the A436 roundabout, arboricultural and ecological advice will be sought) . • Veteran tree buffer (tree specific) following Arboricultural advice and Natural England Guidelines (retained veteran trees are shown on ES Figure 7.9 Retained vegetation (Document Reference 6.3)). • Hedgerows 2m buffer to maintain a grass strip. • Retained trees - canopy and root Protection Area (RPA). • Sensitive habitats including calcareous grassland verges with musk orchid and other calcareous grassland at Barrow wake. No construction activities or storage of materials etc will be permitted within any RPA or buffer zone during construction.	Assumption that habitat degradation will occur without implementation of protective measures.	To protect priority habitat from encroachment and damage during the works.	DCO Requirement 3 (EMP) EMP Annex D Landscape and Ecological Management Plan ES Figure 7.9 Environmental masterplan (Document Reference 6.3)	ES Ch8	Contractor Ecological and arboricultural clerk of works	Implementation of Environmental masterplan	P C	Contractor to ensure ongoing monitoring of conditions laid out in the EMP are adhered to and to check and maintain installation of fencing.
BD22	Translocation of valuable habitat such as important species rich hedgerows, trees including hazel coppice or priority grassland to identified receptor sites (as agreed with the ecologist) within the first phase of the construction programme for environmental mitigation As part of this process, at least a 300mm depth of the soil containing hedgerow ground flora would also be translocated to form banks in which to plant the hedgerows.	Assumption that valuable priority habitat will be impacted by the scheme.	To conserve priority habitat within the scheme	DCO Requirement 3 (EMP) EMP Annex D Landscape and Ecological Management Plan ES Figure 7.9 Environmental masterplan (Document Reference 6.3)	ES Ch8	Contractor ECoW	Implementation of detailed site-specific LEMP. Survival of translocated habitat	P, C	Monitoring of translocated habitats by suitably experienced ecologist to ensure establishment**.**
BD23	Material crushing compound to be located over 200m from Ullen Wood, and crusher to be sensitively located within the compound area so that dust generating activities would be furthest from Ullen Wood and Emma's Grove woodland.	Assumption that habitat degradation will occur without the implementation of protective measures.	To protect irreplaceable ancient woodland habitat from damage during the works.	DCO Requirement 3 (EMP)	ES Ch8	Contractor	Implementation of detailed site-specific EMP.	P, C	N/A

Ref	Environmental action/commitment	Assumptions (on which the action is based)	Objective	How the action/ commitment will be implemented/ secured	Source ref.	Responsible person (s)	Achievement criteria and reporting requirements (if applicable)	Project stage	Monitoring requirements
BD24	Water sprinkler systems to be used whenever there is a risk of dust emissions, screening bunds or barriers installed, no material crushing would be undertaken in high prevailing winds in the direction of the ancient woodland (Ullen Wood) or calcareous grassland at Barrow Wake and crushed materials would be removed from site as soon as possible.	Assumption that habitat degradation will occur without the implementation of protective measures.	To protect sensitive habitat from damage during the works.	DCO Requirement 3 (EMP) Air Quality Management Plan.	ES Ch8	Contractor	Implementation of detailed site-specific EMP.	C	Ecologist to monitor habitat adjacent to the material crushing compound at intervals throughout construction to ensure efficacy of dust management measures.
BD25	Sensitive timing of works such as the removal of vegetation or other suitable nesting habitat between September and February, outside of the core breeding bird season. If vegetation clearance works take place outside of the recommended period, a precautionary method of working will be adopted to include ecological survey for nesting birds immediately prior to vegetation clearance. A check for nesting birds would also be undertaken for the dismantling of stone walls within the nesting season. No netting of vegetation to be used to deter birds from suitable habitat (including buildings)	Assumption that birds including ground nesting birds, will nest in suitable habitats on site, and works would affect them	To ensure that bird nests in the receiving environment are protected from accidental disturbance, damage or destruction during works.	DCO Requirement 3 (EMP) EMP Annex D Landscape and Ecological Management Plan	ES Ch8	Contractor ECoW	Implementation of detailed site-specific LEMP.	P, C	ECoW to advise contractor / oversee works
BD26	Sensitive timing of works near known bat roosts, badger setts (30m), barn owl roosting or nesting sites (100m) and otter holts. Timing may include seasonal constraints for example, with regard to barn owls, avoidance of the early breeding season) or working during daylight hours only.	Assumption that works would disturb known bat roosts, badger setts, barn owl nests and otter holts	To ensure that bat roosts, badger setts, barn owl nests and otter holts in the receiving environment are protected from accidental disturbance during works.	DCO Requirement 3 (EMP) EMP Annex D Landscape and Ecological Management Plan	ES Ch8	Contractor ECoW	Implementation of detailed site-specific LEMP.	C	ECoW or additional surveys or protected species licences may be required if works take place outside of the recommended period or agreed locations
BD27	Sensitive timing of works (avoiding the maternity period) around the lesser horseshoe bat maternity roost/multi-species roost at Haroldstone House cottages.	Assumption that works would disturb roosting lesser horseshoe bats	To minimise disturbance impacts on lesser horseshoe bats during works.	DCO Requirement 3 (EMP) EMP Annex D Landscape and Ecological Management Plan	ES Ch8	Contractor ECoW	Implementation of detailed site-specific LEMP	C	ECoW or additional surveys or protected species licences may be required if works take place outside of the recommended period or agreed locations
BD28	Sensitive timing of works involving realignment of tributary of Norman's Brook regarding tufa habitat, aquatic macroinvertebrates and fish (including eggs laid in spawning habitats) to minimise habitat damage and mortality and injury of species.	Assumption that works would affect fish and aquatic macroinvertebrate community resulting in injury or mortality	To ensure that the aquatic macroinvertebrate community in the receiving environment are protected during works.	DCO Requirement 3 (EMP) EMP Annex D Landscape and Ecological Management Plan	ES Ch8	Contractor ECoW	Implementation of detailed site-specific LEMP.	C	ECoW by a suitably experienced aquatic ecologist or additional surveys may be required if works take place outside of the recommended period

Ref	Environmental action/commitment	Assumptions (on which the action is based)	Objective	How the action/ commitment will be implemented/ secured	Source ref.	Responsible person (s)	Achievement criteria and reporting requirements (if applicable)	Project stage	Monitoring requirements
BD29	Sensitive timing of ground works/ excavation works and removal of Cotswold stone walls in key reptile, great crested newt, Roman snail or other Species of Principle Importance habitat, for example avoidance of hibernation period taken to be October to March inclusive (weather dependent)) (slow-worm and grass snake tend to hibernate from October to March, while adders tend to hibernate from late October/early November to January/February in southern England)	Assumption that works would injure or kill reptiles, great crested newts or Roman snails, e.g. during hibernation	To ensure that reptiles and Roman snails in the receiving environment are protected from accidental injury or death during works.	DCO Requirement 3 (EMP) EMP Annex D Landscape and Ecological Management Plan	ES Ch8	Contractor ECoW	Implementation of detailed site-specific LEMP.	C	ECoW by a suitably experienced ecologist or additional surveys may be required if works take place outside of the recommended period
BD30	Work during hours of darkness will be avoided as far as practicable and where unavoidable, the Contractor will agree any exceptions with the ECoW in advance of construction activities. Should night working be required, these will be discussed with the ECoW and appropriate mitigation put in place as determined by the ECoW (particularly concerning lighting). These could include: • Temporary lighting used for construction will be switched-off when not in use and positioned so as not to spill on to adjacent land, watercourses, sensitive receptors or key bat flight lines within the area surrounding the works. • Directed lighting will be used to minimise light pollution for construction compounds. • Lighting levels around construction compounds will be kept to the minimum necessary for security and safety by the contractor. • Dark conditions will be maintained within 20m of identified bat roosts.	Assumption that lighting during night works would affect the suitability and/ or availability of bat habitats used for foraging, socialising and commuting.	To ensure that bat roosts and flight lines in the receiving environment are protected from accidental disturbance during works.	DCO Requirement 3 (EMP) EMP Annex D Landscape and Ecological Management Plan	ES Ch8	Contractor ECoW	Implementation of detailed site-specific LEMP.	C	Contractor to ensure ongoing monitoring of conditions laid out in the EMP are adhered to

Ref	Environmental action/commitment	Assumptions (on which the action is based)	Objective	How the action/ commitment will be implemented/ secured	Source ref.	Responsible person (s)	Achievement criteria and reporting requirements (if applicable)	Project stage	Monitoring requirements
BD31	Work during hours of darkness will be avoided as far as practicable and where unavoidable, the Contractor will agree any exceptions with the ECoW in advance of construction activities. Should night working be required, these will be discussed with the ECoW and appropriate mitigation put in place as determined by the ECoW (particularly concerning lighting). These could include: • Temporary lighting used for construction will be switched-off when not in use and positioned so as not to spill on to key owl habitat. • Directed lighting will be used to minimise light pollution for construction compounds. • Lighting levels around construction compounds will be kept to the minimum necessary for security and safety by the contractor.	Assumption that lighting during night works would affect the suitability and/or availability of owl habitats used for foraging, socialising and commuting.	To ensure that owl habitats in the receiving environment are protected from accidental disturbance during works.	DCO Requirement 3 (EMP) EMP Annex D Landscape and Ecological Management Plan	ES Ch8	Contractor ECoW	Implementation of detailed site-specific LEMP	C	Contractor to ensure ongoing monitoring of conditions laid out in the EMP are adhered to
BD32	Sensitive timing of works and site speed limits to be implemented to reduce potential for injury or direct mortality of barn owls	Assumption that construction vehicles may injure/kill barn owl in the absence of preventative measures.	To ensure that barn owl are protected from accidental injury/death during works	DCO Requirement 3 (EMP) EMP Annex D Landscape and Ecological Management Plan	ES Ch8	Contractor ECoW	Implementation of detailed site-specific LEMP	C	Contractor to monitor speed limit throughout construction. Periodic checks for barn owl carcasses across the construction site, in particular along haul roads.

Ref	Environmental action/commitment	Assumptions (on which the action is based)	Objective	How the action/ commitment will be implemented/ secured	Source ref.	Responsible person (s)	Achievement criteria and reporting requirements (if applicable)	Project stage	Monitoring requirements
BD33	Sensitive timing of works to avoid winter dormancy/ hibernation period and non-licensed precautionary methodologies of ecologically supervised vegetation clearance would be implemented to ensure no loss off great crested newt habitat occurs and that killing and injury of individual newts is avoided. This mitigation will be implemented for temporary drainage maintenance works required to a culvert adjoining a pond at Bentham Country Club that supports great crested newts, for clearance of habitat including woodland on the northern verge of the Existing A417 within 250m of a breeding pond (pond 2a) (as shown in ES Appendix 8.15 Great crested newt survey report (Document Reference 6.4) and for minor drainage works adjacent to the non-breeding pond at the National Star College golf course. Works will be undertaken using reasonable avoidance measures to ensure that no loss of great crested newt habitat would occur and that risk to individual newts was reduced to a negligible level, i.e. licensable impacts to great crested newt would be avoided. Th	Assumption that works in the vicinity of known great crested newt populations (Bentham) may cause injury or mortality to individual newts.	To ensure that great crested newts in the receiving environment are protected from accidental disturbance, damage or destruction during works	DCO Requirement 3 (EMP) EMP Annex D Landscape and Ecological Management Plan Precautionary Non-licensed method of working statement (PMW) or if the nature of works changes in these location a Natural England mitigation licence or Low Impact Class Licence could be required.	ES Ch8	Contractor ECoW	Implementation of detailed site-specific LEMP to include precautionary method of working overseen by an ecologist.	C	ECoW works for permitted and/or low impact works by licensed ecologist.
BD34	Closure of excavations overnight or provision of ramps to reduce risk of trapping or injuring wildlife.	Assumption that badgers and other wildlife may continue to use construction sites for foraging and commuting and may be injured by falling into excavations.	To ensure that badgers and other wildlife are protected from accidental injury.	DCO Requirement 3 (EMP) EMP Annex D Landscape and Ecological Management Plan	ES Ch8	Contractor ECoW	Implementation of detailed site-specific LEMP.	C	Contractor to ensure ongoing monitoring of conditions laid out in the EMP are adhered to.
BD35	Consideration of Section 41 Species of Principal Importance (SPI) of the Natural Environment and Rural Communities (NERC) Act (2006) during habitat clearance and manipulation techniques including ecological watching brief.	Assumption that SPI may be present in suitable habitats on site.	To ensure that SPI are not affected by accidental injury or killing.	DCO Requirement 3 (EMP) EMP Annex D Landscape and Ecological Management Plan **DCO Requirement 10 (Protected Species)**	ES Ch8	Contractor ECoW	Implementation of detailed site-specific LEMP.	C	ECoW or additional surveys may be required in suitable habitats

Ref	Environmental action/commitment	Assumptions (on which the action is based)	Objective	How the action/ commitment will be implemented/ secured	Source ref.	Responsible person (s)	Achievement criteria and reporting requirements (if applicable)	Project stage	Monitoring requirements
BD36	Felled trees and deadwood (excluding ash) will be used to create habitat in areas to be specified by the project ecologist (preferably within the same woodland). Existing deadwood and also leaf litter can be translocated at any time of year but should be done carefully to avoid damage and should be moved to a location with similar shade conditions to its original location. Freshly felled wood should be moved in the winter, or soon after its felling, before egg-laying adults start to inhabit it.	Assumption that reptiles and invertebrates are present on site and will continue to use the scheme area	To provide refuge for reptiles and create habitat for invertebrates. Ash will not be used to prevent the spread of ash dieback.	DCO Requirement 3 (EMP) EMP Annex D Landscape and Ecological Management Plan	ES Ch8	Contractor ECoW	Implementation of detailed site-specific LEMP.	P, C	N/A
BD37	Relocation of existing roost features to occur where possible, to be carefully removed and strapped to retained mature trees within Highways England ownership.	Assumption that bats will continue to use suitable roost features.	To provide impacted bats with additional roosting locations.	DCO Requirement 3 (EMP) EMP Annex D Landscape and Ecological Management Plan	ES Ch8	Contractor ECoW	Implementation of detailed site-specific LEMP.	P, C	ECoW by a licensed bat ecologist or additional surveys may be required in relocated roost features
BD38	Provision of an artificial bat roosts to include • Creating a purpose built bat barn with cool tower (hibernation feature)(under NE licence). • Using an existing stone-built bus stop on the A417. • Enhancement of the existing World War II brick structure at Shab Hill.	Assume access will be permitted.	To address the cumulative loss of bat roosting features.	DCO Requirement 3 (EMP) EMP Annex D Landscape and Ecological Management Plan	ES Ch8	Contractor Ecologist	Comparison to baseline surveys and ensure target roost conditions are achieved. Monitoring reports to be produced.	C O	Periodic internal inspection of structures to ensure they are maintained (by a licensed bat ecologist).
BD39	Provision of wildlife culverts (3 x badger culverts) and underpasses (1 x bat underpass) and three greened overbridges.	Assumption that protected species such as bats, badgers and barn owl will continue to use the same commuting/ foraging routes.	To provide permeability across the landscape for species and prevent bats, and badgers from entering the road network thus reducing risk of injury and mortality	DCO Requirement 3 (EMP) EMP Annex D Landscape and Ecological Management Plan	ES Ch8	Contractor	No new badger or bat fatalities on the new section of the road.	C, O	Ongoing monitoring of culverts and underpasses to ensure they are maintained and functional for target species.
BD40	Use of veteranisation techniques in younger trees to create bat roosting features usually found on older veteran trees in habitat identified by the ecologist.	Assume landowner agreement to the principle	To create more natural bat roosting features over time as replacement for roosts lost	DCO Requirement 3 (EMP) EMP Annex D Landscape and Ecological Management Plan	ES Ch8	Contractor ECoW	Implementation of detailed site-specific LEMP.	C, O	Monitoring of veteranised tree by a bat ecologist to ensure features develop over time and monitor use by bats.

Ref	Environmental action/commitment	Assumptions (on which the action is based)	Objective	How the action/ commitment will be implemented/ secured	Source ref.	Responsible person (s)	Achievement criteria and reporting requirements (if applicable)	Project stage	Monitoring requirements
BD41	All planting, including hedgerows on the Gloucestershire Way crossing and the Cowley and Stockwell overbridges must be delivered as shown on the Environmental Masterplan and delivered and managed as detailed in the LEMP. Planting of woody species of a height of at least 3m will be undertaken in areas considered to be of high collision risk for wildlife with particular regard to bats and barn owls. Planting of all habitats will comprise species appropriate to the AONB and of local provenance. A small proportion of non-native trees would be considered to offer resilience to climate change as detailed in EMP Annex D Landscape and Ecological Management Plan.	Assumption that all areas within permanent and temporary land take will be revegetated in accordance with the Environmental Masterplan and ecological mitigation requirements	To replace habitat lost and create additional high quality habitat throughout the scheme to benefit biodiversity and provide essential mitigation	DCO Requirement 3 (EMP) EMP Annex D Landscape and Ecological Management Plan DCO Requirement 5 (Landscaping) DCO Requirement 6 (Implementation and maintenance of landscaping)	ES Ch 7 & 8	Contractor Landscape specialist and/or arboricultural specialist, ecologist	Compliance of mitigation measures in EMP and LEMP	C, O	Monitoring of all mitigation planting, in particular those that occur prior to construction, to ensure it is establishing and is not damaged during construction activities. Monitoring of newly planted and seeded areas would be undertaken for the first five years to ensure successful establishment. Following this, monitoring would be detailed in the EMP (end of construction) and consist of annual checks with recommendations made to ensure the maintenance is adjusted to suit the establishing planting and habitats.
BD42	Permanent badger fencing and one way gates to be installed prior to opening of the scheme to traffic. The location of one way gates to be agreed with the ecologist.	Assumption that badgers and other wildlife may continue to use the scheme for foraging and commuting and may be injured or killed by traffic.	To prevent badgers entering the road network thus reducing risk of injury and mortality	DCO Requirement 3 (EMP) EMP Annex D Landscape and Ecological Management Plan ES Figure 7.9 Environmental masterplan (Document Reference 6.3)	ES Ch8	Contractor ECoW	No badger fatalities on the new section of the road.	C, O	Ongoing monitoring of fencing required to ensure it is maintained.
BD43	Monitoring surveys undertaken as a requirement of Natural England licences for Roman snails, badgers and bats (including new structures (bat barn and bat underpass) and bat boxes).	Assume access will be permitted.	To assess the effectiveness of mitigation measures	DCO Requirement 3 (EMP) EMP Annex D Landscape and Ecological Management Plan Natural England Mitigation licence	ES Ch8	Contractor ECoW	Natural England Mitigation licence, Licence return report	O	Monitoring surveys to be undertaken by suitably experienced ecologists named on the relevant Natural England licence

Ref	Environmental action/commitment	Assumptions (on which the action is based)	Objective	How the action/ commitment will be implemented/ secured	Source ref.	Responsible person (s)	Achievement criteria and reporting requirements (if applicable)	Project stage	Monitoring requirements
BD44	Post construction wildlife monitoring of mitigation measures (non-licenced) such as the Gloucestershire Way crossing and Cowley and Stockwell greened overbridges, bat underpass and mammal culverts.	Assume access will be permitted.	To assess the effectiveness of mitigation measures and structure design	DCO Requirement 3 (EMP) EMP Annex D Landscape and Ecological Management Plan	ES Ch8	Contractor ECoW	Comparison to baseline surveys. Return species records to Gloucester Environmental Records Centre	O	Monitoring surveys to be undertaken by suitably experienced ecologists for the first five years to assess the structure effectiveness for wildlife and the condition of habitats
BD45	Monitoring of newly created or translocated habitats to ensure establishment both during construction and post construction to ensure the establishment of vegetation to target condition and to ensure habitat is not damaged during construction activities.	Assume access will be permitted.	To assess the effectiveness of mitigation measures	DCO Requirement 3 (EMP) EMP Annex D Landscape and Ecological Management Plan	ES Ch8	Contractor ECoW	Comparison to baseline surveys and ensure target habitat conditions are achieved. Monitoring reports to be produced.	C, O	Early establishment monitoring by ecologist and landscape contractors as per BD41. Botanical specialist may be required to undertake National Vegetation Classification surveys to ensure target habitat composition achieved.
BD46	Monitoring of the scheme for any barn owl mortalities would be undertaken once a month during the first three years of the new road being operational.	Assumption that barn owl may continue to use the scheme for foraging and commuting and may be injured or killed by traffic.	To assess the effectiveness of mitigation measures such as habitat design and management	DCO Requirement 3 (EMP) EMP Annex D Landscape and Ecological Management Plan ES Figure 7.9 Environmental masterplan (Document Reference 6.3)	ES Ch8	Contractor ECoW	No new badger fatalities on the new section of the road.	O	Monitoring surveys to be undertaken by suitably experienced ecologists.
BD47	Monitoring of aquatic invertebrates and fish to cover the realigned tributary of Norman's Brook both upstream and downstream of the Existing A417, new outflows, and potentially additional locations within the catchment, based on the outcome of ongoing surface water flow and quality monitoring.	Assume access will be permitted.	To assess the effectiveness of mitigation measures such as habitat design and management	DCO Requirement 3 (EMP) EMP Annex D Landscape and Ecological Management Plan	ES Ch8	Contractor ECoW	Comparison to baseline surveys for invertebrates and ensure target habitat conditions of tributary of Norman's Brook habitat are achieved post stream realignment. Monitoring reports to be produced.	O	Monitoring surveys to be undertaken by suitably experienced ecologists.

