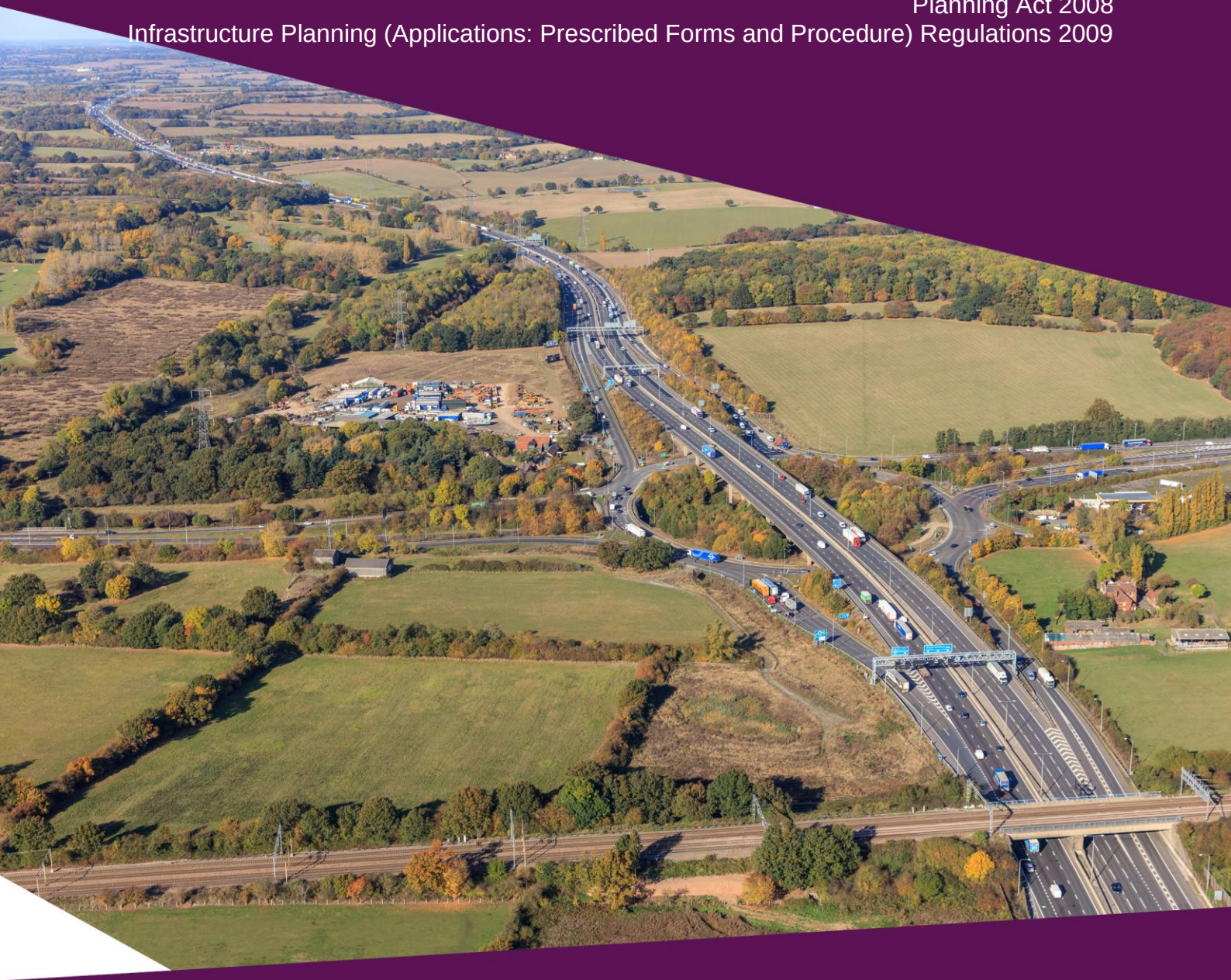
M25 junction 28 improvement scheme TR010029
7.3 Register of Environmental actions and commitments

APFP Regulation 5(2)(q)
Planning Act 2008
Infrastructure Planning (Applications: Prescribed Forms and Procedure) Regulations 2009



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7.3 REGISTER OF ENVIRONMENTAL ACTIONS AND COMMITMENTS

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1. Introduction

1.1.1 This Register of Environmental Actions and Commitments (REAC) is made up of two parts. Part 1 sets out the schedule of mitigation commitments, and Part 2 is the Environmental action plan (EAP).