Ref	Environmental action/commitment	Assumptions (on which the action is based)	Objective	How the action/ commitment will be implemented/ secured	Source ref.	Responsible person (s)	Achievement criteria and reporting requirements (if applicable)	Project stage	Monitoring requirements
BD48	Where bat roosts are being retained within the DCO Boundary, the following methods should be incorporated: • Consideration given to seasonal use of roost in defining working methods. • Exclusion zones to be established and maintained. • Any works within 20m of a confirmed roost shall be carried out under the supervision of an appropriate specialist. • Measures shall be applied to maintain dark conditions within 20m of identified roosts, including measures to avoid light spill from construction lighting onto adjacent habitat, watercourses and key bat flight lines.	Assumption that construction work would affect retained bat roosts.	To ensure that bat roosts and flight lines in the receiving environment are protected from accidental disturbance during works.	DCO Requirement 3 (EMP) EMP Annex D Landscape and Ecological Management Plan	ES Ch8	Contractor ECoW	Implementation of detailed site-specific LEMP.	C	Contractor to ensure ongoing monitoring of conditions laid out in the EMP are adhered to.
BD49	The creation of the re-purposed A417 would require the protection of existing verge habitat (including those where musk orchid are present near Barrow Wake). This would include fencing of areas of higher ecological value to be agreed with the ecologist and pollution prevention measures such as dust control	Assumption that habitat degradation will occur without the implementation of protective measures.	To protect areas of higher ecological value	DCO Requirement 3 (EMP) EMP Annex D Landscape and Ecological Management Plan ES Figure 7.9 Environmental masterplan (Document Reference 6.3)	ES Ch8	Contractor ECoW	Implementation of detailed site-specific EMP.	C	Contractor to ensure ongoing monitoring of conditions laid out in the EMP are adhered to and to check and maintain installation of fencing.
BD50	Subject to landowner agreement, a Woodland Management Plan would be prepared to implement conservation-led woodland management measure to areas of Ullen Wood during operation of the scheme (see section 4.3 EMP (construction) Management Plans).	Provides compensation for Ullen Wood.	To provide compensatory habitat for Ullen Wood.	DCO Requirement 3 (EMP) EMP Annex D Landscape and Ecological Management Plan	ES Ch8	Contractor ECoW	Implementation of Woodland Management Plan	C, O	See BD51
BD51	Post-construction monitoring of measures implemented to improve habitat condition in the impacted areas of Ullen Wood, including monitoring for change in species composition.	Assume access will be permitted.	To assess the effectiveness of mitigation measures such as habitat management	DCO Requirement 3 (EMP) EMP Annex D Landscape and Ecological Management Plan	ES Ch8	Contractor ECoW	Comparison to baseline surveys and ensure target habitat conditions are achieved. Monitoring reports to be produced.	O	Monitoring surveys to be undertaken by botanical specialist, to ensure the efficacy of conservation management techniques in preventing degradation of woodland habitat from increased nitrogen deposition.

Ref	Environmental action/commitment	Assumptions (on which the action is based)	Objective	How the action/ commitment will be implemented/ secured	Source ref.	Responsible person (s)	Achievement criteria and reporting requirements (if applicable)	Project stage	Monitoring requirements
BD52	Subject to agreement, Highways England will work with Natural England and Stroud District Council, to agree specific measures to control recreational use of the Beechwood SAC. Such measures may include the provision of signage/ interpretation boards to raise public awareness of the value of ancient woodland and trees, and the importance of respecting measures installed to reduce root compaction.	Agreement with Natural England and Stroud District Council can be reached.	To ensure recreational disturbance would not result in detrimental impacts to the qualifying interests of the SAC.	DCO Requirement 3 (EMP)	HRA	Contractor ECoW	Mitigation strategy.	C, O	Monitoring surveys to be undertaken in line with mitigation strategy.
BD53	Signage and interpretation boards would be situated in areas along the PROW network such on the Air Balloon Way entrances to the Cotswold Way crossing, and Gloucestershire Way crossing to educate the public regarding the ecological sensitivity of areas such as Barrow Wake, Crickley Hill and Emma's Grove. Locations to be agreed with stakeholders and ecologist. Further measures such as segregation of routes and PROW signage to deter public access from sensitive features would be discussed and agreed at the detailed design stage.	Assumption that the extended PROW network as a result of the scheme may increase the number of visitors to the area.	Signage to help avoid or reduce any impacts arising from recreational visitor pressure on sensitive sites.	DCO Requirement 3 (EMP)	ES Ch8	Contractor ECoW	Mitigation strategy.	C	Periodic inspection to ensure maintenance of signage.
BD54	The Gloucestershire Way crossing bridge deck would include 25 metres (wide) of calcareous grassland and two native species-rich hedgerows three metres wide and at least 2 m high,	Assumption that bat species and other wildlife will use the hedgerows to navigate the crossing	To ensure that essential mitigation for bats is effective and that the calcareous grassland contributes to the habitat stepping-stones providing connectivity of habitat.	DCO Requirement 3 (EMP) EMP Annex D Landscape and Ecological Management Plan ES Figure 7.9 Environmental masterplan (Document Reference 6.3)	ES Ch8	Contractor ECoW	Mitigation strategy.	C, O	Monitoring surveys to be undertaken and maintenance regimes implemented, to ensure establishment to high quality habitat and intended functionality is being delivered.
BD55	Cowley overbridge would include a 3m wide grass verge with a native species-rich hedgerow.	Assumption that bat species and other wildlife will use the hedgerows to navigate the crossing	To ensure that essential mitigation for bats is effective	DCO Requirement 3 (EMP) EMP Annex D Landscape and Ecological Management Plan ES Figure 7.9 Environmental masterplan (Document Reference 6.3)	ES Ch8	Contractor ECoW	Mitigation strategy.	C, O	Monitoring surveys to be undertaken in line with mitigation strategy to ensure establishment of high quality habitat and intended functionality is being delivered.

Ref	Environmental action/commitment	Assumptions (on which the action is based)	Objective	How the action/ commitment will be implemented/ secured	Source ref.	Responsible person (s)	Achievement criteria and reporting requirements (if applicable)	Project stage	Monitoring requirements
BD56	Stockwell overbridge would include two 3m wide verges each with a native species-rich hedgerow.	Assumption that bat species and other wildlife will use the hedgerows to navigate the crossing	To ensure that essential mitigation for bats is effective	DCO Requirement 3 (EMP) EMP Annex D Landscape and Ecological Management Plan ES Figure 7.9 Environmental masterplan (Document Reference 6.3)	ES Ch8	Contractor ECoW	Mitigation strategy.	C, O	Monitoring surveys to be undertaken in line with mitigation strategy.
BD57	All calcareous grassland will be created on subsoil of low fertility excavated materials. No topsoil will be imported.	Assumption that calcareous grassland species will not establish on nutrient rich soil	To ensure that the desired calcareous grassland habitat is achieved	DCO Requirement 3 (EMP) EMP Annex D Landscape and Ecological Management Plan ES Figure 7.9 Environmental masterplan (Document Reference 6.3)	ES Ch8	Contractor ECoW	Mitigation strategy.	C	Monitoring surveys to be undertaken in line with mitigation strategy.
BD 58	Woodland and scrub planting will include fruit trees such as wild cherry and crab apple to provide medium-term mitigation for roosting bats.	Fruit trees enter senescence or ‘veteranise’ much earlier than most tree species, therefore starting to decay at a younger age, leading to the earlier development of cavities and other features that could provide new roosting sites for bats.	To reduce time taken for newly planted trees to provide suitable replacement habitat for bats	DCO Requirement 3 (EMP) EMP Annex D Landscape and Ecological Management Plan	ES Ch8	Contractor ECoW	Mitigation strategy.	C, O	Monitoring surveys to be undertaken in line with mitigation strategy.
BD59	An area of grassland within Ullen Wood meadow will be left as open grassland with no tree planting to maintain nesting habitat for ground nesting birds such as skylark.	Assumption that skylark habitat in this area will be lost.	To ensure habitat is suitable for ground nesting birds and is free from predators which may use nearby trees and hedges to perch.	DCO Requirement 3 (EMP) EMP Annex D Landscape and Ecological Management Plan ES Figure 7.9 Environmental masterplan (Document Reference 6.3)	ES Ch8	Contractor ECoW	Mitigation strategy.	O	Ecologist to monitor location of tree planting
BD60	Rockface embankments would be allowed to colonise naturally and would provide additional habitat for invertebrates.	Assumption that rock faces will create niche habitats	To provide additional habitat for natural colonisation of species including invertebrates	DCO Requirement 3 (EMP)	ES Ch8	Contractor	Implementation of detailed site-specific LEMP.	O	

Ref	Environmental action/commitment	Assumptions (on which the action is based)	Objective	How the action/ commitment will be implemented/ secured	Source ref.	Responsible person (s)	Achievement criteria and reporting requirements (if applicable)	Project stage	Monitoring requirements
BD61	Landscaping near existing reptile and Roman snail habitat and at the reptile and Roman snail translocation site would incorporate features beneficial to both species such grassy banks, log piles, rocks interspersed into banks and areas of bare ground for basking in the case of reptiles and burrowing and egg-laying in the case of Roman snails.	Assumption that habitat creation will provide suitable habitat for reptiles and Roman snail	To maximise habitat suitability for reptiles and Roman snail.	DCO Requirement 3 (EMP) EMP Annex D Landscape and Ecological Management Plan ES Figure 7.9 Environmental masterplan (Document Reference 6.3)	ES Ch8	Contractor ECoW	Mitigation strategy.	C	Monitoring surveys to be undertaken of habitat and populations of reptiles in line with mitigation strategy and in accordance with the Roman snail conservation licence
BD62	Management measures to reduce existing threats and pressures on veteran beech tree (Ref 196380) to include arboricultural management of the tree and of adjacent woody vegetation. Erection of fencing to create a buffer zones to exclude vehicles, animals and WCH.	Assumption that an increase in nitrogen deposition from vehicle emissions will lead to degradation of the tree	To relieve existing threats and pressures to the tree to increase its resilience to the increase in nitrogen deposition.	DCO Requirement 3 (EMP) EMP Annex D Landscape and Ecological Management Plan	ES Ch8	Contractor ECoW	Mitigation strategy.	C	Monitoring of the condition of the veteran beech tree by an arboriculturalist to ensure the efficacy of sensitive arboricultural management and protective measures to prolong the longevity of the tree.
BD63	All works within a SSSI will be subject to a method statement to be agreed and signed off by Natural England.	Assumption that Section 28 assent is disapplied by the DCO	To ensure works are carried out sensitively with no degradation to retained SSSI habitat.	DCO Requirement 3 (EMP)	ES Ch8	Contractor ECoW	Implementation of detailed site-specific LEMP.	C	ECoW to advise contractor / oversee works
BD64	Drainage basins throughout the scheme would be seeded with a native species-rich neutral grassland seed mix of local provenance or from suitable retained topsoil and be subject to low intensity management to maximise their biodiversity value.	Assumption that calcareous grassland would not be achieved within a drainage basin	To ensure that the biodiversity value of attenuation basins is maximised	DCO Requirement 3 (EMP) EMP Annex D Landscape and Ecological Management Plan ES Figure 7.9 Environmental masterplan (Document Reference 6.3)	ES Ch8	Contractor ECoW	Implementation of detailed site-specific LEMP.	C	Monitoring surveys to be undertaken in line with mitigation strategy.

Ref	Environmental action/commitment	Assumptions (on which the action is based)	Objective	How the action/ commitment will be implemented/ secured	Source ref.	Responsible person (s)	Achievement criteria and reporting requirements (if applicable)	Project stage	Monitoring requirements
BD65	Species-rich grassland meadow areas in the Shab Hill area to be managed to provide barn owl foraging habitat, providing rough grassland to encourage prey species in the operational phase. Management of calcareous grassland habitat fields to be created would also include uncut field margins to provide strips of foraging habitat for barn owl.	Assumption that there will be a reduction in suitable barn owl foraging habitat	To leave some grassland long to provide suitable habitat for small mammals to provide foraging resource for barn owl.	DCO Requirement 3 (EMP) EMP Annex D Landscape and Ecological Management Plan ES Figure 7.9 Environmental masterplan (Document Reference 6.3)	ES Ch8	Contractor ECoW	Mitigation strategy.	O	Monitoring surveys to be undertaken in line with mitigation strategy.
BD66	A coppiced wych elm tree within an important hedgerow is marked as notable by the Woodland Trust. This tree is located in the area of the material crushing compound and Gloucestershire Way crossing construction compound. The tree would be coppiced and translocated to a hedgerow receptor site.	Assumption that notable habitat will be impacted by the scheme.	To conserve notable habitat within the scheme	DCO Requirement 3 (EMP) EMP Annex D Landscape and Ecological Management Plan ES Figure 7.9 Environmental masterplan (Document Reference 6.3)	ES Ch8	Contractor ECoW	Implementation of detailed site-specific LEMP. Survival of translocated habitat	C, O	Monitoring of translocated elm tree by suitably experienced ecologist to ensure establishment.
Geology and soils									
GS1	Health and safety training, guidance notes and signs and suitable welfare facilities. Promotion of good hygiene practices implemented for the duration of the works with no smoking, eating, or drinking in the locale of excavations in potentially contaminated areas.	Assumed that construction workers will be working in potentially contaminated soils/groundwater.	To protect construction workers.	DCO Requirement 3 (EMP)	ES Ch9	Contractor	EMP to document on progress, results and compliance. Contractor to provide, implement and document solutions to non-compliances.	P, C	N/A
GS2	A watching brief by a suitably qualified and experienced person should be undertaken for the duration of site works in areas of potential contaminated land or groundwater.	Construction workers will be working in potentially contaminated soils/ groundwater.	To protect construction workers and controlled waters.	DCO Requirement 3 (EMP)	ES Ch9	Contractor	Implementation of detailed site-specific EMP. EMP to document on progress, results and compliance. Appropriate site-specific method statement from contractor. Contractor to provide, implement and document solutions to non-compliances.	C	Environmental monitoring throughout the construction period to ensure environmentally sound working practices are being adopted and adhered to.

Ref	Environmental action/commitment	Assumptions (on which the action is based)	Objective	How the action/ commitment will be implemented/ secured	Source ref.	Responsible person (s)	Achievement criteria and reporting requirements (if applicable)	Project stage	Monitoring requirements
GS3	The use of protective clothing and equipment; appropriate Personal Protective Equipment (PPE) provided to all construction workers. The assessment of risks to construction workers and the provision of appropriate PPE would be the responsibility of the contractor involved in the works.	Construction workers will be working in potentially contaminated soils/ groundwater.	To protect construction workers.	DCO Requirement 3 (EMP)	ES Ch9	Contractor	Implementation of detailed site-specific EMP. EMP to document on progress, results and compliance. Appropriate site-specific method statement from contractor. Contractor to provide, implement and document solutions to non-compliances.	C	n/a
GS4	An Action Plan for safely dealing with unexpected contamination should be developed. This will include provisions to appoint a suitably qualified and experienced contaminated land practitioner to provide a watching brief and supervisory role should unexpected contamination be encountered. This role shall include assessment of the risks to the construction works and workers. In addition, measures shall be identified to reduce the spread or release of contamination by suitably storing contaminated materials (on sheeting and covered to minimise the potential for leachate and run off from the stockpile being generated) and appropriate waste disposal procedures.	Construction workers will be working in potentially contaminated soils/groundwater and that controlled waters are a receptor.	To protect construction workers and controlled waters.	DCO Requirement 3 (EMP) DCO Requirement 8 (Land and groundwater contamination)	ES Ch9	Contractor	Implementation of detailed site-specific EMP. EMP to document on progress, results and compliance. Appropriate site-specific method statement from contractor. Contractor to provide, implement and document solutions to non-compliances.	P, C	Environmental monitoring throughout the construction period to ensure environmentally sound working practices are being adopted and adhered to.
GS5	Management of construction related waters. Agreement and permitting with the Environment Agency with regards to release to controlled waters or Service providers in relation to discharge into existing drainage/sewerage infrastructure.	Potential for contamination of waters.	To protect controlled waters.	DCO Requirement 3 (EMP) DCO requirement 8 (Land and groundwater contamination)	ES Ch9	Contractor	Contractor to arrange for contaminated water to be pumped to a suitably licenced tanker before being exported off site for treatment at an appropriately permitted facility. Contractor to verify and document licence for tanker and treatment facility.	C	Environmental monitoring throughout the construction period to ensure environmentally sound working practices are being adopted and adhered to.

Ref	Environmental action/commitment	Assumptions (on which the action is based)	Objective	How the action/ commitment will be implemented/ secured	Source ref.	Responsible person (s)	Achievement criteria and reporting requirements (if applicable)	Project stage	Monitoring requirements
GS6	If piling or any ground improvement is undertaken, provision for additional task-related and site-specific risk assessments to evaluate the risk to the environment and provide mitigation measures e.g. Foundation Works Risk Assessments (FWRA) for piling if undertaken. Any FWRAs would be developed in consultation with the Environment Agency.	Piling or ground improvement could result in contamination.	To protect construction workers and controlled waters	DCO Requirement 3 (EMP)	ES Ch9	Highways England	FWRA completed for specific structure/ground improvement works Piling technique selected based on conclusions of FWRA Appropriate site-specific method statement from contractor	C	Environmental monitoring throughout the construction period to ensure environmentally sound working practices are being adopted and adhered to.
GS7	A temporary physical barrier would be constructed to protect the identified geological exposures of the Leckhampton Member within the Crickley Hill SSSI (as shown on ES Figure 9.5 (Document Reference 6.3)). This would be considered by the contractor in their temporary works design.	Potential for damage to protected geological exposures within Crickley Hill SSSI.	To prevent damage to geological exposures within Crickley Hill SSSI.	DCO Requirement 3 (EMP)	ES Ch 9	Contractor	Implementation of detailed site-specific EMP.	P, C	N/A
GS8	For any work required to stabilise or descale the rock exposures adjacent to the A417 within the Crickley Hill and Barrow Wake SSSI, measures will be taken to enhance the exposures. Works would be monitored by a suitably qualified geologist.	Benefit cannot be provided without enhancing exposures.	To enhance exposures.	DCO Requirement 3 (EMP)	ES Ch 9	Contractor (collaborating with Natural England). Highways England responsible for maintaining exposures where required.	Meet the requirements of Natural England	P, C	A geological watching brief by a suitably qualified geologist for works to stabilise or descale the rock exposures adjacent to the A417 within the Crickley Hill and Barrow Wake SSSI.
GS9	Provide access for Natural England or their nominated specialists for the detailed sampling of fossils and recording of stratigraphic horizons from temporary geological sections exposed during construction, where safe and practical. Including identifying an area within the site compound where material could be looked at in more detail.	Benefit cannot be provided without detailed sampling and recording.	To increase the understanding of the stratigraphy.	DCO Requirement 3 (EMP)	ES Ch 9	Contractor (collaborating with Natural England).	Meet the requirements of Natural England	P, C	N/A
GS10	Provide information board explaining the geology of the region.	Benefit cannot be provided without providing information to the public.	To raise awareness amongst the public of the geological heritage.	DCO Requirement 3 (EMP)	ES Ch 9	Contractor (collaborating with Natural England).	Meet the requirements of Natural England.	P, C	N/A

Ref	Environmental action/commitment	Assumptions (on which the action is based)	Objective	How the action/ commitment will be implemented/ secured	Source ref.	Responsible person (s)	Achievement criteria and reporting requirements (if applicable)	Project stage	Monitoring requirements
GS11	Prepare Soils Management Plan: Soils should be managed in accordance with Department for Environment, Food & Rural Affairs (DEFRA) (2009) Construction Code of Practice for the Sustainable Use of Soils on Construction Sites.	The scheme requires soil handling and management during construction.	To maintain the quality of soils.	DCO Requirement 3 (EMP) EMP Annex E Materials Management Plan	ES Ch 9	Contractor	DEFRA (2009) Construction Code of Practice for the Sustainable Use of Soils on Construction Sites	P, C	N/A
GS12	Targeted investigations and assessments in areas of encountered hydrocarbon contamination in groundwater. Remediation works, if required.	Hydrocarbon contamination encountered in boreholes DSRC415, OH416 and DSRC229 may pose risk to underlying groundwater and surface water receptors as a result of the proposed scheme.	Remove identified sources to limit unacceptable risks to controlled waters.	DCO Requirement 3 (EMP) EMP Annex G Ground and Surface Water Management Plan	ES Ch 9	Contractor	Controlled waters risk assessments, remediation strategy (if required), remediation implementation and verification plan (if required), verification report (if required)	P	Groundwater and surface water monitoring in affected areas
GS13	Following the completion of construction activities, agricultural land taken on a temporary basis would be restored and returned to the landowner for unrestricted agricultural use in the same agricultural condition (ALC grade) that currently exists.	Agricultural uses are to be resumed on land disturbed during construction of the scheme.	Maintain the quality of soils.	DCO Requirement 3 (EMP)	ES Ch 9	Contractor	DEFRA (2009) Construction Code of Practice for the Sustainable Use of Soils on Construction Sites	C	Monitoring to be set out in the Soil Management Plan.
GS14	The Specification for Highways Works, series 600 Earthworks will set out verification system (incl. soil sampling, testing and assessment criteria) for imported and site won materials.	Uncontrolled materials import may result in use of materials that may pose a risk to end site users and the environment.	Only materials considered suitable for use with respect to end site users and controlled waters will be used in the construction of the scheme.	DCO Requirement 3 (EMP) EMP Annex E Materials Management Plan	ES Ch 9	Highway England	N/A	P, C	N/A
GS15	Abandoned sewage discharge soakaways within the scheme area are to be decommissioned and removed.	Abandoned sewage discharge soakaways are a potential source of contamination and may pose a risk to controlled waters.	Remove ongoing sources of contamination.	DCO Requirement 3 (EMP)	ES Ch 9	Contractor	N/A	C	N/A
GS16	Sheeting of lorries transporting spoil off site and the use of dust suppression equipment on plant.	Construction vehicles have the potential to generate dust.	Limit the mobilisation of dust by construction vehicles.	DCO Requirement 3 (EMP) Air Quality Management Plan	ES Ch9	Contractor	N/A	C	N/A
				Materials and waste					
MAW1	The contractor will update the Materials Management Plan (MMP) (EMP Annex D), developing it in accordance with current industry good practice.	The scheme involves material resources to be managed.	Managed material resources in accordance with best practice requirements	DCO Requirement 3 (EMP) EMP Annex E Materials Management Plan	ES Ch 10	Contractor	N/A	P, C	Monitoring would be undertaken by the contractor during construction to control the use of materials.