1.1.2 The REAC is a document used to set out the mitigation committed for the Scheme as part of the ES. The REAC initially forms part of the Outline CEMP. The CEMP prepared by the Principal Contractor during the implementation of the Scheme will reflect the mitigation contained with the REAC. Any remaining items from the REAC which relate to the post construction and operational stage of the Scheme will be part of the HEMP. The REAC acts in part as a 'bridge' between the Outline CEMP, CEMP and HEMP through the lifecycle of the Scheme.

1.1.3 The CEMP and HEMP will be prepared and maintained by the Principal Contractor and are secured through requirement 4 of the draft Development Consent Order (DCO).

[Note: Principal Contractor to implement and monitor compliance with Part 1 and Part 2 of the REAC on the approval of the DCO.]

1.2 Part 1: Schedule of environmental mitigation commitments

1.2.1 Part 1 (Table 1.1 below) sets out the schedule of mitigation commitments and summarises the mitigation measures that have been committed to within the ES, with a cross-reference to the relevant 'Requirements' that secure those commitments through the DCO.

[Note: Principal Contractor implement and monitor compliance with the actions outlined in Table 1.1 during detailed design and construction on the approval of the DCO.]

1.3 Part 2: Environmental action plan

1.3.1 Part 2 is the EAP which comprises the action plan during detailed design, before the start of construction, during construction, and post construction. The EAP sets out environmental objectives that are derived from environmental mitigation measures identified within Part 1 and the ES, together with the actions required to achieve those objectives and the targets (or achievement criteria) that would be used to determine whether the objectives have been met.

1.3.2 Table 1.2, Table 1.3 and Table 1.4 comprise the EAP before the start of construction, during construction, and post construction.

1.3.3 The environmental objectives identified in the EAP may be related to one or more of the mitigation measures identified in the ES. Relevant mitigation measures are identified by cross-reference to the relevant chapter of the ES and DCO requirements. An individual objective may require a single action to achieve the relevant target or may require a series of actions carried out in order, or several separate actions carried out in parallel. Each action required has been identified separately.

1.3.4 The responsibility for undertaking the action has been allocated as clearly as possible - as a minimum to the relevant corporate body (Highways England, Principal Contractor or the Designer).

1.3.5 If the action requires consultation, agreement or approval from one or more third parties, they are identified in the 'action/commitment implementation methods' column in Table 1.2: , Table 1.3 and Table 1.4.

1.3.6 Part 2 includes the party responsible for implementing the actions through the detailed design, construction and post construction stages and as each objective is achieved, the date of achievement will be entered, with the initials of the organisation and person signing it off.

[Note: Principal Contractor, and other parties identified, to monitor progress in implementing the actions outlined in Table 1.2, Table 1.3 and Table 1.4 during detailed design, construction and post construction on the approval of the DCO.]

Actions required before the start of construction

1.3.7 Table 1.2 outlines the actions required at this stage fall into the following main categories:

- Designing/planning for other actions required before construction and for actions required during construction.
- Consultation with and/or seeking agreement where required, from third parties.
- Applications for European Protected Species Licences and any other consents or legal procedures still required in advance of construction.
- Implementation of mitigation measures required in advance of the main works.
- Environmental works in preparation of the main construction works (i.e. archaeology watching briefs, ecology works, root protection for trees, noise monitoring, etc).

Actions required during the construction period

1.3.8 Table 1.3 outlines the actions required at this stage fall into the following main categories:

- Continued designing/planning for actions required during construction and after construction.
- Implementation of the construction related mitigation measures as outlined in the ES and the EAP actions.

1.3.9 In this instance, actions during this period include actions required while the main works (Phase 1 to 5) are taking place.

Actions required after the end of construction

1.3.10 Table 1.4 outlines the actions required at this stage fall into the following main categories:

- Implementation of actions required during the first few years after construction, to ensure the successful establishment of mitigation measures.
- Implementation of the Scheme long-term maintenance/management measures.
- If applicable, any post-construction monitoring and evaluation measures to determine the success or otherwise of mitigation measures.

Table 1.1: REAC Part 1: Schedule of environmental mitigation commitments

Ref	Impact	ES reference	DCO reference	Mitigation commitments	Residual effect (post mitigation) [not significant, neutral, slight/ moderate/ large adverse, slight/ moderate/ large beneficial]	Proposed plan reference (e.g. Proposed scheme layout plans, etc)
General						
GN0.1	Effects on the environment during construction	N/A	Requirement 4	Preparation of a Construction Environmental Management Plan (CEMP): • The Principal Contractor must prepare a CEMP for their works prior to the commencement of their works and which details the measures that shall be undertaken prior to, and during construction of, the Scheme. • The construction of the authorised development must be carried out in accordance with the approved CEMP. • No part of the authorised development is to commence until a CEMP, substantially in accordance with the Outline CEMP, for that part has been submitted to and approved in writing by the Secretary of State, following consultation with the relevant planning authority and local highway authority to the extent that it relates to matters relevant to its functions. • The CEMP must be written in accordance with ISO14001:2015 and so far as is relevant to that part of the authorised development, must reflect the mitigation measures set out in this REAC, and must include the following environmental control/management plans: a. Pollution Prevention Plan; b. Dust Noise and Nuisance Management Plan; c. Ecological Habitats and Species Plan; d. Invasive Species Management Plan; e. Surface Water Management Plan; f. Contaminated Land Management Plan; g. Soil Handling Management Plan; h. Material Management Plan; i. Site Waste Management Plan; j. Material, Waste Storage and Refuelling Plan; k. Energy and Resource Use Management Plan; l. Emergency Response Plan; and m. ~~Arboricultural Method Statement; and~~ n. Community Engagement Plan. A Handover Environmental Management Plan (HEMP) must be developed and completed by the end of the construction, commissioning and handover stage of the authorised development, in accordance with the process set out in the approved CEMP. • The authorised development must be operated and maintained in accordance with the HEMP.	N/A	CEMP
Air quality						
AQ0.1	Dust and emissions to air caused by the construction works of the Scheme	Ch 5, section 5.9 TR010029/APP/6.1	Requirement 4	Mitigation and control measures for construction activities will be included in the CEMP and implemented during the construction phase. The CEMP will be subject to consultation with the relevant planning authority and local highway authority to the extent that it relates to matters relevant to its functions.	Not significant	CEMP