Ref	Environmental action/commitment	Assumptions (on which the action is based)	Objective	How the action/ commitment will be implemented/ secured	Source ref.	Responsible person (s)	Achievement criteria and reporting requirements (if applicable)	Project stage	Monitoring requirements
MAW2	The contractor will update the Site Waste Management Plan (SWMP) (EMP Annex H), developing it in accordance with current industry good practice.	The scheme has the potential to generate waste.	To identify, segregate, handle, and store different types of wastes in line with waste regulations.	DCO Requirement 3 (EMP) EMP Annex H Site Waste Management Plan	ES Ch 10	Contractor	N/A	P, C	Monitoring would be undertaken by the contractor during construction to control the generation of waste.
MAW3	Waste arisings would be prevented and designed out where practicable.	The scheme has the potential to generate waste.	Design to re-use materials on site and minimise the amount of waste produced by the scheme.	DCO Requirement 3 (EMP) EMP Annex E Materials Management Plan	ES Ch 10	Contractor	N/A	P, C	N/A
MAW4	When applying the waste hierarchy, measures would be implemented to encourage the options that they deliver compliance with waste regulations to ensure the best environmental outcome.	The scheme has the potential to generate waste.	Ensure waste is handled in line with waste regulations .	DCO Requirement 3 (EMP) EMP Annex E Materials Management Plan	ES Ch 10	Contractor	N/A	P, C	N/A
MAW5	Design for re-use, recovery and materials optimisation opportunities to re-use material resources would be sought and opportunities to support the circular economy would be considered.	The scheme has the potential to generate excess materials.	Design to re-use materials on site and minimise the amount of waste produced by the scheme.	DCO Requirement 3 (EMP) EMP Annex E Materials Management Plan	ES Ch 10	Contractor	N/A	P, C	N/A
MAW6	Reuse on-site where possible. Recycle/recovery opportunities. Re-use of site won materials in earthworks. Re-use of site won materials off-site on other local projects or with local landowners. Limit disposal and movements.	The scheme has the potential to generate excess materials.	To re-use as much material as possible on-site to reduce the amount of material that may will be disposed at landfill or diverted off-site.	DCO Requirement 3 (EMP) EMP Annex E Materials Management Plan of the EMP.	ES Ch 10	Contractor	N/A	P, C	N/A

Ref	Environmental action/commitment	Assumptions (on which the action is based)	Objective	How the action/ commitment will be implemented/ secured	Source ref.	Responsible person (s)	Achievement criteria and reporting requirements (if applicable)	Project stage	Monitoring requirements
MAW7	The scheme would be designed to maximise the earthworks balance. An earthworks surplus of 65,945m^3 has been identified. This material is comprised of three types of material including clay, mudstone and limestone. Measures would be taken to reduce this excess material to the point that no surplus material will remain after the required cut and fill construction operations. These measures include: • Highway alignment changes to reduce cut volumes. • Changes to landscape earthworks cross section and slope design to increase placed fill volumes. • Changes to cut slope design and cross sections at locations in deep cutting to reduce cut volumes. • Utilisation of excavated limestone materials in pavement construction.	The scheme has the potential to generate excess materials.	To re-use as much material as possible on-site to reduce the amount of material that may will be disposed at landfill or diverted off-site.	DCO Requirement 3 (EMP) EMP Annex E Materials Management Plan	ES Ch 10	Contractor	N/A	P, C	N/A
MAW8	Re-use material as sub-base in footpaths, in pavement construction and elsewhere.	The scheme has the potential to generate excess materials.	To re-use as much material as possible on-site to reduce the amount of material that may will be disposed at landfill.	DCO Requirement 3 (EMP) EMP Annex E Materials Management Plan	ES Ch 10	Contractor	N/A	P, C	N/A
MAW9	Other imported materials related to the installation of manufactured products are likely to be sourced from local, established suppliers who regularly provide materials for similar sized projects.	Transporting materials has the potential to generate environmental effects.	To ensure materials are sourced locally from established suppliers to reduce the distance materials are travelling.	DCO Requirement 3 (EMP) EMP Annex E Materials Management Plan	ES Ch 10	Contractor	N/A	P, C	N/A
MAW10	Damp down surfaces during spells of dry weather and brush or water spray heavily used site entrances or tracks.	The scheme has the potential to have localised impacts of waste on the surrounding environment.	To minimise the likelihood of any localised impacts of waste on the surrounding environment.	DCO Requirement 3 (EMP) EMP Annex H Site Waste Management Plan	ES Ch 10	Contractor	N/A	P, C	N/A
MAW11	Off-site prefabrication should be undertaken where possible.	The scheme has the potential to have localised impacts of waste on the surrounding environment.	To minimise the likelihood of any localised impacts of waste on the surrounding environment.	DCO Requirement 3 (EMP) EMP Annex H Site Waste Management Plan	ES Ch 10	Contractor	N/A	P, C	N/A

Ref	Environmental action/commitment	Assumptions (on which the action is based)	Objective	How the action/ commitment will be implemented/ secured	Source ref.	Responsible person (s)	Achievement criteria and reporting requirements (if applicable)	Project stage	Monitoring requirements
MAW12	No burning of waste or unwanted material on-site.	The scheme has the potential to have localised impacts of waste on the surrounding environment.	To minimise the likelihood of any localised impacts of waste on the surrounding environment.	DCO Requirement 3 (EMP) EMP Annex H Site Waste Management Plan	ES Ch 10	Contractor	N/A	P, C	N/A
MAW13	All hazardous material including fuels, chemicals, cleaning agents or solvent products to be kept in sealed containers and stored appropriately.	The scheme has the potential to have localised impacts of waste on the surrounding environment.	To minimise the likelihood of any localised impacts of waste on the surrounding environment.	DCO Requirement 3 (EMP) EMP Annex H Site Waste Management Plan	ES Ch 10	Contractor	N/A	P, C	N/A
MAW14	All contaminated materials encountered on site are to be dealt with through further ground investigations and specific risk assessments (as per ES Chapter 9 Geology and soils (Document Reference 6.2)).	The scheme has the potential to have localised impacts of waste on the surrounding environment.	To minimise the likelihood of any localised impacts of waste on the surrounding environment.	DCO Requirement 3 (EMP) EMP Annex H Site Waste Management Plan	ES Ch 10	Contractor	N/A	P, C	N/A
MAW15	Materials requiring removal from the site would be transported using licensed carriers and records would be kept detailing the types of waste moved.	The scheme has the potential to have localised impacts of waste on the surrounding environment.	To minimise the likelihood of any localised impacts of waste on the surrounding environment.	DCO Requirement 3 (EMP) EMP Annex H Site Waste Management Plan	ES Ch 10	Contractor	N/A	P, C	N/A
MAW16	The handling of waste material should be in accordance with the CL:AIRE Definition of Waste: Development Industry Code of Practice.	The scheme has the potential to generate waste.	To minimise the quantities of waste requiring disposal.	DCO Requirement 3 (EMP) EMP Annex E Materials Management Plan	ES Ch 10	Contractor	N/A	P, C	N/A
MAW17	Agreements with material suppliers to reduce the amount of packaging or to participate in a packaging take-back scheme.	The scheme has the potential to generate waste.	To minimise the quantities of waste requiring disposal.	DCO Requirement 3 (EMP) EMP Annex E Materials Management Plan	ES Ch 10	Contractor	N/A	P, C	N/A
MAW18	Implementation of just-in-time material delivery system to avoid materials being stockpiled, which increases the risk of their damage and disposal as waste.	The scheme has the potential to generate waste.	To minimise the quantities of waste requiring disposal.	DCO Requirement 3 (EMP) EMP Annex E Materials Management Plan	ES Ch 10	Contractor	N/A	P, C	N/A
MAW19	Attention to material quantity requirements to avoid over-ordering and generation of waste materials.	The scheme has the potential to generate waste.	To minimise the quantities of waste requiring disposal.	DCO Requirement 3 (EMP) EMP Annex E Materials Management Plan	ES Ch 10	Contractor	N/A	P, C	N/A

Ref	Environmental action/commitment	Assumptions (on which the action is based)	Objective	How the action/ commitment will be implemented/ secured	Source ref.	Responsible person (s)	Achievement criteria and reporting requirements (if applicable)	Project stage	Monitoring requirements
MAW20	The materials would be sorted or processed and where necessary, treated. Where materials excavated on-site are initially unable to meet the re-use criteria, they would either be treated to make them suitable for use or, as a last resort, disposed off-site as waste.	The scheme has the potential to generate waste.	To minimise the quantities of waste requiring disposal.	DCO Requirement 3 (EMP) EMP Annex E Materials Management Plan	ES Ch 10	Contractor	N/A	P, C	N/A
MAW21	Segregation of waste at source where practical.	The scheme has the potential to generate waste.	To minimise the quantities of waste requiring disposal.		ES Ch 10	Contractor	N/A	P, C	N/A
MAW22	During site clearance and construction re-use of materials wherever feasible e.g. re-use of excavated soil for earthwork embankments and landscaping. Re-use of materials within construction for example, re-use of pavement planning in subbase in footpaths where practicable.	The scheme has the potential to generate waste.	To minimise the quantities of waste requiring disposal	DCO Requirement 3 (EMP) EMP Annex E Materials Management Plan	ES Ch 10	Contractor	N/A	P, C	N/A
MAW23	Re-use and recycling off-site would be undertaken where re-use on-site is not practical.	The scheme has the potential to generate waste.	To minimise the quantities of waste requiring disposal.	DCO Requirement 3 (EMP) EMP Annex E Materials Management Plan	ES Ch 10	Contractor	N/A	P, C	N/A
MAW24	Should hazardous waste be encountered during construction, this would be handled at storage compounds, prior to transfer to external waste management sites. Non-hazardous materials would be segregated and appropriately re-distributed to alternative projects or re-distributed to waste management facilities	The scheme has the potential to generate hazardous waste.	To minimise the quantities of hazardous waste requiring disposal.	DCO Requirement 3 (EMP) EMP Annex H Site Waste Management Plan	ES Ch 10	Contractor	N/A	P, C	N/A
MAW25	Materials would be responsibly sourced (i.e. must have a certified provenance, traceability and sustainability) in order to reduce the impact on the highways network and material assets.		Responsible sourcing is defined in BS8902[vi] *Responsible sourcing sector certification schemes for construction projects*	DCO Requirement 3 (EMP) EMP Annex E Materials Management Plan	ES Ch 10	Contractor	N/A	P, C	Monitoring would be undertaken by the contractor during construction to ensure responsible sourcing of materials.

Ref	Environmental action/commitment	Assumptions (on which the action is based)	Objective	How the action/ commitment will be implemented/ secured	Source ref.	Responsible person (s)	Achievement criteria and reporting requirements (if applicable)	Project stage	Monitoring requirements
MAW26	Asbestos surveys of any buildings to be demolished at detailed design. Subject to the results of these surveys an Asbestos Management Plan would be added into EMP (construction) if appropriate.	Potential for asbestos to be present within buildings the removal or which would need to be managed.	Ensure that any asbestos is identified prior to demolition and appropriate management and disposal undertaken.	DCO Requirement 3 (EMP)	ES Ch 10	Contractor	N/A	P, C	N/A
				Noise and vibration					
NV1	**Best Practicable Means** To implement Best Practicable Means (BPM) as defined under Section 72 of the Control of Pollution Act (CoPA) 1974 and Section 79 of the Environmental Protection Act 1990. This shall be applied at all times in order to control noise and vibration from construction. The contractor (all) shall apply the BPM controls as specified in detail in BS 5228 Annex B - Noise sources, remedies and their effectiveness). The contractor will consider mitigation in the following order: (1) BPM, including: • Noise and vibration control at source - for example the selection of quiet and low vibration equipment, review of construction programme and methodology to consider quieter methods (including non-vibratory compaction plant, where required), location of equipment on site, control of working hours, the provision of acoustic enclosures and the use of less intrusive alarms, such as broadband vehicle reversing warnings. • Screening - for example local screening of equipment, perimeter hoarding or the use of temporary stockpiles. (2) Then, if situations arise where despite the implementation of BPM, the noise exposure exceeds the criteria defined in the Noise and Vibration Management Plan (NVMP), the contractor may offer: • Noise insulation; or ultimately • Temporary re-housing.	Construction activity has the potential to generate noise and vibration effects.	To avoid significant construction noise and vibration effects and minimise adverse impact arising from construction works.	DCO Requirement 3 (EMP) DCO Requirement 14 (Noise Mitigation)	ES Ch 11	Contractor	Compliance with mitigation measures outlined in Noise and Vibration Management Plan.	P, C	N/A

Ref	Environmental action/commitment	Assumptions (on which the action is based)	Objective	How the action/ commitment will be implemented/ secured	Source ref.	Responsible person (s)	Achievement criteria and reporting requirements (if applicable)	Project stage	Monitoring requirements
NV2	**Section 61 Consents:** The contractor will seek to obtain consents from the relevant local authority under Section 61 of the Control of Pollution Act 1974 for the proposed construction works, excluding non-intrusive surveys. Applications will be made to the relevant local authority for a Section 61 consent at least 28 days before the relevant work is due to start or earlier if reasonably practicable. Details of construction activities, prediction methods, location of sensitive receivers and noise and vibration levels will be discussed with the relevant local authority, or authorities, both prior to construction work and throughout the construction period. Prediction, evaluation and assessment of noise and vibration as well as discussion between the employer's representative and its contractor and the relevant local authority will continue throughout the construction period. The application for a Section 61 consent will require noise (and where appropriate vibration) assessments to be undertaken and BPM measures set out to manage noise associated with construction of the scheme. The contractor will submit the assessment initially to the employer's representative for review, prior to submission to the relevant local authority.	Construction activity has the potential to generate noise and vibration effects.	To avoid significant construction noise and vibration effects and minimise adverse impact arising from construction works.	DCO Requirement 3 (EMP) Section 61 consent – under Section 61 of the Control of Pollution Act 1974	ES Ch 11	Contractor	Compliance with mitigation measures outlined in Noise and Vibration Management Plan.	P, C	N/A

Ref	Environmental action/commitment	Assumptions (on which the action is based)	Objective	How the action/ commitment will be implemented/ secured	Source ref.	Responsible person (s)	Achievement criteria and reporting requirements (if applicable)	Project stage	Monitoring requirements
NV3	**Noise and Vibration Management Plan:** The contractor will prepare a noise and vibration management plan, as detailed in Section 4.3 EMP (construction) Management Plans. The provisions of the Noise and Vibration Management Plan will be monitored (see NV5).	Construction activity has the potential to generate noise and vibration effects. Effects on sensitive receptors. Assessment assumes good practice mitigation and monitoring measures will be followed during the construction phase.	To avoid significant construction noise and vibration effects and minimise adverse impact arising from construction works. To ensure that the effects of noise are controlled, and that the measures for controlling noise are implemented accordingly.	DCO Requirement 3 (EMP)	ES Ch 11	Contractor	Acceptance by The Authority and approval by the Secretary of State of the Noise and Vibration Management Plan. Consultation with Local Authorities, Historic England and National Trust in respect of matters relevant to their roles and responsibilities.	P, C	See NV5.

Ref	Environmental action/commitment	Assumptions (on which the action is based)	Objective	How the action/ commitment will be implemented/ secured	Source ref.	Responsible person (s)	Achievement criteria and reporting requirements (if applicable)	Project stage	Monitoring requirements
NV4	**Vibration:** Criteria and/or procedures for vibration control are specified for three purposes and assessed using three different sets of parameters: • To protect the occupants and users of buildings from disturbance, for which vibration dose values are assessed (vibration dose values (VDVs) are defined and their application to occupants of buildings is discussed in BS 6472-1 Guide to evaluation of human exposure to vibration in buildings – vibration sources other than blasting, 2008). • To protect buildings from risk of physical damage, for which peak component particle velocities are assessed in accordance with BS 7385-2 Evaluation and measurement for vibration in buildings. Guide to damage levels from groundborne vibration, 1993. • To protect particularly vibration-sensitive equipment and processes from damage or disruption, for which peak component acceleration, velocity or displacement are assessed as appropriate to each process or item of equipment. The monitoring and compliance assurance process will be set out in the contractor's Noise and Vibration Management Plan. The Section 61 applications will include a detailed description of the monitoring and monitoring locations proposed for the particular works covered by the consent application.	Construction activity has the potential to generate vibration effects.	To avoid significant construction vibration effects and minimise adverse impact arising from construction works. To ensure that the effects of vibration are controlled, and that the measures for controlling vibration are implemented accordingly.	DCO Requirement 3 (EMP)	ES Ch 11	Contractor	Compliance with mitigation measures outlined in the Noise and Vibration Management Plan.	P, C	See NV5.

Ref	Environmental action/commitment	Assumptions (on which the action is based)	Objective	How the action/ commitment will be implemented/ secured	Source ref.	Responsible person (s)	Achievement criteria and reporting requirements (if applicable)	Project stage	Monitoring requirements
NV5	**Monitoring of noise and vibration:** Monitoring will include physical measurements and observational checks/audits. The contractor will undertake and report noise and vibration monitoring, including real time noise and vibration monitoring, as is necessary to ensure and demonstrate compliance with all noise and vibration commitments, the requirements of the EMP and any Section 61 consent(s). Regular on-site observation monitoring and checks/audits will be undertaken to ensure that BPM is being employed at all times. The site reviews will be logged and any remedial actions recorded. Such checks will include: hours of working; • Presence of mitigation measures, equipment (engines doors closed, airlines not leaking, etc.) and screening (location and condition of local screening, etc.). • Number and type of plant. • Construction method. • Where applicable, any specific Section 61 consent conditions. The monitoring and compliance assurance process will be set out in the contractors' noise and vibration management plan. The Section 61 applications will include a detailed description of the monitoring and monitoring locations proposed for the particular works covered by the consent application.	Construction activity has the potential to generate noise and vibration effects.	To avoid significant construction noise and vibration effects and adequacy of control measures. To identify if the mitigation proposed is adequate and if construction related noise exceedances require further mitigation to reduce overall impact.	DCO Requirement 3 (EMP)	ES Ch 11	Contractor	If required, the Contractor will carry out noise monitoring surveys during the construction period. Monitoring requirements will be agreed with the relevant local authorities.	C	Monitoring will be undertaken by the contractor in line with the EMP and any Section 61 consent(s)

Ref	Environmental action/commitment	Assumptions (on which the action is based)	Objective	How the action/ commitment will be implemented/ secured	Source ref.	Responsible person (s)	Achievement criteria and reporting requirements (if applicable)	Project stage	Monitoring requirements
NV6	**Noise insulation and temporary re-housing:** Highways England/employer's representative will implement a noise insulation and temporary rehousing policy (see Section 4.2) . The policy is intended to provide additional protection to residents in the event that it is not practicable to mitigate airborne noise, or reduce their exposure to it, to levels that are tolerable during certain intensive construction phases. The contractor will submit a noise insulation/temporary rehousing appraisal at least six months prior to starting that phase of work on site or such time appropriate to the scale and nature of the works. It is essential that the assessment is carried out early enough so that noise insulation can be installed before the start of the works predicted to exceed noise insulation or temporary re-housing criteria.	Construction activity has the potential to generate noise and vibration effects.	To avoid significant construction noise and vibration effects and adequacy of control measures.	DCO Requirement 3 (EMP)	ES Ch 11	Contractor	Not applicable	C	Monitoring requirements will be agreed with the applicable local authorities.
NV7	**Operational noise mitigation:** Noise mitigation measures incorporated into the design of the scheme to control operational noise impacts including, a low noise road surface, earth bunds, Cotswold walls and noise fencing. These are documented in ES chapter 11 Noise and vibration (Documents Reference 6.2). Highways England/employer's representative will assess noise levels following the opening of the scheme to traffic. Noise insulation would be offered under Regulation 6 of the Noise Insulation Regulations 1975 (as amended) where the eligibility criteria are met. Contractor to work in accordance with the EMPs.	Operational activity has the potential to generate noise effects.	To avoid significant operational noise effects and minimise adverse impact arising from the operation of the scheme.	DCO Requirement 3 (EMP) DCO Requirement 13 (Noise Mitigation)	ES Ch 11	Contractor	Verification of the effectiveness of any mitigation measures against the accepted design. This would be carried out as part of Highways England's Project Evaluation procedures, to ensure the post-opening and longer-term performance of the mitigation measures.	O	Monitoring requirements will be agreed with the applicable local authorities.

Ref	Environmental action/commitment	Assumptions (on which the action is based)	Objective	How the action/ commitment will be implemented/ secured	Source ref.	Responsible person (s)	Achievement criteria and reporting requirements (if applicable)	Project stage	Monitoring requirements
NV8	**National Star College – construction noise mitigation provisions (See section 4.2 Other Control Measures)** The contractor shall offer mechanical ventilation for particularly noise sensitive rooms such that windows can be closed if construction noise is intrusive. This shall be based upon a review, with the College, of the potential for disturbance from construction works at those locations relative to ambient noise sources. Further studies will be carried out, in agreement with the College, to determine, in more detail, the construction noise levels at those most noise sensitive rooms to inform this process. Based on this review, the appropriate noise mitigation installations described above would be carried out before the relevant construction works commence.	Construction activity has the potential to generate noise and vibration effects.	To avoid significant construction noise and vibration effects and adequacy of control measures.	DCO Requirement 3 (EMP) DCO Requirement 13 (Noise Mitigation)	ES Ch 11	Contractor	Not applicable	C	Monitoring requirements will be agreed with National Star College.
NV9	Air Balloon Cottages (nos. 1 and 2) are predicted to be at risk of being exposed to vibration levels in excess of 6mm/s (below which the risk of damage tends to zero for continuous vibration). To avoid these vibration levels occurring, trials would be conducted at the start of works to establish actual vibration levels at the nearest sensitive receptors and where necessary, alternative plant or methods would be utilised e.g. more passes with compaction plant operating in 'static' mode or use of lower vibration equipment. In either case there is a trade-off between the vibration level experienced and the time taken to complete the works (i.e. potentially lower vibration impacts for a longer duration).	Potential building damage to Air Balloon Cottages.	To avoid damage to Air Balloon Cottages through vibration.	DCO Requirement 3 (EMP)	ES Ch 11	Contractor	Not applicable	C	Monitoring requirements will be agreed with property owners.

Ref	Environmental action/commitment	Assumptions (on which the action is based)	Objective	How the action/ commitment will be implemented/ secured	Source ref.	Responsible person (s)	Achievement criteria and reporting requirements (if applicable)	Project stage	Monitoring requirements
Population and health									
PH1	Mitigation and enhancement in relation to PRoW and Walking, Cycling and Horse-riding (WCH) routes during both construction and operation to be implemented as detailed in Annex F Public Rights of Way Management Plan.	Mitigation hierarchy and proposals within Annex F Public Rights of Way Management Plan to be followed.	Ensure safety of users whilst maintaining accessibility where possible (e.g. diversions) during construction. Maintain and enhance the PRoW network (e.g. new or improved routes) during operation. Ensure suitable surfacing, signage and enclosures are agreed between GCC and Highways England at detailed design stage	DCO Requirement 3 (EMP) EMP Annex F Public Rights of Way Management Plan.	ES Ch 12 ES Appendix 2.1, Annex F	Contractor	Implementation of measures outlined in the PRoW Management Plan.	P, C, O	Condition surveys of diversions / new routes during construction.
PH2	Where the construction works would affect access to any of the existing receptors identified in ES Chapter 12 Population and human health (Document Reference 6.2), temporary alternative access arrangements would be provided in agreement with the receptor, landowner and/or tenant(s). This is to be detailed within the Construction Traffic Management Plan to be refined at detailed design.	Local traffic will require access to key receptors.	To maintain access to existing private property, business and community receptors during construction.	DCO Requirement 3 (EMP) EMP Annex B Construction Traffic Management Plan	ES Ch 12	Contractor	Implementation of any measures within the Traffic Management Plan.	C	Completion record
PH3	Discuss and agree as appropriate the need for/provision of additional signage with Gloucestershire County Council (GCC) along the scheme and its junctions to key business receptors.	N/A	Help mitigate reduced accessibility directly from the A417.	DCO Requirement 3 (EMP) Legal agreement with GCC	ES Ch 12	Contractor and Highways England	N/A	O	N/A
PH4	Provision of replacement open space/common land as shown on the Special Category Land Plans (Document Reference 2.3)	N/A	To mitigate the loss of common land / open space as part of the scheme.	DCO Article 38 Special Category Land Plans ((Document Reference 2.3)	ES Ch 12	Contractor and Highways England	No less land in terms of area and equivalent access / qualities.	C, O	N/A

Ref	Environmental action/commitment	Assumptions (on which the action is based)	Objective	How the action/ commitment will be implemented/ secured	Source ref.	Responsible person (s)	Achievement criteria and reporting requirements (if applicable)	Project stage	Monitoring requirements
PH5	Provision of a Public Liaison Officer	N/A	To maintain access to existing private property, business and community receptors during construction.	DCO Requirement 3 (EMP)	ES Ch 12	Contractor and Highways England	N/A	C	N/A
PH6	Badgeworth footpath 89 to be diverted to avoid cutting through SSSI woodland and calcareous grassland so as not to incur further loss or degradation of the SSSI habitat	If the footpath remained in place it would add to the loss and degradation of the SSSI habitat	To maintain access while mitigating impacts to the SSSI	DCO Requirement 3 (EMP)	ES Ch 12	Contractor	N/A	C, O	N/A
Road drainage and the water environment									
RDWE1	A surface water management system using measures such as temporary silt fencing, cut off ditches, settlement ponds and bunds set up early in the construction period to capture all runoff and prevent ingress of sediments and contaminants into existing drainage ditches where necessary. This would be managed by the EMP in accordance with CIRIA Guidelines and the Environment Agency's approach to groundwater protection and groundwater protection guidelines.	Assumption that water, sediment and contaminants from the construction site will pollute receiving water environment receptors.	To ensure that the receiving environment is protected from accidental damage or loss during construction, in accordance with NPSNN 4.49.	DCO Requirement 3 (EMP) EMP Annex G Ground and Surface Water Management Plan	ES Ch 13	Contractor	Construction drainage design and detailed site-specific EMP. EM to document progress, results and compliance. Contractor to provide, implement and document solutions to non-compliances.	P, C	Monitoring of site's water management and discharge by suitably qualified EM and contractor. Water quality monitoring of surface and groundwaters.
RDWE2	Water with a higher risk of contamination which requires discharge, including groundwater pumped out of pilings during concrete pouring, would be contained and treated using appropriate measures such as coagulation of sediments, dewatering and pH neutralisation prior to discharge. There are various proprietary package treatment plants available that can provide these measures.	Assumption that contaminated water from construction site will pollute receiving groundwater and surface water receptors.	To ensure that the receiving environment is protected from accidental damage or loss during construction, in accordance with NPSNN 5.231.	DCO Requirement 3 (EMP) EMP Annex G Ground and Surface Water Management Plan	ES Ch 13	Contractor	Construction drainage design and detailed site-specific EMP. Use of flocculant/coagulants to be used in accordance with site-specific method statement and all use to be recorded. Appropriate site-specific method statement from contractor. EM to document on progress, results and compliance. Contractor to provide, implement and document solutions to non-compliances.	C	Monitoring of site's water management and discharge by suitably qualified EM and contractor. Water quality monitoring of surface and groundwaters.

Ref	Environmental action/commitment	Assumptions (on which the action is based)	Objective	How the action/ commitment will be implemented/ secured	Source ref.	Responsible person (s)	Achievement criteria and reporting requirements (if applicable)	Project stage	Monitoring requirements
RDWE3	Contaminated water that cannot be treated on site would, if necessary, be pumped to a suitably licenced tanker before being exported off site for treatment at an appropriately permitted facility.	Assumption that contaminated water from the construction site will pollute receiving water environment receptors.	To ensure that the receiving environment is protected from accidental damage or loss during construction, in accordance with NPSNN 5.231.	DCO Requirement 3 (EMP) EMP Annex G Ground and Surface Water Management Plan	ES Ch 13	Contractor	Contractor to arrange for contaminated water to be pumped to a suitably licenced tanker before being exported off site for treatment at an appropriately permitted facility. Contractor to verify and document licence for tanker and treatment facility.	C	Monitoring of contaminated water by suitably qualified EM and contractor. Appropriate site-specific method statement from contractor.
RDWE4	Areas of exposed sediment deemed at risk of erosion during heavy rainfall or flood inundation should be protected using either temporary measures (e.g. sheeting) or semi-permanent measures (for example coir matting) until vegetation is able to establish on these surfaces.	Assumption that water from the construction site will pollute receiving water environment receptors.	To ensure that the receiving environment is asset is protected from accidental damage or loss during construction, in accordance with NPSNN 5.231.	DCO Requirement 3 (EMP) EMP Annex G Ground and Surface Water Management Plan	ES Ch 13	Contractor	Implementation of detailed site-specific EMP. EM to document on progress, results and compliance. Appropriate site-specific method statement from contractor. Contractor to provide, implement and document solutions to non-compliances.	C	Monitoring of site's water management and discharge by suitably qualified EM and contractor. Water quality monitoring of surface and groundwaters.
RDWE5	Works would be suspended during out-of-bank river flows or during intense rainstorms.	Assumption that during out-of-bank river flows or during intense rainstorms water from the construction site will pollute receiving water environment receptors.	To ensure that the receiving environment is protected from accidental damage or loss during construction, in accordance with NPSNN 5.231.	DCO Requirement 3 (EMP) EMP Annex G Ground and Surface Water Management Plan	ES Ch 13	Contractor	Implementation of detailed site-specific EMP. Incident report to be produced following actions.	C	Monitoring of site's water management and discharge by suitably qualified EM and contractor. Programme of works to monitor weather conditions.

Ref	Environmental action/commitment	Assumptions (on which the action is based)	Objective	How the action/ commitment will be implemented/ secured	Source ref.	Responsible person (s)	Achievement criteria and reporting requirements (if applicable)	Project stage	Monitoring requirements
RDWE6	A water quality monitoring programme prior to and during construction works would be agreed with EA.	Confirm assumptions that water quality may change from baseline conditions as a result of the scheme.	Adhere to request from EA for monitoring. To ensure that the receiving environment is protected from accidental damage or loss during construction, in accordance with NPSNN 5.221 and 5.231.	DCO Requirement 3 (EMP) EMP Annex G Ground and Surface Water Management Plan	ES Ch 13	Contractor	Water quality monitoring of receiving surface watercourses and groundwater to be conducted, analysed and reported. Use data to characterise baseline and monitor effectiveness of scheme.	P, C, O	Pre-construction, construction and post construction water quality and flow monitoring of surface and groundwaters.
RDWE7	Tracer testing to identify and confirm groundwater flow paths and surface water interactions. It is anticipated additional tracer tests and hydraulic testing may be required to confirm hydraulic connectivity and properties of surface waters and groundwater bodies, define sub-catchments and fill gaps in knowledge following the previous rounds of surveys and monitoring.	Confirm assumptions regarding groundwater flow paths and surface water interactions.	To ensure that the receiving environment is protected from accidental damage, loss or increased flood risk during construction, in accordance with NPSNN 5.231.	DCO Requirement 3 (EMP)	ES Ch 13	Contractor	Tracer tests to be conducted and results incorporated into detailed design.	P	N/A
RDWE8	Works would be carried out in accordance with any additional permitting requirements, for example Ordinary Watercourse Consent, discharge, impoundment, or abstraction permits. Land drainage consents would be obtained from the LLFA, and would include information on all works, including temporary works, methodology and permanent design approval. Measures that are non-standard or site-specific would be incorporated into the contractor's construction method statement.	Assumption that contaminated water from construction site will pollute receiving groundwater and surface water receptors	To ensure that the receiving environment is protected from accidental damage or loss during construction, in accordance with NPSNN 5.231.	DCO Requirement 3 (EMP) EMP Annex G Ground and Surface Water Management Plan Environmental Permitting Regulations.	ES Ch 13	Contractor	Correct licences and permits to be secured. Appropriate site-specific method statement from contractor.	C	N/A

Ref	Environmental action/commitment	Assumptions (on which the action is based)	Objective	How the action/ commitment will be implemented/ secured	Source ref.	Responsible person (s)	Achievement criteria and reporting requirements (if applicable)	Project stage	Monitoring requirements
RDWE9	Appropriate sequencing and domaining of works, such as the tributary of Norman's Brook realignment, to reduce impacts to surface and groundwater flows to be temporarily diverted downstream of the works area.	Assumption that water from the construction site will pollute receiving water environment receptors.	To ensure that the receiving environment is protected from accidental damage or loss during construction, in accordance with NPSNN 5.231.	DCO Requirement 3 (EMP) EMP Annex G Ground and Surface Water Management Plan	ES Ch 13	Contractor	Implementation of detailed site-specific EMP. EM to document progress, results and compliance. Appropriate site-specific method statement from contractor. Contractor to provide, implement and document solutions to non-compliances.	C	Monitoring of site's water management and discharge by suitably qualified EM and contractor. Water quality and flow monitoring of surface and groundwaters.
RDWE10	Consideration of local groundwater catchment and flow regimes that may be affected by dewatering design and discharging the abstracted water to the same groundwater catchment and down gradient of the dewatered element.	Assumption that dewatering and discharge of water from the construction site will alter water balance of the affected catchments.	To ensure that the receiving environment is protected from accidental damage or loss during construction, in accordance with NPSNN 5.231.	DCO Requirement 3 (EMP) EMP Annex G Ground and Surface Water Management Plan	ES Ch 13	Contractor	Implementation of detailed site-specific EMP. EM to document progress, results and compliance. Appropriate site-specific method statement from contractor. Contractor to provide, implement and document solutions to non-compliances.	C	Monitoring of site's water management and discharge by suitably qualified EM and contractor. Flow monitoring of surface and groundwaters.
RDWE11	Discharge from dewatering activities such as earthworks, works within a floodplain or within eight metres of a watercourse will have a tailored risk assessment, consent and licences from the EA. Dewatering abstractions may also require transfer licenses from the EA.	Assumption that water quality may change from baseline conditions as a result of the scheme.	To ensure that the receiving environment is asset is protected from accidental damage or loss during construction, in accordance with NPSNN 5.221 and 5.231.	DCO Requirement 3 (EMP) Annex G Ground and Surface Water Management Plan Environmental Permitting Regulations.	ES Ch 13	Contractor	Site-specific risk assessments.	C	Monitoring of site's water management, discharge by suitably qualified EM and contractor.
RDWE12	Appropriate grouting methodology to be developed, where required, to reduce grout/cement escape through fractured rock/fissures/gulls and reduce risk to the water environment. The results of the tracer tests or any other investigations, where available, to be considered in grouting methodology development.	Assumption that grouting may result in negative impact upon water quality from baseline conditions as a result of the scheme.	To ensure that the receiving environment is protected from accidental damage or loss during construction, in accordance with NPSNN 5.231.	DCO Requirement 3 (EMP) EMP Annex G Ground and Surface Water Management Plan	ES Ch 13	Contractor	Methodology to be developed and adhered to following tracer testing.	C	Monitoring of site's water management by suitably qualified EM and contractor. Water quality monitoring of surface and groundwaters.

Ref	Environmental action/commitment	Assumptions (on which the action is based)	Objective	How the action/ commitment will be implemented/ secured	Source ref.	Responsible person (s)	Achievement criteria and reporting requirements (if applicable)	Project stage	Monitoring requirements
RDWE13	Review and update of groundwater conceptual model as new, site specific information is received.	Confirm assumptions regarding groundwater interactions.	To ensure that the receiving environment is protected from accidental damage or loss during construction, in accordance with NPSNN 5.231.	DCO Requirement 3 (EMP)	ES Ch 13	Highways England	Conceptual model to be updated.	P, C	Groundwater/springs flow, level and quality monitoring.
RDWE14	Review and update of the hydrogeological impact assessment as new, site specific information is received.	Confirm assumptions regarding groundwater interactions.	To ensure that the receiving environment is protected from accidental damage or loss during construction, in accordance with NPSNN 5.231.	DCO Requirement 3 (EMP)	ES Ch 13	Highways England	Hydrogeological impact assessment to be updated.	P, C	Groundwater/springs flow, level and quality monitoring.
RDWE15	A site-specific foundation works risk assessment (FWRA) for the construction of underground structures and ground improvement works.	Assumption that foundation works will pose risk to groundwater receptors.	To ensure that the receiving environment is protected from accidental damage or loss during construction, in accordance with NPSNN 5.231.	DCO Requirement 3 (EMP)	ES Ch 13	Highways England/ Contractor	FWRA completed for specific structure/ground improvement works. Piling technique selected based on conclusions of FWRA. Appropriate site-specific method statement from contractor.	P, C	Suitable qualified EM to monitor compliance with agreed method statement. Groundwater level and quality monitoring.
RDWE16	Construction of realigned tributary of Norman's Brook would be developed at detailed design, supported by further studies of hydromorphology and hydrology, aquatic ecology surveys, river condition surveys and data from ongoing water quality and flow monitoring.	Assumption that realignment of watercourse will pose risk to water environment receptors.	To ensure that the receiving environment is protected from accidental damage or loss during construction, in accordance with NPSNN 5.231.	DCO Requirement 3 (EMP)	ES Ch 13	Highways England	Detailed assessments to be prepared. Outcomes from assessments to be incorporated into method statements and adhered to during construction.	P, C	Suitable qualified EM to monitor compliance with agreed method statement. Surface and groundwater level and quality monitoring.
RDWE17	Detailed drainage design would retain the recharge of flows in the tributary of Norman's Brook, so that the flow regime of the realigned watercourse would be as similar as the existing flow regime as practicable.	Assumption that drainage will pose risk to water environment receptors.	To ensure that the receiving environment is protected from accidental damage or loss during construction, in accordance with NPSNN 5.231.	DCO Requirement 3 (EMP) EMP Annex G Ground and Surface Water Management Plan	ES Ch 13	Highways England	Detailed drainage design to be prepared. Detailed design to be incorporated into method statements and adhered to during construction.	P, C	Suitable qualified EM to monitor compliance with agreed method statement. Surface and groundwater level and quality monitoring.

Ref	Environmental action/commitment	Assumptions (on which the action is based)	Objective	How the action/ commitment will be implemented/ secured	Source ref.	Responsible person (s)	Achievement criteria and reporting requirements (if applicable)	Project stage	Monitoring requirements
RDWE18	Design of stabilisation measures will discharge captured groundwater into the realigned watercourse therefore maintaining the net water balance within the catchment.	Assumption that construction and operation will pose risk to water environment receptors.	To ensure that the receiving environment is protected from accidental damage or loss during operation, in accordance with NPSNN 5.231.	DCO Requirement 3 (EMP) EMP Annex G Ground and Surface Water Management Plan	ES Ch 13	Highways England/ Contractor	Detailed design of stabilisation measures. Appropriate site-specific method statement from contractor. Contractor to provide, implement and document solutions to non-compliances.	P, C, O	Suitable qualified EM to monitor compliance with agreed method statement. Surface and groundwater level and quality monitoring.
RDWE19	Development of voids protocol setting out procedures and measures allowing for treatment of voids that will reduce impact on groundwater flows.	Assumption that construction will pose risk to water environment receptors.	To ensure that the receiving environment is protected from accidental damage or loss during operation, in accordance with NPSNN 5.231.	DCO Requirement 3 (EMP)	ES Ch 13	Highways England/ Contractor	Development of voids protocol. Appropriate site-specific method statement from contractor. Contractor to provide, implement and document solutions to non-compliances.	P, C, O	Monitoring adherence to method statement by suitably qualified EM and contractor.
RDWE 20	Flow volume and quality control measures are incorporated into the scheme design to provide a sustainable drainage system (SuDS) and are not considered to comprise additional mitigation.	Assumption that operation will pose risk to water environment receptors.	To ensure that the receiving environment is protected from accidental damage or loss during operation, in accordance with NPSNN 5.231.	DCO Requirement 3 (EMP) DCO Requirement 12 (Surface and foul water drainage)	ES Ch 13	Highways England	Correct operation of SuDS features.	O	Monitoring and maintenance of SuDS features. Operational water flow and quality monitoring.
RDWE 21	The carriageway drainage will consist of a multi-stage treatment train to remove and retain soluble and suspended pollutants to ensure discharges to groundwater or local watercourses are at acceptable levels.	Assumption that operation will pose risk to water environment receptors.	To ensure that the receiving environment is protected from accidental damage or loss during operation, in accordance with NPSNN 5.231.	DCO Requirement 3 (EMP) DCO Requirement 12 (Surface and foul water drainage)	ES Ch 13	Highways England	Correct operation of SuDS features.	O	Monitoring and maintenance of SuDS features. Operational water flow and quality monitoring.
RDWE 22	Attenuation/infiltration basins will be designed to ensure that groundwater levels would not impede their performance. Embankments are to be constructed above key groundwater/surface water interactions (springs), culverts or drainage blankets will be incorporated into the RDWE 23 design to maintain the existing flow.	Assumption that operation will pose risk to water environment receptors.	To ensure that the receiving environment is protected from accidental damage or loss during operation, in accordance with NPSNN 5.231.	DCO Requirement 3 (EMP) DCO Requirement 12 (Surface and foul water drainage)	ES Ch 13	Highways England	Correct operation of SuDS features.	O	Monitoring and maintenance of SuDS features. Operational water flow and quality monitoring.