Ref	Impact	ES reference	DCO reference	Mitigation commitments	Residual effect (post mitigation) [not significant, neutral, slight/ moderate/ large adverse, slight/ moderate/ large beneficial]	Proposed plan reference (e.g. Proposed scheme layout plans, etc)
Noise and vibration						
NV0.1	Construction noise and vibration	Ch 6, section 6.9 TR010029/APP/6.1	Requirement 4	• Apply mitigation measures in alignment with the guidance detailed in British Standards (BS) 5228: 2009+A1:2014 - Part 1: Noise 'Code of Practice for noise and vibration control on construction and open sites', Part 1: Noise and Part 2: Vibration (see paragraph 12.8.1) and best practicable means (BPM) in accordance with the Control of Pollution Act 1974. • Temporary noise barriers or solid fencing will be used for Grove Farm~~, and~~ Maylands Cottages and Putwell Bridge Caravan Park (for Cadent gas works) during construction. • Vibratory rolling to be avoided within 20m of Grove Farm. • Carry out good stakeholder communications with local residents to ensure that they are well informed of the progress of the works and are given notice of any activities that are likely to generate high levels of noise or vibration in advance of the works being undertaken.	Not significant	CEMP
NV0.2	Construction traffic	Ch 6, section 6.9 TR010029/APP/6.1	Requirement 10	Prepare and implement a Traffic Management Plan to manage construction traffic flows and routing to avoid residential areas as far as possible.	Not significant	Traffic Management Plan
NV0.3	Operational noise and vibration	Ch 6, section 6.9 TR010029/APP/6.1	Requirement 4	Provide low noise road surfacing on sections where required in the design of the Scheme to minimise impacts during the operation phase and to improve existing noise levels. During the operational phase, routine maintenance of road surfaces is required to avoid further noise and vibration impacts from surface deflections.	Not significant	Scheme layout plans (application document TR010029/APP/2.7) HEMP
Biodiversity						
BD0.1	Potential indirect impacts to Ancient Woodland	Ch 7, section 7.9 TR010029/APP/6.1	Requirement 4	• The location of Ancient Woodland will be identified in the CEMP. • CEMP will include measures to prevent indirect impacts such as pollution control and protection against damage, such as fencing and buffer areas where necessary.	Neutral	CEMP
BD0.2	Loss of veteran trees (including impacts on invertebrates) and protection of retained veteran trees	Ch 7, section 7.9 TR010029/APP/6.1	Requirement 4	• Retained veteran trees within and adjacent to the construction areas will be protected following standard practice (i.e. BS 5837:2012 Trees in relation to design, demolition and construction. – Recommendations) to be included within the CEMP. • Location of access tracks, haul roads, site compounds and material storage areas will be sited away from retained veteran trees. • Two veteran trees that are being lost. Each will be replaced with eight trees of the same native species of local origin (where veteran ash is lost, this will be replaced with a suitable native tree which has the potential to grow to a similar age and size, extra heavy standards will be used). The trees will be planted with space around them to develop into an open crown. • Standing and fallen deadwood have ecological benefits and the approach selected for of the veteran trees that cannot be retained will be tailored to maximise the value of any features that can be salvaged through translocation or other means. Arboricultural assessment during detailed design will determine the appropriate approach to compensation on an individual tree-by-tree basis. All work will be determined jointly by a suitably qualified arboriculturalist and suitably qualified ecologist, and then supervised on site by a suitably qualified arboriculturalist. • To replace dead wood habitat, some felled trees will be retained on-site and repositioned into a range of situations (from damp shady situations to full sun) to benefit invertebrates. Location of repositioned felled trees to take into account the position of retained veteran trees and links between dead wood	Moderate adverse effect	CEMP Scheme layout plans (application document TR010029/APP/2.7)

Ref	Impact	ES reference	DCO reference	Mitigation commitments	Residual effect (post mitigation) [not significant, neutral, slight/ moderate/ large adverse, slight/ moderate/ large beneficial]	Proposed plan reference (e.g. Proposed scheme layout plans, etc)
				resources. These felled trees and limbs will be retained in as large a single unit as possible. These trees will not be cut up into rings or sawn up and stacked into log piles. • For stag beetles, at least two large trees that need to be felled will be made into monoliths (large deadwood trunks implanted approximately 1/3 into the ground to provide standing deadwood both above and below the ground surface). Location of monoliths to take into account the position of retained veteran trees and links between dead wood resources. • At least two retained suitable trees will be 'veteranised' as additional compensation for loss of dead wood features. • A series of Prunus specimens will be planted at strategic woodland edge and open situations.		
BD0.3	Non-statutory designated sites – Permanent and temporary loss of habitat within Ingrebourne Valley SMI	Ch 7, section 7.9 TR010029/APP/6.1	Requirements 4, ~~and~~ 5 and 11	Compensation package for permanent and temporary loss of habitat within Ingrebourne Valley Site of Metropolitan Importance (SMI) will be provided in line with the Preliminary environmental design (Figure 2.2, application document TR010029/APP/6.2) and Outline Landscape and Ecological Management and Monitoring Plan (LEMP) (Appendix 7.16, application document TR010029/APP/6.3) to include the following features: • Reinstatement of habitats in temporary working areas, on new earthworks, around balancing ponds and flood compensation areas, to include creation of broad-leaved woodland, grassland and scrub habitats. Appropriate seed mixes to be used depending on location and soil type (e.g. wet or clay areas) or to mitigate for species (such as tussocky grassland and wildflower mixes, see species specific sections below and Outline LEMP). • Enhancement of River Ingrebourne and Weald Brook (in-channel features, selective coppicing of trees to reduce shade cover, realignment of channel, creation of back waters and lowering of floodplain to create wet grassland habitats (these measures are described in detail in the 'watercourses' section below). • Widespan bridges to allow movement of species along the river corridors. • Creation of woodland around the west of the loop road and on embankments to compensate for woodland loss during construction. • Grassland creation to provide a richer and more diverse resource of flowering plants. This would include plant families that would benefit a wide range of invertebrates such as Fabaceae (especially vetches and trefoils), white Asteraceae (such as ox-eye) and yellow Asteraceae (such as hawkweeds) and Apiaceae. • Creation of tussocky grassland and scrub mix to be managed on rotation to provide a structural diversity for invertebrates, great crested newts, reptiles and birds. • Meadow areas to be managed with margins to create structural diversity and retention of features for invertebrates and other foraging and sheltering species. • Reinstatement of grasslands temporarily affected by construction to provide an increase in the number of species compared to the exiting prior to construction, where possible. • Control/removal of non-native plant species (early goldenrod) to reinstate grassland habitat and to avoid the spread of this species into other areas of the SMI. • Creation of ponds for great crested newt. • During establishment, appropriate measures would be adopted to protect new planting from deer. • Specific mitigation and compensation measures for priority and protected species are set out in the relevant sections below. • Retained habitats within the Development Consent Order (DCO) boundary and habitats adjacent to the DCO boundary will be protected against indirect impacts under measures provided in the CEMP, such as pollution control, fencing and buffer areas.	Short term moderate adverse effect Long term slight adverse	CEMP LEMP Scheme layout plans (application document TR010029/APP/2.7)