Ref	Environmental action/commitment	Assumptions (on which the action is based)	Objective	How the action/ commitment will be implemented/ secured	Source ref.	Responsible person (s)	Achievement criteria and reporting requirements (if applicable)	Project stage	Monitoring requirements
RDWE 23	Design of drainage within cuttings will allow groundwater to be collected separately from the highway drainage and allow recharge to the underlying aquifers maintaining the existing recharge mechanisms. Where underlying geology prevents infiltration, collected groundwater would be discharged into the nearest surface watercourse, which in baseline conditions would be recharged by that groundwater and thus maintaining the overall water balance within the catchments.	Assumption that operation will pose risk to water environment receptors.	To ensure that the receiving environment is protected from accidental damage or loss during operation, in accordance with NPSNN 5.231.	DCO Requirement 3 (EMP) DCO Requirement 12 (Surface and foul water drainage)	ES Ch 13	Highways England	Correct operation of SuDS features.	O	Monitoring and maintenance of SuDS features. Operational water flow and quality monitoring.
RDWE 24	Geotechnical design may require localised dig and replacement of soils. Through the Project Specification, Appendix Series 600, the design will take due consideration to minimising potential impact on local hydrogeology. This will specify adequate physical properties and compaction requirements to ensure that the hydraulic properties of the engineering fill would not result in significant adverse impact on groundwater flows.	Assumption that operation will pose risk to water environment receptors.	To ensure that the receiving environment is protected from accidental damage or loss during operation, in accordance with NPSNN 5.231.	DCO Requirement 3 (EMP)	ES Ch 13	Highways England/ Contractor	Appropriate site-specific method statement from contractor. Contractor to provide, implement and document solutions to non-compliances.	P, C	Suitable qualified EM to monitor compliance with agreed method statement.
RDWE 25	Following the completion of post-construction groundwater monitoring, observation boreholes may be decommissioned. The decommissioning of the boreholes should be done in a way that the material placed in the observation well mimics the annulus construction.	Assumption that decommissioning of boreholes will pose risk to water environment receptors by creating a flow path for pollution.	To ensure that the receiving environment is protected from accidental damage or loss during operation, in accordance with NPSNN 5.231.	DCO Requirement 3 (EMP)	ES Ch 13 ES CH 9	Highways England/ Contractor	Appropriate site-specific method statement from contractor. Contractor to provide, implement and document solutions to non-compliances.	O	Suitable qualified EM to monitor borehole decommissioning in accordance with agreed method statement.
RDWE 26	Fluvial flood risk: The scheme will be designed based on the findings of the hydraulic modelling to be undertaken at detailed design, including any mitigation measures associated with the watercourse realignment.	Assumption that the scheme will have no adverse effect on flood risk.	To ensure consideration of the risks of all forms of flooding arising from the project in accordance with NPSNN paragraph reference 5.90 to 5.115	DCO Requirement 3 (EMP)	ES Ch 2	Highways England	Appropriately managed flood risk, with no increase in flood risk associated with the scheme.	P	N/A

Ref	Environmental action/commitment	Assumptions (on which the action is based)	Objective	How the action/ commitment will be implemented/ secured	Source ref.	Responsible person (s)	Achievement criteria and reporting requirements (if applicable)	Project stage	Monitoring requirements
RDWE 27	Surface water flood risk: The baseline model will be updated with the scheme including the proposed highway drainage and the realignment of the tributary of Norman's Brook. This model will be used to inform the detail design to ensure any residual surface water flood risk is mitigated. Where the scheme passes over surface water flood flow paths, culverts will be designed to accommodate flow. The hydrology for the catchment draining to this point will be estimated using industry standard methods and used in the design of a suitable cross drainage structure to pass this water beneath the scheme and reduce the potential for ponding or increased upstream flood risk.	Assumption that the scheme will have no adverse effect on flood risk.	To ensure consideration of the risks of all forms of flooding arising from the project in accordance with NPSNN paragraph reference 5.90 to 5.115	DCO Requirement 3 (EMP) DCO Requirement 12 (Surface and foul water drainage)	ES Ch 2	Highways England	Appropriately managed flood risk, with no increase in flood risk associated with the scheme.	P	N/A
RDWE 28	The detailed design of the realignment of the tributary of Norman's Brook watercourse would: • Provide naturalistic features of an equivalent or greater value to that of the existing watercourse. • Maintain the character and geomorphology of the existing watercourse through reintroducing step pools, cascades informal steps and irregular meanders and identifying possible sections of the culverted watercourse that could be de-culverted and naturalised. • Minimise the introduction of new culverted sections, wherever possible. • Be overseen by an experienced fluvial geomorphologist.	Assumption that realignment of watercourse will pose risk to the character and geomorphology of water environment receptors.	To ensure that the receiving environment is protected from accidental damage or loss during construction, in accordance with NPSNN 5.231.	DCO Requirement 3 (EMP)	ES Ch 13	Highways England	Detailed assessments to be prepared. Outcomes from assessments to be incorporated into method statements and adhered to during construction.	P, C	Suitable qualified EM to monitor compliance with agreed method statement. Surface and groundwater level and quality monitoring.
RDWE 29	Groundwater flood risk: The drainage design will include aspects of groundwater flood risk management such as managing inflows so that the intercepted groundwater flows will remain within the catchment of the respective receiving water.	Assumption that the scheme will have no adverse effect on flood risk.	To ensure consideration of the risks of all forms of flooding arising from the project in accordance with NPSNN paragraph reference 5.90 to 5.115	DCO Requirement 3 (EMP)	ES Ch 2	Highways England	Appropriately managed flood risk, with no increase in flood risk associated with the scheme.	P	N/A

Ref	Environmental action/commitment	Assumptions (on which the action is based)	Objective	How the action/ commitment will be implemented/ secured	Source ref.	Responsible person (s)	Achievement criteria and reporting requirements (if applicable)	Project stage	Monitoring requirements
RDWE 30	The drainage design will be informed by hydraulic modelling at detailed design, further geotechnical investigation data, baseline hydrological data and physical surveys of existing buried drainage features. Highway runoff will not be allowed to discharge freely, instead attenuation basins and swales will be incorporated into the drainage design to manage this.	Road drainage surface water has a potential to result in downstream flood risk.	To ensure consideration of the risks of all forms of flooding arising from the project in accordance with NPSNN paragraph reference 5.90 to 5.115	DCO Requirement 3 (EMP) DCO Requirement 12 (Surface and foul water drainage)	ES Ch 2	Highways England	Appropriately managed run-off with controlled discharges.	P	N/A
RDWE 31	The design of the road drainage network will consider necessary measures and treatment to provide appropriate protection to the karst aquifer from potential water quality deterioration. Where there is potential interaction with groundwater levels than these are appropriately assessed based upon the groundwater monitoring network.	Road drainage surface water has a potential to impact groundwater quality.	To ensure no significant deterioration of groundwater quality.	DCO Requirement 3 (EMP) DCO Requirement 12 (Surface and foul water drainage)	ES Ch 2	Highways England	Infiltration to the ground only where risk assessments show no significant risk to controlled waters.	P	N/A
RDWE 32	During construction adequate fuel/chemical storage facilities e.g. bunded tanks, hard standing and associated emergency response spillage control procedures are to be set out in accordance with current industry guidance and standards. Construction plant is to be well maintained and associated emergency response/spillage control procedures are to be in place.	Fuel/chemical storage and fuel leakages/spillages from plant have a potential to result in pollution of water environment.	To ensure no significant deterioration of groundwater quality.	DCO Requirement 3 (EMP)	ES Ch13 ES Ch9	Contractor	N/A	C	Suitable qualified EM to monitor compliance with agreed method statement. Surface and groundwater level and quality monitoring.
Climate									
CC1	Avoid/prevent' greenhouse gas (GHG) emissions as far as reasonably practical by maximising the potential for re-using and/or refurbishing existing assets to reduce the extent of new construction required, and/or explore alternative lower carbon options to deliver the project objectives.	The scheme has the potential to generate GHG emissions.	'Avoid/prevent' GHG emissions as far as reasonably practical in line with HE's Sustainable Development Strategy (2017)[2] and Action Plan[3], and UK carbon budgets.	DCO Requirement 3 (EMP)	ES Ch 14	Contractor and Highways England	N/A	P, C	N/A

[2] Highways England (2017) Sustainable development strategy – Our Approach. Available online at: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/605079/Sustainable_Development_Strategy_6.pdf
[3] Highways England (2018) Sustainable Development and Environment Action Plan: Roads Period 1. Available online at: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/763125/Sustainable_Development_and_Environment_Action_Plan_final.pdf

Ref	Environmental action/commitment	Assumptions (on which the action is based)	Objective	How the action/ commitment will be implemented/ secured	Source ref.	Responsible person (s)	Achievement criteria and reporting requirements (if applicable)	Project stage	Monitoring requirements
CC2	Reduce GHG emissions as far as reasonably practical by implementing low carbon and/or reduced resource consumption solutions (including technologies, materials and products) to minimise resource consumption during the construction, operation, and at end of life.	The scheme has the potential to generate GHG emissions.	'Reduce' GHG emissions as far as reasonably practical in line with HE's Sustainable Development Strategy (2017) and Action Plan, and UK carbon budgets.	DCO Requirement 3 (EMP)	ES Ch 14	Contractor and Highways England	N/A	P, C	N/A
CC3	Reduce/remediate carbon emissions through on-site offsetting or sequestration.	The scheme has the potential to generate GHG emissions.	'Reduce' or 'remediate' GHG emissions as far as reasonably practical in line with HE's Sustainable Development Strategy (2017) and Action Plan, and UK carbon budgets.	DCO Requirement 3 (EMP)	ES Ch 14	Contractor and Highways England	N/A	P, C	N/A
CC4	The scheme should minimise the requirement for energy consuming operational equipment such as street lighting or intelligent transport systems wherever possible. Where lighting may be potentially required, for example at Grove Farm underpass, low lux demand sensitive lighting is proposed to reduce GHG emissions associated with operating the scheme.	The scheme has the potential to generate GHG emissions.	Avoid/prevent, reduce and mitigate GHG emissions as far as reasonably practical in line with HE's Sustainable Development Strategy (2017) and Action Plan, and UK carbon budgets.	DCO Requirement 3 (EMP)	ES Ch 14	Contractor and Highways England	N/A	P, C	N/A
CC5	All crossings should be designed considering embodied GHG emissions.	The scheme has the potential to generate GHG emissions.	Avoid/prevent, reduce and mitigate GHG emissions as far as reasonably practical in line with HE's Sustainable Development Strategy (2017) and Action Plan, and UK carbon budgets.	DCO Requirement 3 (EMP)	ES Ch 14	Contractor and Highways England	N/A	P, C	N/A

Ref	Environmental action/commitment	Assumptions (on which the action is based)	Objective	How the action/ commitment will be implemented/ secured	Source ref.	Responsible person (s)	Achievement criteria and reporting requirements (if applicable)	Project stage	Monitoring requirements
CC6	The depth of cutting through the escarpment must be in the region of 17 metres. This removes the requirement for a number of retaining walls and their associated embedded carbon emissions. This also reduced the required earthworks and excess material, reducing the corresponding construction process emissions and emissions associated with waste management activities (transport, processing and final disposal).	The scheme has the potential to generate GHG emissions.	Avoid/prevent, reduce and mitigate GHG emissions as far as reasonably practical in line with HE's Sustainable Development Strategy (2017) and Action Plan, and UK carbon budgets.	DCO Requirement 3 (EMP)	ES Ch 14	Contractor and Highways England	N/A	P, C	N/A
CC7	The contractor would develop and implement a plan to reduce energy consumption and associated carbon emissions. This could include: • The consideration of renewable and/or low or zero carbon energy sources and recording the savings implemented and working closely with suppliers to reduce emissions from network related activity. • The consideration of renewable energy power sources for technology assets on the scheme would be considered at the detailed design stage. • The consideration for electric vehicle charging points to be included in maintenance lay-bys.	The scheme has the potential to generate GHG emissions.	Avoid/prevent, reduce and mitigate GHG emissions as far as reasonably practical in line with HE's Sustainable Development Strategy (2017) and Action Plan, and UK carbon budgets.	DCO Requirement 3 (EMP)	ES Ch 14	Contractor and Highways England	Successful implementation of plan and records of carbon 'reduced' by actions within the plan.	P, C	N/A
CC8	Energy consumption and materials use will be recorded and reported on an ongoing basis during the construction phase of the scheme using the Highways England Carbon Reporting Tool.	The scheme has the potential to generate GHG emissions.	Accurate reporting of GHG emissions.	DCO Requirement 3 (EMP)	ES Ch 14	Contractor and Highways England	Reporting via the Highways England Carbon Reporting Tool.	P, C	N/A

Ref	Environmental action/commitment	Assumptions (on which the action is based)	Objective	How the action/ commitment will be implemented/ secured	Source ref.	Responsible person (s)	Achievement criteria and reporting requirements (if applicable)	Project stage	Monitoring requirements
CC9	Where practicable, measures will be implemented to manage material resource use during construction including: • Using materials with lower embedded GHG emissions and water consumption. • Using sustainably sourced materials. • Using recycled or secondary materials. • Employing low carbon construction techniques, e.g. warm asphalt.	The scheme has the potential to generate GHG emissions.	Reduce GHG emissions as far as reasonably practical in line with HE's Sustainable Development Strategy (2017)[4] and Action Plan[5], and UK carbon budgets.	DCO Requirement 3 (EMP)	ES Ch 14	Contractor and Highways England	Successful implementation of carbon reduction measures in relation to materials use and records of carbon 'reduced' by actions.	P, C	Continuous monitoring of opportunities for carbon reduction
CC10	Material excavated during construction would be processed for use in the works wherever possible to reduce the amount of material disposed of off-site as well as imported from other sources, and associated GHG emissions. Possible uses include general fill and other graded materials. Processing of material would take place on-site.	The scheme has the potential to generate GHG emissions.	'Reduce' GHG emissions as far as reasonably practical in line with HE's Sustainable Development Strategy (2017) and Action Plan, and UK carbon budgets.	DCO Requirement 3 (EMP)	ES Ch 14	Contractor and Highways England	N/A	P, C	N/A
CC11	Quarterly greenhouse gas (GHG) emission returns during construction and operation shall be reported in accordance with Highways England's requirements. Data provided for the GHG returns shall be evaluated to inform any ongoing monitoring of GHG emissions and feed back into future assessment of projects during design development and planning approval.	The scheme has the potential to generate GHG emissions.	Reduce GHG emissions as far as reasonably practical in line with HE's Sustainable Development Strategy (2017)[6] and Action Plan[7], and UK carbon budgets.	DCO Requirement 3 (EMP)	ES Ch 14	Contractor and Highways England	Reporting via the Highways England Carbon Reporting Tool. Evaluation and monitoring of results, and implementation of improvement measures.	C, O	Quarterly monitoring
CC12	Existing pavements on the A417 will be retained wherever possible within the scheme to minimise the requirement for additional materials and construction.	The scheme has the potential to generate GHG emissions.	Avoid GHG emissions by utilising existing infrastructure wherever possible	DCO Requirement 3 (EMP)	ES Ch14	Highways England to undertake and provide pavement survey data to design contractor prior to inform detailed design.	Pavement survey completed and provided to design team to inform detailed design.	P	N/A

[4] Highways England (2017) Sustainable development strategy – Our Approach. Available online at: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/605079/Sustainable_Development_Strategy_6.pdf
[5] Highways England (2018) Sustainable Development and Environment Action Plan: Roads Period 1. Available online at: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/763125/Sustainable_Development_and_Environment_Action_Plan_final.pdf
[6] Highways England (2017) Sustainable development strategy – Our Approach. Available online at: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/605079/Sustainable_Development_Strategy_6.pdf
[7] Highways England (2018) Sustainable Development and Environment Action Plan: Roads Period 1. Available online at: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/763125/Sustainable_Development_and_Environment_Action_Plan_final.pdf

Ref	Environmental action/commitment	Assumptions (on which the action is based)	Objective	How the action/ commitment will be implemented/ secured	Source ref.	Responsible person (s)	Achievement criteria and reporting requirements (if applicable)	Project stage	Monitoring requirements
CC13	The scheme design must carefully consider the use of appropriate tree and shrub species and low maintenance wildflower grassland (calcareous grassland) to reduce associated maintenance operations. Calcareous grassland, which has been used throughout the scheme, only requires cutting once a year (reducing maintenance-related emissions) and can be seeded directly on to low fertility excavated materials or subsoil, which would remove the requirement to import topsoil during construction.	The scheme has the potential to generate GHG emissions.	'Reduce' GHG emissions as far as reasonably practical in line with HE's Sustainable Development Strategy (2017) and Action Plan, and UK carbon budgets.	DCO Requirement 3 (EMP)	ES Ch 14	Contractor and Highways England	N/A	P, C	N/A
CC14	Once operational, asset data will be managed, maintained and monitored to ensure the project design is operating as intended. Asset management measures will evolve once the scheme is operational and to respond appropriately to climate impacts. Where a design issue is identified, an assessment shall be made to determine if corrective action is required.	Future projected climate conditions and extreme weather events have the potential to impact upon resilience of the scheme.	To minimise the impacts of future projected climate conditions and extreme weather on operation	DCO Requirement 3 (EMP)	ES Ch 14	Contractor and Highways England	A management system for asset data to be maintained and monitored. Early identification and implementation of corrective actions.	O	Throughout operation
CC15	Ensure climate change resilience planning for extreme weather events is undertaken during construction. These should include: • Check of medium range weather forecasting service from the Met-Office to manage climate related risks. • Register with the Environment Agency's Floodline Warnings Direct service.	Extreme weather events have the potential to impact upon the resilience of the scheme and cause hazards and associated delay during construction.	To minimise the impacts of extreme weather on construction.	DCO Requirement 3 (EMP)	ES Ch 14	Contractor	N/A	P, C	N/A
CC16	The vulnerable safety-critical features of the scheme must be designed with consideration given to H++ climate scenarios[8]. Safety critical features have been identified in the ES as: • DrainageEarthworks • Asphalt surface • Operational electrical equipment • Pavement • Groundwater flow • Foundations • Slope stability	More radical changes to the climate beyond that projected in the UK Climate Projections 2018 (UKCP18) have the potential to affect safety-critical features of the scheme.	To improve the scheme's resilience to future climate conditions.	DCO Requirement 3 (EMP) Managed in in accordance with CS 641 Managing the maintenance of highway geotechnical assets[vii].	ES Ch14	Contractor and Highways England	Evidence that the detailed design adequately considers the H++ climate scenarios.	A	Once operational, monitoring and maintenance to ensure safe and effective functioning of the scheme.

[8] H++ scenarios are a set of plausible 'high-end' climate change scenarios which are typically extreme climate change scenarios on the margins or outside of the 10th to 90th percentile range presented in the UK Climate Projections 2009 (UKCP09). They cover the following climate hazards: heat waves, cold snaps, low and high rainfall, droughts, floods and windstorms. The H++ scenarios are available online: https://www.theccc.org.uk/publication/met-office-for-the-asc-developing-h-climate-change-scenarios/

Ref	Environmental action/commitment	Assumptions (on which the action is based)	Objective	How the action/ commitment will be implemented/ secured	Source ref.	Responsible person (s)	Achievement criteria and reporting requirements (if applicable)	Project stage	Monitoring requirements
CC17	H&S to be incorporated within proposed maintenance regimes. These can be reviewed regularly to ensure health and safety requirements within Highways England are met.	Increased number of hot days may increase impact to staff during construction and maintenance. Increased heat stress for staff, particularly for outdoor construction and maintenance workers.	To reduce H&S risk to workers from heat stress	DCO Requirement 3 (EMP)	ES Ch14	Contractor and Highways England	H&S adequately considered within maintenance regimes	C, O	N/A
CC18	Emergency procedures in place during operation.	Extended periods of hot, dry weather may lead to a risk of spontaneous grassland fires in vicinity of the route, affecting safety on the road.	To reduce risks from fire hazard	DCO Requirement 3 (EMP)	ES Ch14	Contractor and Highways England	Emergency procedures in place	O	N/A
CC19	Implementation of maintenance regimes for the road surface	Asphalt surface may exhibit permanent deformation in long periods of hot, sunny conditions. High temperatures increase the risk of surfacing rutting leading to water ponding in the ruts. Higher temperatures also increase the risk of reduced skid resistance due to fatting and chipping embedment. This increases the risk of vehicle accidents. Increased impact of diesel spills in higher temperatures and increased number of hot, dry days increase the likelihood of ignition of this diesel leading to road and forest fires.	To reduce risks from damaged or dangerous road surface	DCO Requirement 3 (EMP)	ES Ch14	Contractor and Highways England	Maintenance regimes in place	O	Monitoring to be undertaken as part of maintenance regimes
CC20	Road surface laying and maintenance to be undertaken in suitable weather conditions	Increased number of hot days may impact the bitumen binder hardening rate. Risk of being unable to lay road surface layers in hot weather.	To ensure suitable road surface	DCO Requirement 3 (EMP)	ES Ch14	Contractor and Highways England	Suitable road surface	C, O	Monitoring to be undertaken as part of maintenance regimes

Ref	Environmental action/commitment	Assumptions (on which the action is based)	Objective	How the action/ commitment will be implemented/ secured	Source ref.	Responsible person (s)	Achievement criteria and reporting requirements (if applicable)	Project stage	Monitoring requirements
CC21	Drainage design and attenuation ponds to be designed to the latest climate change allowances (from the Environment Agency). Drainage on site to be suitably monitored, managed and maintained, including maintenance of attenuation ponds. Electrical cables must be water-tight cables housed in plastic ducts.	Increased risk of flooding from river/streams, surface and groundwater sources could lead to: • Flooding of road surface, access roads and/or road infrastructure. • Increase risk of sewage overflow in floodwater could cause damage and impact health of maintenance workers. • Increased risk of scouring of culverts. • Flooding causing damage to fibre optic cables running near to site. • Increased pore water pressure in. embankments/cuttings • Increased erosion at toe of embankment. • Water ingress to critical construction equipment. • Water ingress to signalling, lighting and other operational electrical equipment. • Change in ground water level affecting earth pressures and foundation settlement causing possible large ground movement. • Increased risk of debris deposit from water seeping up to the surface through the pavement e.g. calcium sulphate leading to reduced skid resistance. • Construction site flooding during construction phase, excavations flooded and site roads impassable. Safety risk of slips, trips and falls to construction workers. • Increased ground water level in winter may lead to flooding of underpasses.	To reduce risks associated with high precipitation	DCO Requirement 3 (EMP) DCO Requirement 12 (Surface and foul water drainage) EMP Annex G Ground and Surface Water Management Plan	ES Ch14	Contractor and Highways England	Appropriate drainage design. Monitoring and maintenance procedures specified. Correct electrical cables utilised.	A	Continuous monitoring and maintenance of drainage features.

4 Consents and permissions

4.1 Other Consents and licences

4.1.1 The principal consent for the scheme is the DCO which 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 is a need to supplement the DCO with additional consents and permissions that relate directly to measures within the EMP these need to be sought separately from the DCO.

4.1.2 The Consents and Agreements Position Statement (Document Reference 7.2) has been submitted as part of the DCO Application. This sets out Highways England's intended strategy for obtaining the consents and associated agreements needed to implement the scheme. It identifies at a high-level what consents are expected to be needed for the scheme, together with how these consents will be obtained. A list of other permissions and agreements that Highways England intends to obtain to allow for the construction, operation and maintenance of the scheme is provided in Table 4.1 of the Consents and Agreements Position Statement (Document Reference 7.2).

4.1.3 A brief indicative summary of possible consent requirements identified includes:

- Legally Protected Species – known licences including badgers, bats, and Roman snails.
- Authorisation to translocate fish prior to realignment of Norman's Brook
- Environmental Permit for the management and disposal of waste from site, to protect the environment against contamination.
- Environmental Permit for a mobile crushing operations.
- Licence for demolition of buildings.
- Section 61 agreement: under Section 61 of the Control of Pollution Act 1974, required to avoid significant construction noise and vibration effects.

Section 61

4.1.4 The contractor will seek to obtain consents from the relevant local authority under Section 61 of the Control of Pollution Act 1974 for the proposed construction works, excluding non-intrusive surveys. Applications will be made to the relevant local authority for a Section 61 consent at least 28 days before the relevant work is due to start, or earlier, if reasonably practicable.

4.1.5 The application for a Section 61 consent will require noise (and where appropriate vibration) assessments to be undertaken and BPM measures set out to manage noise associated with construction of the scheme.

4.2 Other Control Measures

Noise Insulation and Temporary Rehousing Policy

4.2.1 The contractor shall offer noise insulation or temporary re-housing to qualifying parties when:

a) noise levels are predicted or measured by the contractor to exceed the relevant trigger level (as defined in BS 5228-1, Table E.2) for at least ten days out of any period of 15 consecutive days or alternatively 40 days in any six month period at affected properties.

b) the property complies with all other requirements of the Noise Insulation Regulations 1975 (as amended).
c) the property is lawfully occupied as a permanent dwelling.
d) noise insulation does not already exist that is of an equivalent standard to that which would be allowed for under the Noise Insulation Regulations 1975 (as amended).

4.2.2 The contractor shall consider all applications supported by evidence for noise insulation or temporary rehousing from occupiers who may have special circumstances. Special circumstances could include night workers, those working in home occupations, local businesses or buildings that provide community facilities requiring a particularly quiet environment and those with a medical condition which will be seriously aggravated by construction noise, and provide noise insulation or temporary re-housing where it is demonstrated that this is necessary.

4.2.3 The contractor shall inform the Council(s) and owners / occupiers should it be identified that noise insulation or temporary re-housing is required.

4.2.4 Highways England/employer's representative will assess noise levels following the opening of the scheme to traffic. Noise insulation would be offered under Regulation 6 of the Noise Insulation Regulations 1975 (as amended) where the eligibility criteria are met for operational traffic noise, including provisions b to d above. This mitigation offer would apply to dwellings identified in ES Chapter 11: Noise and Vibration (Document Reference 6.2) as subject to significant adverse indirect effects above the SOAEL located beyond 600m from the scheme (although this is beyond the usual NIR eligibility distance from the scheme).

National Star College – construction noise mitigation provisions

4.2.5 National Star College is an educational facility for young people with complex disabilities and therefore is considered especially sensitive to noise. With windows closed, internal noise levels within teaching spaces are likely to be acceptable throughout the construction period, although with windows open for ventilation, there is more potential in some spaces for disturbance. The contractor shall offer mechanical ventilation for particularly noise sensitive rooms based upon a review, with the College, of the potential for disturbance from construction works at those locations relative to ambient noise sources. Mechanical ventilation would ensure that windows could be closed at times that construction noise is intrusive. This will ensure that appropriate noise levels would be achieved.

4.2.6 Further studies will be carried out, in agreement with the College, to determine, in more detail, the construction noise levels at those most noise sensitive rooms to inform this process. Based on this review, the appropriate noise mitigation installations described above would be carried out before the relevant construction works commence.

4.3 EMP (Construction) Management Plans

4.3.1 The contractor shall prepare Management Plans for certain environmental topic areas as the detailed design is developed, to include at least the following plans:

- Emergency Preparedness and Response Plan (minimum requirements described in Annex G Ground and Surface Water Management Plan).
- Pollution Prevention and Control Management Plan (minimum requirements described in Annex G Ground and Surface Water Management Plan).

- Arboricultural Method Statement and Tree Protection Plan.
- Invasive Species Management Plan (if shown as required through measures in Annex D Landscape and Ecological Management Plan).
- Noise and Vibration Management Plan.
- Air Quality Management Plan.
- Soils Management Plan.
- Woodland Management Plan.

4.3.2 These plans shall be inserted into the EMP (construction) as annexes.

4.3.3 The plans shall be prepared in consultation with the relevant regulatory organisation, relevant planning authority and the local highway authority and submitted to and approved in writing by the Secretary of State.

4.3.4 A brief outline of the minimum requirements that need to be included and described further in these additional management plans is provided as follows.

Arboricultural Method Statement and Tree Protection Plan

4.3.5 Tree surveys have been undertaken and a Tree Protection Plan is included in ES Appendix 7.6 Arboricultural Impact Assessment (Document Reference 6.4). This plan would be updated in accordance with L13 in Table 3-2 and draft DCO Requirement 5 (Document Reference 3.1). This should follow requirements described in guidance for British Standard 5837:2012.

Noise and Vibration Management Plan

4.3.6 The Noise and Vibration Management Plan will include management and monitoring processes to ensure as a minimum:

- Integration of noise control into the preparation of method statements.
- Ensuring proactive links between noise management activities and community relations activities.
- Preparing details of site hoardings, screens or bunds that will be put in place to provide acoustic screening during construction, together with an inspection and maintenance schedule for such features.
- Developing procedures for the installation of noise insulation (if deemed to be required under NV 6 in Table 3-2 or provision of temporary re-housing and to ensure such measures are, where required, in place as early as reasonably practicable.
- Preparing risk assessments to inform structural surveys of buildings and structures which may be affected by vibration from construction.
- Developing a noise and vibration monitoring protocol including a schedule of noise and vibration monitoring locations and stages during construction of the scheme when monitoring will be undertaken.
- Preparing and submitting Section 61 consent applications.
- Identifying likely noisy activities in the construction programme, the proposed noise mitigation measures, and a strategy for actively communicating this information to local communities.
- Undertaking and publishing all monitoring required to ensure compliance with all acoustic commitments and consents.
- Implementing management processes to ensure ongoing compliance, improvement, and rapid corrective actions to avoid any potential non-compliance.

Air Quality Management Plan

4.3.7 The Air Quality Management Plan will comprise, as a minimum, further details describing:

- Best practical means for site management.
- Measures to limit emissions from construction plant and vehicles.
- Measures to limit pollution from transportation, storage, and handling of materials.
- Measures to manage dust from haul roads.
- Measures to limit dust pollution from demolition activities.
- Measures to limit dust pollution from excavations and earthworks activities.
- Measures to limit dust pollution from drilling activities.
- Measures to limit dust pollution from processing, crushing, cutting, and grinding activities.
- Monitoring of dust and the recording of inspection results.

Soils Management Plan

4.3.8 The Soils Management Plan will include the following as a minimum:

- Undertaking a soil survey and soil record of condition.
- Works would be undertaken in compliance with the Defra Construction Code of Practice for the Sustainable Use of Soils on Construction Sites[8].
- The source of imported topsoil and subsoil would be investigated carefully with respect to its suitability for the intended use.
- Should imported soils be required, these would require verification prior to use within the scheme.
- Soil sampling, testing and assessment would be defined in an earthworks specification for the construction works. This specification would be prepared in accordance with the Specification for Highway Works, Series 600 Earthworks.
- The Soil Management Plan would detail the areas and type of topsoil/subsoil to be stripped, stripping method, haul routes and the management of the soil stockpiles. This would ensure high standards in the handling, storage and reinstatement of soils during construction.
- Topsoil would be handled only in the appropriate conditions of weather and soil moisture, and with suitable machinery in line with the Defra Construction Code of Practice.
- Topsoil excavated from areas of known high quality agricultural land would be stored separately and, where possible, reused on-site in areas that would be returned to agricultural use.
- The stockpiling of soils would be avoided whenever possible. Where stockpiling is unavoidable, heaps would be tipped loosely and the surface firmed and shaped to shed water. Where soils are to be stockpiled for more than six months the surface would be seeded with a grass/ clover seed mix.
- Where possible, topsoil would be re-used on site as applicable.
- Any soils that do not meet chemical acceptability criteria would be treated or disposed of to a suitably licenced facility.
- A watching brief would be developed to enable unforeseen ground conditions to be addressed if or when encountered on site.
- The movement of traffic would be confined to designated haul routes to reduce the amount of heavy machinery going over soil materials which could

cause compaction of soil materials. Such routes would exclude areas of proposed landscaping.
- Following completion of construction, all temporary facilities would be removed, and the soil reinstated in accordance with the agreed end use for the land.

Woodland Management Plan

4.3.9 Subject to landowner agreement, a Woodland Management Plan would be prepared by the contractor to implement conservation-led woodland management measures to areas of Ullen Wood during operation of the scheme.

4.3.10 The Woodland Management Plan would improve the woodland structure, creating variation of light conditions in the woodland and increasing diversity of the ground flora. This will be achieved through introduction of conservation-led woodland management measures to areas of impacted woodland.

4.3.11 The Woodland Management Plan would include descriptions of the following measures as a minimum:

- Selective thinning of trees - taking natural ash dieback/ related felling into account.
- Rotational coppicing of hazel.
- Erection of deer exclusion fencing.

4.4 EMP (Construction) Environmental Method Statements

4.4.1 The contractor shall prepare Environmental Method Statements for environmental topic areas at detailed design (for example site clearance) for construction and operation, as required. Commitments to produce specific method statements are included in the REAC.

5 Environmental asset data and as built drawings

5.1 Highways England Asset Data Management Manual (ADMM)

5.1.1 The Asset Data Management Manual (ADMM) sets out Highways England's asset data requirements to achieve both its corporate objectives as well as its asset management objectives. It brings clarity and consistency to reflect asset data needs and is revised every six months to accommodate changes and expansion to the business needs.

5.1.2 The ADMM contains the company's asset data requirements to ensure the company collects and maintains the asset data it needs to operate safely and efficiently. It is for use by anyone creating, maintaining, or using data on behalf of or within Highways England. It is composed of four documents:

- Part 1 - Data Principles and Governance[9] - defines the approach to, associated governance for, asset data management.
- Part 2 - Requirements and Additional Information[10] - provides Highways England's requirements for asset data management, detailed guidance, information, and descriptions of each asset type; providing visual examples.
- Part 3 - Data Dictionary[11] - defines the structure and rules for individual assets and attributes.
- Part 4 - Asset Inventory Selector[12] - includes a tool to assist in identifying and recording specific assets.

5.2 Collection and submission of environmental data

5.2.1 Environmental data is categorised as either **Environmental Inventory** or **Environmental Management Information** which together provide key detail on the composition of the soft estate, what condition those assets are in and how they should be managed.

5.2.2 Environmental inventory data describes each environmental asset in terms of what it is, where it is and what it does; environmental management information data details the asset's maintenance requirements, as well as its performance and condition. The environmental inventory establishes the baseline upon which environmental management information can be attached. Therefore, environmental management information can only be submitted once the corresponding asset has been recorded via the submission of environmental inventory data.

Environmental Inventory Data

5.2.3 The environmental inventory contains data collected by Major Projects and should include details relating to the following environmental topics:

- Landscape.
- Biodiversity.
- Cultural Heritage.
- Noise.

5.2.4 Submissions of environmental inventory asset data should be broken down by point/line/polygon feature into geographic information system (GIS) tables.

5.2.5 For details on the submission of environmental inventory asset data, reference should be made to section 13.4 Environmental Inventory Data of ADMM Part 2 - *Requirements and Additional Information*[13].

Environmental Management Information

5.2.6 Environmental Management Information (EMI) is specific data attached to individual assets and assists in informing Highway England and their contractors of the broad environmental management requirements of the strategic road network, and corresponding environmental performance.

5.2.7 For details on EMI, reference should be made to section 13 of ADMM Part 2 - *Requirements and Additional Information*[13].

Environmental data submission

5.2.8 At this stage of the project, environmental data is submitted through the publication of the ES as part of the DCO Application. This includes the submission of all species surveys results undertaken to inform the ES.

5.2.9 Surveys undertaken to inform the ES are provided in ES Appendices 8.1 to 8.25 (Document Reference 6.4) as pdfs and include the following:

- Appendix 8.1 Phase 1 Habitat Survey.
- Appendix 8.2 Hedgerow Technical Report.
- Appendix 8.3 National Vegetation Classification (NVC) Woodland Survey.
- Appendix 8.4 Botanical Assessment.
- Appendix 8.5 Bat Roost Surveys Technical Report CONFIDENTIAL.
- Appendix 8.6 Bat Activity Survey Report.
- Appendix 8.7 Bat Crossing Point Survey Report.
- Appendix 8.8 Bat Advanced Survey Techniques Report CONFIDENTIAL.
- Appendix 8.9 Badger Survey Report CONFIDENTIAL.
- Appendix 8.10 Breeding Bird Technical Report.
- Appendix 8.11 Wintering Bird Survey Report.
- Appendix 8.12 Stage 1 & 2 Barn Owl Survey Report CONFIDENTIAL.
- Appendix 8.13 Stage 3 Barn Owl Survey Report CONFIDENTIAL.
- Appendix 8.14 Dormouse Survey Report.
- Appendix 8.15 Great Crested Newt Survey Report.
- Appendix 8.16 Reptile Survey Technical Report.
- Appendix 8.17 Otter Technical Report.
- Appendix 8.18 Water Vole Technical Report.
- Appendix 8.19 White-Clawed Crayfish Technical Report.
- Appendix 8.20 Terrestrial Invertebrate Survey Report.
- Appendix 8.21 Roman Snail Survey Report 2019.
- Appendix 8.22 Aquatic Invertebrate Survey Report.
- Appendix 8.23 River Habitat Survey and Fish Habitat Assessment Report.
- Appendix 8.24 Assessment of Tufaceous Vegetation.
- Appendix 8.25 Tufa-forming springs: selection of potential compensation sites.

5.2.10 AutoCAD dwgs and GIS shapefiles would be provided following detailed design for incorporation into Highways England Environmental Information System (EnvIS).

5.2.11 For details on the submission of EMI, reference should be made to section 13.5 Submission of Data of ADMM Part 2 - Requirements and Additional Information.

6 Details of maintenance and EMP monitoring activities

6.1 Environmental records inspections

6.1.1 This section describes systems of recording and inspections that will be required to maintain an audit trail of the environmental obligations. This will be managed through the Quality and Safety Management Systems (QMS) and the Environmental Management System (EMS) of the contractor which will be certified in line with the ISO 14001 standards.

6.1.2 The system would 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 lifetime of the scheme through the corrective action system managed by the contractor.

6.1.3 The contractor's Project Quality Administrator will ensure there is a central filing system in place for any checklists, reports and monitoring consistent with the Project QMS and EMS. Records of compliance with the requirements of the EMP, derived from audits and other inspection by representatives of any internal or external audit teams.

6.2 Daily inspection check list

6.2.1 The contractor as site owner will ensure environmental mitigation and staff responsibilities are made clear to site managers, sub-contracted staff and site supervisors. This would be managed through site inductions and specialist training as required. The contractor will make key staff aware of their responsibilities for undertaking daily routine checks of the site and equipment. It will be essential that the contractor has processes and protocols in place for environmental aspects to be checked. The contractor will insert their standard inspection forms and checklists that are associated with their internal EMS into the EMP appendices for information.

6.2.2 Once inspection and daily checks have been completed, they will be logged and corrective actions implemented by the delegated site manager in discussion with the contractor. The log will be reviewed as part of Highways England's checking and audit role.

6.3 Procedures to monitor compliance

6.3.1 An overall project record will be required for formal records associated with implementation of the EMP. This should be managed and controlled within the standard Project Control Framework (PCF) project filing systems.

Administration

6.3.2 The contractor 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 annexes to the EMP are 'living documents'. The environmental records are to be scanned and filed electronically or filed in a hard copy as part of the EMS (subject to the contractor's internal filing systems). In the case of overlap with Health, Safety, Environment and Quality (HSEQ) files, these

will be cross referenced within the updated EMP back to HSEQ files held by the contractor for any formal auditors to track and monitor compliance. This will most likely be in the case of handling and disposal of hazardous or contaminated waste and any chemicals and specialist materials subject to Control of Substances Hazardous to Health (COSHH) regulations.

Quality management – environmental audit

6.3.3 As part of the 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, EMP, and site-specific method statements. The review of monitoring, recording, and reporting procedures will be included, being maintained by the contractor throughout the scheme.

6.3.4 For completeness, an auditor can only review and take account of the environmental information available at the time of audit. The outcome of an audit is to identify environmental progress of the project and to issue a formal record in the form of an audit report. Issues will be raised and dealt with at the time, or, a corrective action request will be made for actions to be undertaken with a reasonable and timely manner.

Environmental management systems

6.3.5 Contractors are required to be accredited or seeking to be accredited under ISO 14001. This indicates an understanding of implementation of an EMS for recording, monitoring, and managing the scheme. The EMS will be maintained throughout the scheme.

6.3.6 The level of environmental management would be monitored to assess compliance with the contract and environmental standards through inspections and audits. Subject to contract arrangements, the responsibility for maintaining correspondence and day-to-day records will rest with the contractor. Original copies of correspondence and record copies of issued documentation would be recorded, together with records of subsequent charges. Copies are to be kept on site and circulated to appropriate personnel for action or information only.

Control documents

6.3.7 Contractor Risk Assessments, Method Statements and COSHH forms must all consider environmental impacts and sensitivities in addition to health and safety concerns.

6.3.8 This section would be updated prior to construction by the appointed contractor to additionally include:

- Full details of monitoring and reviewing compliance with the EMP. For example, daily/weekly/monthly inspection/audit reports.
- Assessment criteria to identify success.
- Procedures for rectification of breaching or failings of EMP/EMS measures.

7 Induction, training and briefing procedures for staff

7.1 Introduction

7.1.1 The contractor will develop a programme of training on environmental issues prior to and during the construction stage. On commencement of site mobilisation, the contractor will be the site owner and responsible for site inductions and training of all personnel on the site, whether full time staff, subcontractors or visitors.

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

7.1.3 Specific training needs would be identified and provided for all personnel involved in work activities that could result in adverse impacts on the environment. Training would include reference to the importance of adhering to the contents of the EMP and the potential consequences of departure from specified method statements. Environmental training in the form of Toolbox Talks will also be undertaken on site, evidence of which would be maintained on record as part of the EMS.

7.1.4 Table 7-1 identifies an indicative programme of training on environmental issues relevant to the scheme. The list is not exhaustive and the contractor 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.

Topic	Personnel	Delivery	Delivery format
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 Contractor Site Induction Pack and PowerPoint Presentation (if applicable).
Tree root protection areas (RPAs)	All	Site induction	The Contractor Site Induction Pack and PowerPoint Presentation (if applicable).
Waste from Welfare units and offices – Sewage	All	Site induction	The 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 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 banksmen.	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 contractor will ensure all personnel conducting environmental tasks are suitably qualified and/or experienced for the roles and responsibilities that they are employed to undertake.

7.2.2 The contractor will monitor and record that all staff have attended the relevant environmental induction or training 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 contractor, prior to commencing work on site. This would introduce accountability for personnel working on the scheme. Environmental training at the induction will include, but not be limited to, the following:

- Company/project environmental policy.
- Site environment.
- Fuel containment.
- Earthworks and excavations (risks of exposing contamination).
- Pollution protocol and measures such as use of spill kits.
- Defined materials storage area (excavated and imported).
- Defined waste areas – domestic and construction materials.

- Wheel wash – road sweeping.
- Dust and emissions control.
- Noise control.
- Vibration control.
- Site traffic protocols and routes in the form of a Construction Traffic Management Plan – haul routes, staff travel to site plan.
- Warning signs.
- Site inspection and monitoring forms.
- Material procuremen.t
- Toolbox Talks where relevant to specific works.
- communication systems on site – dealing with the public, incident and near miss reporting inclusive of environment.
- Site organisation, key personnel responsibilities and contact details.
- Emergency Preparedness and Response Plan(s) for addressing safety and environmental issues.
- Contamination risk management.
- Update and maintain site specific Toolbox Talks or advisory sheets to the relevant project.

7.3.2 The list is not exhaustive and the contractor's Environment 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 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 a high standard of environmental management, implementing requirements in the EMP and other plans, EMS and associated best practice guidance, and reduce risks that could negatively impact on the environment.

7.4 Toolbox talks and induction supporting materials

7.4.1 The contractor and its subcontractors will establish a regime of Toolbox Talks such that every employee receives a health, safety and environmental briefing as appropriate. For subcontractors, their supervisors are responsible for conducting these briefings and their implementation would be monitored by the contractor. Records must be kept of toolbox talks carried out, and who attended them. Requests for new/specific Toolbox Talks can be made to the Environment Manager.

7.4.2 Toolbox Talks would also be posted within common use areas such as welfare units and office reception areas. Key environmental issues linked to the programme would be targeted on the daily notice board as an aide memoir to all staff on site. For example, seasonal environmental constraints such as bird nesting season.

8 Glossary

8.1.1 Table 8-1 provides definitions of the technical terms used in the Environmental Statement (Document Reference 6.2) and this EMP.

8.1.2 For a list of all terms used as defined terms within the EMP (Document Reference 6.4), and all the Applicant's other DCO Application documents, please refer to the Introduction to the Application (Document Reference 1.3).

Table 8-1 Glossary table

Glossary term	Description
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.
Affected Road Network (ARN)	Parts of the road network which are identified as likely to be affected by changes in air quality as a result of a project.
Air quality action plan	A plan that must be compiled by a local authority if they declare an air quality management area
Air quality exceedance	Where pollutant concentrations exceed an air quality standard.
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 Objective	Air quality 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*[14] for the key air pollutants.
Air Quality Plan	Statutory plan setting out the *UK Government's plan*[15] for reducing roadside nitrogen dioxide concentrations.
Air Quality Strategy (AQS)	The *Air Quality Strategy*[14] intends to provide a clear framework for improving air quality.
Ambient noise	A sound that is totally encompassing in a given situation at a given time usually composed of sound from many sources near and far.
Amenity	The relative pleasantness of a journey, or the ability of communities to achieve enjoyment and/ or quality of life.
Ancient trees	The Woodland Trust defines an ancient tree as one that has passed beyond maturity and is old, or aged, in comparison with other trees of the same species. There is no set age for a tree to be considered ancient, as different species age at different rates. Natural England note that ancient trees are exceptionally valuable and are defined by age, size, condition, biodiversity value (as a result of significant wood decay and the habitat created from the ageing process), cultural and heritage value.
Ancient woodland	Ancient woodland as defined by the Woodland Trust and Natural England are areas of woodland that have persisted since 1600 in England and Wales, and 1750 in Scotland. Ancient woodland includes:

Glossary term	Description
	• ancient semi-natural woodland mainly made up of trees and shrubs native to the site, usually arising from natural regeneration • plantations on ancient woodland sites - replanted with conifer or broadleaved trees that retain ancient woodland features, such as undisturbed soil, ground flora and fungi.
Ancient Woodland Inventory (AWI)	A Natural England data base of ancient woodland. The inventory identifies over 52,000 ancient woodland sites in England. Ancient woodland is identified using presence or absence of woods from old maps, information about the wood's name, shape, internal boundaries, location relative to other features, ground survey, and aerial photography.
Annex I Habitat Types	A natural habitat listed in Annex I of the Habitat Directive, for which Special Areas of Conservation can be designated under the Habitat Regulations.
Annex II species	A species listed in Annex II of the Habitat Directive, for which Special Areas of Conservation can be designated under the Habitat Regulations.
Annual Average Daily Traffic (AADT)	A measure used in transportation engineering and is the number of vehicles that will use a new or improved road on an average day.
Annual Average Weekday Traffic	The average 24-hour traffic volume occurring on weekdays throughout a full year
Annual Average Weekly Traffic	Traffic data obtained by calculating weekly traffic flows and then calculating the annual average. Often used in predicting noise levels and air quality, usually in conjunction with other parameters such as average vehicle speed and percentage heavy vehicles.
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.
Aquifer	An underground layer of water-bearing permeable rock, rock fractures or unconsolidated materials (gravel, sand or silt).
Area of Outstanding Natural Beauty (AONB)	Area of Outstanding Natural Beauty is land protected by the Countryside and Rights of Way Act 2000 (CROW Act). It protects the land to conserve and enhance its natural beauty.to conserve and enhance its beauty[16].
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
Baseline conditions	The environment as it appears (or would appear) immediately prior to the implementation of the scheme together with any known or foreseeable future changes that will take place before completion of the scheme.

Glossary term	Description
Baseline scenario	A description of the current state of the environment without implementation of the project.
Base year	Reflects the year which the data has been collected.
Bedrock	Rock that underlies loose deposits such as soil or alluvium.
Best and most versatile land	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.
Biodiversity	The biological diversity of the earth's living resources. The total range of variability among systems and organisms at the following levels of organisation: bioregional, landscape, ecosystem, habitat, communities, species, populations, individuals, genes and the structural and functional relationships within and between these different levels.
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.
British Geological Survey	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 Standards Institution (BSI)	A group which produces British Standards across industry sectors and which is formally designated as the National Standards Body for the UK.
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 structure.
Buried archaeology (or buried heritage)	An archaeological asset beneath ground level, which may include earthworks
Calculation of Road Traffic Noise (CRTN)	A technical memorandum[17] that describes the procedures for calculating noise from road traffic.
Carbon footprint	The total greenhouse gas emissions associated with a particular policy or development.
Carriageway	The width of a highway that can be used by motorised vehicles and non-motorised users, formed by a number of lanes.
Catchment	A drainage/basin area within which precipitation drains into a river system and eventually into the sea.
Chartered Environmentalist (CEnv)	A professional qualification obtained by knowledgeable, experienced, competent and committed environmental professionals.

Glossary term	Description
Climate	The climate can be described simply as the 'average weather', typically looked at over a period of 30 years. It can include temperature, rainfall, snow cover, or any other weather characteristic.
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.
Combined effect	A type of cumulative effect which occurs when different types of activity combine to have an effect on a specific receptor or resource.
Common Land	Common Land is defined as “any land subject to be enclosed under the Inclosure Acts 1845 to 1882…”. Common Land is also open access land under the under the CRoW Act unless there is evidence that the public have a right of access on foot for recreation by some other means. In addition, there is no right for use over common land by bicycle or on horseback unless that right has been specifically provided by the landowner.
Compensation (environmental)	Measures applied where nothing can be done to reduce an environmental impact or effect. An example is habitat and species relocation.
Competent expert(s)	The terms used in the EIA Regulations to describe a suitably qualified and experienced person (or persons) responsible for the preparation of the Environmental Statement, either whole or in part.
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.
Conceptual Site Model	Method used to manage identification of the various types of risk relating to contaminated land. The conceptual site model includes: categorisation of sources of contamination; categorisation of potential receptors; and identification of potential contamination pathways (i.e. linking sources to receptors).
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.
Construction and demolition waste	Consists of unwanted material produced directly or indirectly as a result of the construction phase.
Construction compound	Construction compounds will 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 top soil, and to facilitate transfer of materials to and from the site.
Construction plant	Portable construction machinery and equipment.
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.

Glossary term	Description
Controlled waters	These are fully defined in section 104 of the Water Resources Act 1991 and section 30A (d) of the Control of Pollution Act 1974. They include in summary: a) relevant territorial waters which extend seaward for three miles from the low-tide limit from which the territorial sea adjacent to England and Wales is measured; b) coastal waters from the low-tide limit to the high-tide limit or fresh-water limit of a river or watercourse; c) inland freshwaters: • natural and artificial lakes, ponds, reservoirs, rivers or watercourses above the fresh-water limit; • natural and artificial underground rivers and watercourses; • surface water sewers, ditches and soakaways that discharge to surface or groundwater; • it also includes those that may be currently dry; and d) groundwaters– any waters contained in underground strata.
Culvert	A tunnel (pipe or box shaped) that carries a stream or open drain under a road or railway.
Cutting	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.
Cumulative effects (or impacts)	Impacts that result from incremental changes caused by other present or reasonably foreseeable actions together with the project. A cumulative impact can arise as the result of: a) the combined impact of a number of different environmental factors-specific impacts from a single project on a single receptor/resource; and/or b) the combines impact of a number of different projects within the vicinity (in combination with the environmental impact assessment project) on a single receptor/resource.
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 definitive map is a map prepared by a surveying authority which is a legal record of the public's rights of way in one of four categories (footpath, bridleway, restricted byway or byway open to all traffic). If a way is shown on the map, then that is legal, or conclusive, evidence that the public had those rights along the way at the relevant date of the map (and has them still, unless there has been a legally authorised change). But the reverse is not true. So the showing of a way as a footpath does not prove that there are not, for example, additional unrecorded rights for horse-riders to use the way. Nor is the fact that a way is omitted from the definitive map proof that the public has no rights over it.[18]

Glossary term	Description
Deposition	The vertical passage of a substance (e.g. dust or nitrogen) to a surface or the ground.
Design development	The process in which technical specialists (engineers and environmentalists) refine the design for the various elements of a development project.
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 speed	The design speed is a tool used to determine geometric features of a new road design based on the anticipated vehicle speeds on the road.
Designer	The organisation commissioned to undertake the various stages of scheme preparation and supervision of construction. This includes specialist subconsultants brought in to advise on specific areas of assessment and mitigation.
Detailed assessment	Method applied to gain an in-depth appreciation of the beneficial and adverse consequences of the project and to inform project decisions. Detailed Assessments are likely to require detailed field surveys and/or quantified modelling techniques.
Diffusion tube monitoring	Diffusion tubes are a pollutant specific method of monitoring and measuring different pollutants, including measuring oxides of nitrogen (NOx). Diffusion tubes passively absorb the pollutant to which they are exposed in each place over a period, generally 2-4 weeks, and the tube is then returned to the laboratory for analysis.
Design year	The design year is a future year scenario 15 years after the Opening Year when mitigation measures are likely to have achieved their desired outcome. For this scheme it is 2041.
Do-minimum	The ‘do-minimum’ forecast scenario in the opening/design year is the base road and traffic network against which alternative improvements can be assessed. In many cases, the definition of the ‘Do-minimum’ is straight forward; it is simply the ‘Do-nothing’ scenario. However, one or more of the following four cases may arise, in which the ‘Do-minimum’ differs from the ‘Do-nothing’: a) The case where works will be carried out regardless of whether or not the ‘Do-something’ scheme is built. b) The case where the existing network may be improved to form a ‘Do-minimum scheme which can be tested as an alternative to carrying out major Do-something improvements. c) The case where traffic conditions can be improved without significant capital expenditure. d) The case where the area covered by the modelled network includes road proposals other than the one under immediate consideration.
Do-nothing	The Do-nothing forecasting scenario is simply the existing network without modification in the Opening/Design Year.

Glossary term	Description
Do-something	The 'Do-something' forecast scenario is the road proposal under consideration in the opening/design year.
Drinking Water Protected Area (DrWPA)	For definition see Safeguard Zones (surface water).
Dual Carriageway	A dual carriageway is a road with one, two or more lanes arranged within distinct carriageways with a separation between opposing flows of traffic.
Dust	All airborne particulate matter
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.
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).
Ecosystem	Biological community of interacting organisms (e.g. plants and animals) and their environment.
Effect	Term used to express the consequence of an impact (expressed as the 'significance of effect', which is determined by correlating the magnitude of the impact (or change) to the importance, value or sensitivity of the receptor or resource, in accordance with defined significance criteria).
Embankment	Artificially raised ground, commonly made of earth material, such as stone.
Embedded mitigation	Design measures which are integrated into a project for the purpose of avoiding or preventing adverse environmental effects.
Enhancement	A measure that is over and above what is required to avoid, mitigate, and compensate the adverse effects of a project.
Environment Agency Recorded Pollution Incidents	A record of pollution incidents to water, land and air held by the Environment Agency.
Environmental assessment	A method and process by which information about environmental effects is collected, assessed and used to inform decision-making.
Environmental/ Ecological Clerk of Works (ECoW)	Supports compliance with legislation and planning conditions but also provides advice and guidance throughout construction.
Environmental factors	1) Population and human health. 2) Biodiversity. 3) Land, soil, water, air and climate. 4) Material assets, cultural heritage, and landscape. 5) The interaction between the factors listed above.

Glossary term	Description
Environmental Management Plan (EMP)	The environmental management plan provides the framework for recording environmental risks, commitments and other environmental constraints and clearly identifies the structures and processes that will be used to manage and control these aspects. The EMP for the scheme is presented in ES Appendix 2.1 Environmental Management Plan (Document Reference 6.4). The various stages of the EMP are explained further in section 2.7 of ES Chapter 2 The project (Document Reference 6.2).
Environmental masterplan	The plans which illustrates the mitigation measures integrated into the design of the scheme ad presented in ES Figure 7.11 Environmental Masterplans (Document Reference 6.3).
Environmental Quality Standard (EQS)	Standards that have been developed with the aim to meet the requirements of the Water Environment (Water Framework Directive) (England and Wales) Regulations 2017.
Essential mitigation	Mitigation critical for the delivery of a project which can be acquired through statutory powers. These are measures required to reduce and if possible offset likely significant adverse environmental effects, in support of the reported significance of effects in the environmental assessment.
European Protected Sites	Sites which are protected by The Conservation of Habitats and Species Regulations 2017.
European Protected Species	Species of plants and animals (not birds) which are protected by the Habitats Regulations 2017.
Excavated material	Largely natural soil and rock material that is removed from the ground during construction.
Extended Phase 1 Survey.	A Phase 1 survey is a survey to collect and map habitat types within the survey area using the Joint nature conservation council habitat classification system which defines ninety specified habitat types and condition, using standard colour codes. An Extended Phase 1 Survey collects further data on habitat suitability for protected species to inform further survey or may include preliminary badger surveys for example, at the same time.
Favourable conservation status	The concept of Favourable Conservation Status (FCS) has a foundation in international wildlife conservation, notably the 1979 Bonn Convention on Migratory species (CMS). Achievement of FCS for a wider range of species and natural habitat types was subsequently incorporated as the explicit aim of the EU Habitats Directive. Natural England defines Favourable Conservation Status as the minimum threshold at which habitats and species in England can be considered to be thriving.
Fill	Material used to artificially raise the existing ground levels.
Flood Risk Assessment (FRA)	An assessment of the likelihood of flooding in a particular area so that development needs and mitigation measures can be carefully considered.
Flood Zone	Flood Zone definitions are set out in the Guidance: Flood risk and coastal change (2014) Ministry of Housing, Communities & Local

Glossary term	Description
	Government[19], and have been used to create a flood map for planning risk. There are 3 flood zones which refer to the probability of river and sea flooding, ignoring the presence of defences.
Flood Zone 1	Flood Zone 1: land outside the floodplain. There is little or no risk of flooding in this zone.
Flood Zone 2	Flood Zone 2: the area of the floodplain where there is a low to medium flood risk.
Flood Zone 3	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.
Forebay	Small basin that water from the drainage system will flow through providing treatment, before flowing into the larger basin.
Future baseline scenario	An outline of the likely evolution of the current state of the environment without implementation of the project.
Geomorphology	The study of landforms and the processes which create them.
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.
At grade junction	The meeting of two or more roads at the same level.
Grade separated junction	Roads crossing the carriageway pass at a different level, so as not to disrupt the flow of traffic. Slip roads connect the carriageway to the junction.
Greenhouse gases	Atmospheric gases such as carbon dioxide, methane, chlorofluorocarbons, nitrous oxide, ozone, and water vapour that absorb and emit infrared radiation emitted by the Earth's surface, the atmosphere and clouds.
Ground investigation (GI)	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	All water which is below the surface of the ground and within the permanently saturated zone.
Groundwater source protection zone (SPZ)	Areas defined by the Environment Agency and set out in *Guidance: Groundwater source protection zones* (SPZs) (2019)[20] which show the risk from contamination/pollution to groundwater that is extracted for drinking water.
H++ climate scenarios	The H++ climate scenarios are a set of plausible ‘high-end’ climate change scenarios which are typically extreme climate change scenarios on the margins or outside of the 10th to 90th percentile

Glossary term	Description
	range presented in the *UK Climate Projections 2009* (UKCP09). They cover the following climate hazards: heat waves, cold snaps, low and high rainfall, droughts, floods and windstorms.
Habitat	The natural home or environment of an animal, plant, or other organism.
Habitat of principal importance	Habitats in England identified as requiring action in The UK Post-2010 Biodiversity Framework[21] and which are regarded as having biodiversity conservation priorities.
Habitat Suitability Index (HSI)	The Habitat Suitability Index (HSI) for the great crested newt was developed by Oldham et al. (2000). HIS scoring systems were originally developed by the US Fish and Wildlife Service as a means of evaluating habitat quality and quantity. An HSI is a numerical index, between 0 and 1. Values close to 0 indicate unsuitable habitat, 1 represents optimal habitat. The HSI for the great crested newt incorporates ten suitability indices, all of which are factors known to affect this species
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
Heavy duty vehicles (HDVs)	As HGVs with the inclusion of buses and coaches.
Heavy goods vehicles (HGVs)	Heavy Goods Vehicles, over 3.5 tonnes and includes rigid and articulate lorries.
Hectare	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.
Heritage at Risk Register	Historic England's register of historic sites most at risk and most in need of safeguarding for the future.
Highways England Water Risk Assessment Tool (HEWRAT)	A spreadsheet-based application used to determine whether highway runoff is likely to have an ecological impact on surface watercourses.
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.
Historic Landscape Characterisation (HLC)	A method of identification and interpretation of the varying historic character within an area that looks beyond individual heritage assets
Historic Landscape Character Area (HLCA)	A unit of landscape defined by particular features such as fields patterns, hedgerows, parkland, which when considered together can demonstrate the development of land-use over time.
HRA screening	The screening process in which Competent Authorities decide whether or not an Appropriate Assessment is required for a plan or project in accordance with the HRA Regulations 2017. This consideration should take into account the potential effects both of the plan/project itself and in combination with other plans or projects. Where the potential for

Glossary term	Description
	likely significant effects cannot be excluded, the Competent Authority must make an Appropriate Assessment of the implications of the plan or project for that site, in view the site's conservation objectives.
Hydrogeology	The nature, distribution and movement of groundwater in soils and rocks, including in aquifers.
Hydrological regime	The variations in the state and characteristics of a waterbody which ae regularly repeated in time and space and which pas through phases e.g. seasonal.
Hydromorphological	Water flow, sediment composition and movement, continuity (In rivers) and the structure of physical habitat.
Hwicce	A tribal kingdom in Anglo-Saxon England.
Hypocaust	Roman underfloor heating system.
Impact	Change that is caused by an action; for example, land clearing (action) during construction which results in habitat loss (impact).
Impact Risk Zone (IRZ)[22]	The Impact Risk Zones (IRZs) are a GIS tool developed by Natural England to make a rapid initial assessment of the potential risks to SSSIs posed by development proposals. They define zones around each SSSI which reflect the particular sensitivities of the features for which it is notified and indicate the types of development proposal which could potentially have adverse impacts. The IRZs also cover the interest features and sensitivities of European sites, which are underpinned by the SSSI designation and "Compensation Sites", which have been secured as compensation for impacts on European/Ramsar sites.
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	According to Regulation 7(4) of the Landfill Regulations 2002, inert waste is waste that: • Will not undergo any significant physical, chemical or biological transformations. • Will not dissolve. • Will not burn. • Will not physically or chemically react. • Will not biodegrade. • Will not 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. • Has insignificant total leachability and pollutant content • Produces a leachate with an ecotoxicity that is insignificant (if it produces leachate).
International designated site	The generic term used to describe the following designated sites: • Special Areas of Conservation (SACs) and Special Protection Areas (SPAs).

Glossary term	Description
	• Sites that are in the process of designation as SACs and SPAs - these are known as proposed SACs, candidate SACs, potential SPAs and Sites of Community Importance (SCIs), depending on the type of designation and point of progression through the designation process; and Ramsar Sites.
Invasive species	Non-native UK plants that are invasive, for example Japanese Knotweed.
Junction	A place where two roads meet, regardless of design or layout.
Key characteristics (landscape)	The combination of elements that are particularly important to the current character of the landscape and help to give an area its particularly distinctive sense of place.
Landscape character area	Distinct, recognisable and consistent patterns of elements and activity that make one landscape different from another. Note these can be a combination of landscape, biodiversity, geodiversity and economic activity that follow natural, rather than administrative, boundaries.
Landscape elements	Broad classification types of component parts of the landscape with specific requirements or management needs to achieve their longer-term objectives. These can be subdivided according to their detailed design or management needs relating to their function.
Land Use	What land is used for, based on broad categories of functional land cover, such as urban and industrial use and the different types of agriculture and forestry.
Legislation	All references to legislation are to the legislation as amended and in force on the date of the document.
Limit Value (LV)	A maximum pollutant concentration to be achieved in the atmosphere, either without exception or with a permitted number of exceedances. Limit Values are implemented in United Kingdom legislation.
Link	A section of road between two junctions.
Listed building	A building which is considered to be of special architectural or historic interest and listed in accordance with the Town and Country Planning (Listed Buildings and Conservation Areas) Act 1990.
Local Air Quality Management	A key part in the UK Government's and the Devolved Administrations' strategies to achieve the National air quality objectives of the Air Quality Strategy[14].
Local authorities	An administrative body in local government
Local Authority Pollution Prevention Controls	Local authorities who regulate businesses are usually district or borough councils. If an area has only one council (a unitary council) then that's the regulator. The Port Health Authority may be the regulator in port areas. This guidance helps local authorities: • follow statutory guidance under regulation 64 of the Environmental Permitting Regulations (EPR); and

Glossary term	Description
	• understand the EPR's main functions, procedures and terminology[23].
Local Geological Site	Non-statutory geological sites considered worthy of protection for their earth science or landscape importance. Formerly known as Regionally Important Geological Sites.
Local Nature Reserves	A statutory designation made under Section 21 of the National Parks and Access to the Countryside Act 1949 by principal local authorities. They are places with wildlife or geological features that are of special interest locally.
Local planning authority	The local authority or council that is empowered by law to exercise planning functions.
Local Wildlife Site	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.
Lowest Observed Adverse Effect Level (LOAEL)	This is the level of noise above which adverse effects on health and quality of life can be detected.
Main river	A river maintained directly by the Environment Agency. They are generally larger arterial watercourses.
Mainline	The carriageway carrying the main flow of traffic, generally traffic passing straight through a junction or interchange.
Major events	Major accidents and disasters
Material assets	Construction materials and products (from primary (natural assets), recycled or secondary and renewable sources) and built assets such as landfill capacity and mineral safeguard sites and/or peat resources.
Mineral safeguarding areas	Areas defined by mineral planning authorities with known mineral resources that are of identified economic or conservation value.
Mitigation	Measures intended to avoid, reduce and, where possible, remedy significant adverse environmental effects.
Modelling	The process of estimating changes within an area of interest under a specific set of conditions.
Monitoring	A continuing 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.
Motorway Incident Detection and Automatic Signalling (MIDAS)	MIDAS systems enable Highways England to constantly monitor traffic flow across vital routes. MIDAS spots early warning signs of traffic build-up and intervenes to reduce the risk of serious congestion.
Multi-stage treatment train	A sequence of drainage components that collect, store, convey and treat runoff through the site. The sequence of components provides

Glossary term	Description
	processes to manage the frequency, the rates and volumes of runoff, and reduce the concentrations of contaminants to acceptable levels.
National Character Area (NCA)	Areas of England defined by their unique combination of landscape, biodiversity, geodiversity, history and cultural an economic activity.
National Cycle Network (NCN)	The National Cycle Network is a series of safe, traffic-free paths and quiet on-road cycling and walking routes that connect to every major town and city.
National Pond Survey	This is a national scheme to develop a classification of ponds in Britain based on the composition of their plant and macroinvertebrate communities.
National Vegetation Classification (NVC)	A comprehensive classification and description of the plant communities of Britain, administered by the Joint Nature Conservation Committee
Nitrate Vulnerable Zones	Areas designated as being at risk from agricultural nitrate pollution[24].
Noise barrier	A solid construction that reduces unwanted sound. It may take many forms including: engineering cutting; retaining wall; noise fence barrier; landscape earthworks; a 'low level' barrier on a viaduct; a parapet barrier on a viaduct; or any combination of these measures. Also called an attenuation barrier.
Noise Important Areas	These areas provide a framework for the local management of the Important Areas.
Noise sensitive receptor	These comprise mainly residential buildings, but also include educational buildings, hospitals and places of worship.
Non-hazardous waste	Any waste not defined as 'hazardous' under Directive 91/689/EEC. Examples include soils from ground/site clearance and demolition wastes
Non-Technical Summary (NTS)	Information for the non-specialist reader to enable them to understand the main predicted environmental effects of the proposal without reference to the main Environmental Statement.
NO_x	Oxides of Nitrogen – which encompasses all nitrogen species although mainly NO and NO_2.
Opening year	The opening year when the scheme is to become operational, i.e. open to traffic is 2026.
Operational	The functioning of a project on completion of construction
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 (OS)	The national mapping agency for the UK.
Parish Council	A parish council is a civil local authority found in England and is the lowest tier of local government. They are elected corporate bodies,

Glossary term	Description
	have variable tax raising powers, and are responsible for areas known as civil parishes, serving in total 16 million people.
Particulate matter (PM)	Discrete particles in ambient air, with diameters ranging between nanometres (billionths of a metre) to micrometres (millionths of a metre).
Pathways	The routes by which pollutants are transmitted through air, water, soils, plants and organisms to their receptors
Phase 1 habitat survey	A habitat classification and field survey technique to record semi-natural vegetation and other wildlife habitats.
Photomontage	Inserting an image of a proposed development onto a photograph for the purposes of creating an illustrative representation of potential changes to existing views.
Phytobenthos	Benthic organisms that are plants or algae.
PM10	PM10 Particulate matter with a diameter of 10 microns or less
Pollution Climate Mapping (PCM)	A collection of models designed to report on the concentrations of particular pollutants in the atmosphere. These models are run by Ricardo Energy & Environment on behalf of Defra. The PCM Model is used to produce background maps, 1x1 km grids of pollutant concentrations, for the UK.
Portable Antiquities Scheme	The Portable Antiquities Scheme is a partnership project which records archaeological objects found by the public in order to advance understanding of the past.
Preliminary Sources Study Report (PSSR)	Reports the geotechnical implications for the feasibility of all project options.
Principal aquifer	These are layers of rock or drift deposits that have high intergranular and/ or fracture permeability – meaning they usually provide a high level of water storage. They may support water supply and/ or river base flow on a strategic scale. In most cases, principal aquifers are aquifers previously designated as major aquifer.
Priority habitat	Priority habitats are taken as principal habitats for the conservation of biodiversity listed under Section 41 of the Natural Environment and Rural Communities Act 2006.
Protected species	Species of wild plants, birds and animals which are afforded protection through legislative provisions.
Public right of way (ProW)	A way over which the public have a right to pass and repass. The route may be used on foot, on (or leading) a horse, on a pedal cycle or with a motor vehicle, depending on its status. Although the land may be owned by a private individual, the public may still gain access across that land along a specific route
Qualitative	Qualitative research is a scientific method of observation to gather non-numerical data.

Glossary term	Description
Quantitative	Quantitative data is any data that is in a numerical form such as statistics or percentages.
Ramsar Sites	Wetland of international importance
Reasonable alternatives	Different project design, technology, location, size and scale solutions considered by the developer.
Receptor	A defined individual environmental feature usually associated with population, fauna and flora that has potential to be affected by a project.
Record of Environmental Actions and Commitments (REAC)	The REAC forms part of the Environmental Management Plan (EMP) and defines the environmental actions and commitments which have been identified and developed to mitigate the scheme's environmental effects. The actions and commitments contained within the REAC are considered to be in place within the ES assessments
Red List /Red data book	The International Union for Conservation of Nature (IUCN) Red List of Threatened Species (also known as the IUCN Red List or Red Data Book), founded in 1964, is the world's most comprehensive inventory of the global conservation status of animal, plant and fungi species It uses a set of criteria to evaluate the extinction risk of thousands of species and subspecies.
Regionally Important Geological Sites (RIGS)	Locally designated sites of importance for geodiversity[25].
Registered Parks and Gardens	Designed landscapes that are considered to be of national importance are included on The Register of Parks and Gardens of Special Historic Interest in England. The register is maintained by Historic England.
Remediation	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.
Representative concentration pathways (RCP)	*UK Climate Projections 2018*[26] is a climate analysis tool that uses a range of possible scenarios, classified as Representative Concentration Pathways (RCPs), to inform differing future emission trends. These RCPs "… specify the concentrations of greenhouse gases that will result in total radiative forcing increasing by a target amount by 2100, relative to preindustrial levels."
Residual effect	The predicted consequential change on the environment from the impacts of a development after mitigation.
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.
Riparian	Relating to or situated on the banks of a river

Glossary term	Description
Risk assessment	An assessment of the probability of a hazard occurring that could result in an impact.
River Basin Management Plan (RBMP)	*River basin management plans* (RBMPs)[27] set out how organisations, stakeholders and communities will work together to improve the water environment
River Habitat Survey	River Habitat Survey (RHS) is the Environment Agency standard for collecting data on the physical character and quality of river habitats across the UK
River Habitat Survey database	This database provides survey details and summary results for river habitat surveys carried out from 1994 to present. This database is a subset of AfA286 River Habitat Survey. Since 1994 approximately 19,000 surveys have been carried out in England. The bulk of surveys were carried out between 1994 to 1997 and 2006 to 2008. Surveys are still carried out for specific drivers, for example assessing habitat availability and Water Framework Directive. Software such as RHS Toolbox, which is underpinned by the dataset, can be used to analyse new RHS survey data in context by comparing results to those recorded at 150 of the most similar site selected automatically from the database.
Rochdale Envelope	An approach to consenting and environmental impact assessment, named after a UK planning law case, which allows the promoters of development projects to broadly define their schemes within agreed parameters to retain flexibility of design[28].
Roundabout	A circular, one-way junction at which other roads meet and terminate.
Runoff	The flow of water over the ground surface.
Safeguard Zones (surface water)	Catchment areas upstream of ‘at risk’ Drinking Water Protected Areas (DrWPAs) that influence the water quality in the immediate DrWPA are being delineated by the EA and water companies. The ‘at risk’ DrWPAs and Safeguard Zones are where action to address water contamination will be targeted, so that extra treatment by water companies can be avoided. All Safeguard Zones have yet to be fully delineated, or those that are almost complete may be subject to refinement.
Schedule 5 of WCA	Schedule 5 lists Animal Species that are protected under Section 9 of the Wildlife and Countryside Act. Section 9 prohibits the intentional killing, injuring or taking of the species listed in Schedule 5 and also prohibits their possession and the trade in the wild animals listed. The species listed are also further protected from disturbance by prohibiting actions that affect places they use for shelter.
Schedule 9 of the WCA	Schedule 9 lists non-native species of plants and animals to which Section 14 of the Wildlife and Countryside Act 1981 applies. These are species that are already established in the wild, but which continue to pose a conservation threat to native biodiversity and habitats, such that further releases or spread should be regulated
Scheduled Monument	A scheduled monument is a historic building or site that is included in the Schedule of Monuments kept by the Secretary of State for Culture,

Glossary term	Description
	Media and Sport under the regime set out in the Ancient Monuments and Archaeological Areas Act 1979.
Scoping	The process of considering the information required for reaching a (reasoned) conclusion on the likely significant effects of a project on the environment.
Scoping opinion	A written opinion of the relevant consenting authority, following a request from the applicant, as to the information to be provided in the Environmental Statement.
Scoping report	A report which records the outcomes of the scoping process and is typically submitted as part of a formal request for a scoping opinion.
Screening	The formal process undertaken to determine whether it is necessary to carry out a statutory Environmental Impact Assessment and publish an Environmental Statement in accordance with the EIA Regulations.
Secondary A aquifer	These are 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.
Secondary B aquifer	These are predominantly lower permeability layers which may store and yield limited amounts of groundwater due to localised features such as fissures, thin permeable horizons and weathering. These are generally the water-bearing parts of the former non-aquifers.
Setting (cultural heritage)	The surroundings in which a heritage asset is experienced. Its extent is not fixed and may change as the asset and its surroundings evolve. Elements of a setting may make a positive, negative or neutral contribution to the significance of an asset and may affect the ability to appreciate it.
Severance (land)	The splitting of a land holding into more than one part, for example through the introduction of a new section of road.
Severance (non-motorised users)	The perceived separation of residents from facilities and services they use within their community caused by new or improved roads, or by changes in traffic flows.
Significance (of effect)	A measure of the importance or gravity of the environmental effect, defined by significance criteria specific to the environmental topic.
Significant Observed Adverse Effect Level (SOAEL)	This is the level of noise above which significant adverse effects on health and quality of life occur.
Simple Assessment	Initial, brief assessment activity based on the assembly of data and information that is readily available, to fulfil one of the following functions: a) to address unknown aspects in the Scoping assessment level; b) to reach an understanding of the likely environmental effects to inform; c) the final design and assessment; or,

Glossary term	Description
	d) to reach an understanding of the likely environmental effects that identifies the need for a Detailed Assessment.
Site of Special Scientific Interest (SSSI)	A SSSI is a conservation designation notified under the Wildlife and Countryside Act 1981, denoting a protected area in the United Kingdom, designated due to special interest in its flora, fauna, geological or physiographical features. They are protected by law to conserve their wildlife or geology.
Source Protection Zone (SPZ)	Source Protection Zones ("SPZ")[29] show the risk of contamination from any activities that might cause pollution to groundwater sources such as wells, boreholes and springs used for public water supplies. The closer the activity, the greater the risk. SPZs can comprise of up to three main zones (inner, outer and total catchment). A fourth zone of special interest can also occasionally be applied to a groundwater source.
Span	The horizontal distance between two supports of a structure (e.g. piers of a bridge or viaduct).
Spatial	The geographic area over which environmental impacts and effects could occur as a result of a development project.
Special Area of Conservation (SAC)	A Special Area of Conservation is a site designated under the Conservation of Habitats and Species Regulations 2017[31]. These sites, together with Special Protection Areas (or SPAs), are called Natura sites and they are internationally important for threatened habitats and species.
Special Protection Area (SPA)	Special Protection Area are protected areas for birds in the UK classified under the Wildlife & Countryside Act 1981[30] and the Conservation of Habitats and Species Regulations 2017[31] .
Species of Principal Importance	Habitats and species of principal importance in England. Section 41 of the Natural Environment and Rural Communities (NERC) Act 2006 requires the Secretary of State to publish a list of habitats and species which are of principal importance for the conservation of biodiversity in England.
Stakeholder	An organisation or individual with a particular interest in a development project.
Statement of Common Ground (SoCG)	A written statement prepared jointly by the applicant and another party or parties, setting out any matters on which they agree. In some cases, statements of common ground will also identify areas where agreement has not been reached.
Statutory consultee	Organisations and bodies, defined by statute, which must be consulted on relevant planning matters
Study area	The spatial area within which environmental effects are assessed (i.e. extending a distance from the scheme footprint in which significant environmental effects are anticipated to occur).
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.

Glossary term	Description
Surface water	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.
Target Notes	Target notes are an outcome of the Phase 1 Habitat survey and provide a descriptive but brief account of particular area of interest. Target notes are displayed as a number on a Phase 1 habitat Map and in full in an accompanying report.
Temporal	The duration of time over which environmental impacts and effects could occur as a result of a development project.
Traffic	The total volume of vehicle traffic on a road flowing past a certain point over a year, divided by 365 days.
Transboundary effects	The term used to describe the significant environmental effects of a development project which extend beyond the boundary of the European Economic Area State within which it would be implemented.
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.
Transport Analysis Guidance (TAG)	Guidance[32] produced by the Department for Transport for undertaking transportation studies, appraisals and modelling. Also referred to as WebTAG.
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.
Tufaceous habitat (Tufa)	Tufa is an Annex 1 habitat for which Special Areas of Conservation can be designated under the Habitat Regulations. Tufa is a limestone habitat formed from calcium carbonate deposited by springs on which bryophyte habitat forms.
Underbridge (or underpass)	A bridge crossing under a transport corridor (e.g. a highway).
Unexploded ordnance	Unexploded ordnance, unexploded bombs, or explosive remnants of war are explosive weapons that did not explode when they were employed and still pose a risk of detonation, sometimes many decades after they were used or discarded.
Ullen Wood	Ullen Wood is designated ancient woodland and a local wildlife site.
Ullenwood	Ullenwood is a village in the Coberley civil parish, near Cheltenham in Gloucestershire to the north of the scheme.
Utilities	The term utilities can also refer to the set of services provided by these organisations consumed by the public: Coal, electricity, natural gas, water, sewage, telephone, and transportation. Broadband internet

Glossary term	Description
	services (both fixed-line and mobile) are increasingly being included within the definition.
Vehicle movement	A journey made by a vehicle. This can either be a one way or two way trip.
Vehicle restraint systems	System installed on a road to provide a level of containment for an errant vehicle such as a safety barrier.
Veteran trees	All ancient trees are veteran trees, but not all veteran trees are ancient. A veteran tree may not be very old, but it has decay features, such as branch death and hollowing. These features contribute to its biodiversity, cultural and heritage value.
Viewpoint	A place from which something can be viewed.
Visual amenity	The overall pleasantness of the views people enjoy of their surroundings, which provides an attractive visual setting or backdrop for the enjoyment of activities of the people living, working, recreating, visiting or travelling through an area.
Visual receptor	People who may have a view of a proposed development during construction or operation.
Waste	Waste is defined as per section 75(2) of the Environmental Protection Act 1990[33] as “any substance or object which the holder discards or intends or is required to discard."
Waste hierarchy	The “waste hierarchy” ranks waste management options according to what is best for the environment. It gives top priority to preventing waste in the first place. When waste is created, it gives priority to preparing it for re-use, then recycling, then recovery, and last of all disposal (e.g. landfill).
Waste local plan	A policy document produced by a local planning authority to provide further information in support of the implementation of waste planning policy.
Water Framework Directive (WFD)	The Water Environment (Water Framework Directive) (England and Wales) Regulations 2017 34 provide a system for monitoring and classifying the quality of surface and ground waters. The Regulations require that environmental objectives are set for all surface waters and groundwater, with deadlines by which the objectives should be achieved.
WebTAG	UK transport analysis guidance[32] that provides information on the role of transport modelling and appraisal.
Wildlife and Countryside Act 1981	An Act to repeal and re-enact with amendments the Protection of Birds Acts 1954 to 1967 and the Conservation of Wild Creatures and Wild Plants Act 1975; to prohibit certain methods of killing or taking wild animals; to amend the law relating to protection of certain mammals; to restrict the introduction of certain animals and plants; to amend the Endangered Species (Import and Export) Act 1976; to amend the law relating to nature conservation, the countryside and National Parks and to make provision with respect to the Countryside Commission; to

Glossary term	Description
	amend the law relating to public rights of way; and for connected purposes
World Health Organisation (WHO)	The World Health Organization is a specialized agency of the United Nations that is concerned with international public health.
Written Scheme of Investigation (WSI)	A Written Scheme of Investigation outlines known and potential archaeological features and deposits or built heritage elements on a site and suggests a structure for exploring them using the latest, most appropriate and cost-effective archaeological techniques.
Zone of Influence (ZoI)	The area for the assessment of combined effects. ZoIs are variable depending on the environmental factor being discussed.
Zone of Influence (ZoI) (Biodiversity)	The Zone of Influence for a project as defined by CIEEM is the area over which ecological features may be affected by biophysical changes as a result of the proposed project and associated activities. This is likely to extend beyond the project site, for example where there are ecological or hydrological links beyond the site boundaries. The ZoI will vary for different ecological features depending on their sensitivity to an environmental change.
Zone of Theoretical Visibility (ZTV)	This is the zone from which the scheme is theoretically visible over 'bare earth.'
Zone of Visual Influence (ZVI)	The area within which a project may be visible and may influence the quality of views. The 'zone of visual influence' approximately covers all land from which the scheme is visible. It is limited by topographic features such as hill and valleys and by visual barriers such as woodland and buildings.

Annexes

Annex A Environmental Constraints Plan

Annex B Construction Traffic Management Plan

Annex C Detailed Archaeological Mitigation Strategy and Overarching Written Schemes of Investigation

Annex D Landscape and Ecological Management Plan

Annex E Materials Management Plan

Annex F Public Rights of Way Management Plan

Annex G Ground and Surface Water Management Plan

Annex H Site Waste Management Plan

References

[1] Available at: https://www.standardsforhighways.co.uk/ha/standards/dmrb/vol11/section2/LA%20120%20Environmental%20management%20plans-web.pdf

[2] Available at: http://www.standardsforhighways.co.uk/ha/standards/dmrb/vol0/section2/GG%20182%20Major%20schemes_%20Enabling%20handover%20into%20operation%20and%20maintenance-web.pdf

[3] Highways England. LA 104, 'Environmental assessment and monitoring'

[4] The DCO would contain a Schedule of Requirements, which are in effect the conditions which govern how the scheme is to be delivered.

[5] Protective provisions contained within a DCO are designed to protect the interests of statutory bodies whose assets and facilities might be affected by the construction or operation of the project.

[vi] BS 8902:2009 Responsible sourcing sector certification schemes for construction products specification. October 2009.

[vii] Highways England, Transport Scotland, Welsh Government, and Department for Infrastructure, "Design Manual for Roads and Bridges CS 641 Managing the maintenance of highway geotechnical assets" 2020

[8] Defra, "Construction Code of Practice for the Sustainable Use of Soils on Construction Sites", 2009.

[9] Highways England (2020) Asset Data Management Manual Part 1 – Data Principles and Governance. Available at: https://www.standardsforhighways.co.uk/ha/standards/admm/

[10] Highways England (2020) Asset Data Management Manual Part 2 – Requirements and Additional Information. Available at: https://www.standardsforhighways.co.uk/ha/standards/admm/

[11] Highways England (2020) Asset Data Management Manual Part 3 - Data Dictionary. Available at: https://www.standardsforhighways.co.uk/ha/standards/admm/

[12] Highways England (2020) Asset Data Management Manual Part 4 - Asset Inventory Selector. Available at: https://www.standardsforhighways.co.uk/ha/standards/admm/

[13] Highways England (2020) Asset Data Management Manual Part 1 – Requirements and Additional Information. Available at: https://www.standardsforhighways.co.uk/ha/standards/admm/

[14] Department for Environment Food & Rural Affairs (2007) The Air Quality Strategy for England, Scotland, Wales and Northern Ireland

[15] Department for Environment Food & Rural Affairs (2019) Air Quality Plan for nitrogen dioxide (NO2) in UK (2017): Zone Plans- Defra, UK

[16] Natural England (2018) Guidance: Areas of outstanding natural beauty (AONBs): designation and management https://www.gov.uk/guidance/areas-of-outstanding-natural-beauty-aonbs-designation-and-management

[17] Department of Transport and Welsh Office (1988) Calculation of Road Traffic Noise, HMSO http://programmeofficers.co.uk/Preston/CoreDocuments/LCC389.pdf

[18] Natural England (2008) A guide to definitive maps and changes to public rights of way – 2008 revision https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/414670/definitive-map-guide.pdf

[19] Ministry of Housing, Communities & Local Government (2014) Guidance: Flood risk and coastal change https://www.gov.uk/guidance/flood-risk-and-coastal-change

[20] Environment Agency (2019) Guidance: Groundwater source protection zones (SPZs) https://www.gov.uk/guidance/groundwater-source-protection-zones-spzs

[21] JNCC and Defra (2012) UK Post-2010 Biodiversity Framework https://data.jncc.gov.uk/data/587024ff-864f-4d1d-a669-f38cb448abdc/UK-Post2010-Biodiversity-Framework-2012.pdf

[22] Natural England (2021) Natural England's Impact Risk Zones for Sites of Special Scientific Interest https://magic.defra.gov.uk/Metadata_for_magic/SSSI%20IRZ%20User%20Guidance%20MAGIC.pdf

[23] Department for Environment, Food & Rural Affairs (2017) Statutory guidance: Local Authority Pollution Control: general guidance manual https://www.gov.uk/government/publications/local-authority-pollution-control-general-guidance-manual

[24] Environment Agency (2017). Nitrate Vulnerable Zones (NVZ) 2017 – Combined (Final Designations) https://magic.defra.gov.uk/magicmap.aspx

[25] The Association of UK RIGS Groups. UKRIGS Development Strategy 2006-2010

[26] UK Climate Projections (UKCP) https://www.metoffice.gov.uk/research/approach/collaboration/ukcp/index

[27] Department for Environment, Food & Rural Affairs and Environment Agency (2016). River basin management plans: 2015 https://www.gov.uk/government/collections/river-basin-management-plans-2015

[28] The Planning Inspectorate (2018) Advice Note Nine: Rochdale Envelope https://infrastructure.planninginspectorate.gov.uk/wp-content/uploads/2013/05/Advice-note-9.-Rochdale-envelope-web.pdf

[29] Environment Agency (2019). Groundwater source protection zones (SPZs) https://magic.defra.gov.uk/MagicMap.aspx

[30] Wildlife and Countryside Act 1981 https://www.legislation.gov.uk/ukpga/1981/69/contents

[31] he Conservation of Habitats and Species Regulations 2017 https://www.legislation.gov.uk/uksi/2017/1012/contents/made

[32] Department for Transport (2019). Transport analysis guidance https://www.gov.uk/guidance/transport-analysis-guidance-tag

[33] Environmental Protection Act 1990 https://www.legislation.gov.uk/ukpga/1990/43/contents

[34] The Water Environment (Water Framework Directive) (England and Wales) Regulations 2017 https://www.legislation.gov.uk/uksi/2017/407/contents