Ref	Impact	ES reference	DCO reference	Mitigation commitments	Residual effect (post mitigation) [not significant, neutral, slight/ moderate/ large adverse, slight/ moderate/ large beneficial]	Proposed plan reference (e.g. Proposed scheme layout plans, etc)
				Preparation of a final version of the LEMP: • The Principal Contractor must prepare a final version of the LEMP. Preparation of the LEMP is secured by requirement 5 of the DCO. The LEMP must reflect the measures set out in the REAC and be substantially in accordance with the Preliminary environmental design (Figure 2.2, application document TR010029/APP/6.2) and the Outline LEMP (Appendix 7.16, application document TR010029/APP/6.3). • During the establishment period (five years from completion of the authorised development), the Principal Contractor will carry out monitoring and habitat management in accordance with the LEMP. • Beyond the establishment period (five years from completion of the authorised development), Highways England will continue to manage and monitor habitats and species accordance with the LEMP. • Retained habitats within the DCO boundary and habitats adjacent to the DCO boundary will be protected against indirect impacts under measures provided in the CEMP, such as pollution control, fencing and buffer areas. The Arboricultural Impact Assessment (AIA) and associated Tree Protection Plans (TPPs) (Appendix 7.7, application document TR010029/A)/6.3 as well as updated TPPs in the Outline Arboricultural Method Statement (TR010029/APP/7.2(2)) will be reviewed, and measures incorporated into CEMP and Arboricultural Method Statement.		
BD0.4	Non-statutory designated sites – Protection of site close to the DCO boundary during construction	Ch 7, section 7.9 TR010029/APP/6.1	Requirement 4	• The location of designated sites will be identified in the CEMP (The Oaks LoWS, Lower Vicarage Wood LoWS, Jermains Wood SBI, Tyler's Wood SBI and Folkes Lane Woodland (Upminster) SBI). • The CEMP will include measures to prevent indirect impacts such as pollution control and protection against damage, such as fencing and buffer areas where necessary.	Neutral	CEMP
BD0.5	Damage to and loss of river / riparian habitats and aquatic receptors (including fish and invertebrates within the Weald Brook, River Ingrebourne and ephemeral ditches)	Ch 7, section 7.9 TR010029/APP/6.1	Requirements 4 and 5	Implementation of embedded mitigation works as detailed in the Water Framework Directive report, Biodiversity and Road Drainage and Water Environment chapters below, including: • Measures will be implemented through the CEMP that act to manage the potential for pollution to watercourses and groundwater (e.g. through fine sediment run-off and accidental spills) to occur through general construction activities, such as adherence to appropriate pollution prevention (PPG/GPP's) and CIRIA guidance. • Management of road runoff before discharge to the natural drainage system (further details within Road Drainage and the Water Environment chapter (Chapter 8) in the ES). • Realignment of two sections of existing straight channel to new sinuous courses on the lower Weald Brook. Including the restoration of more natural functioning channel. • Realignment of c. 200 m of existing straight channel to new sinuous course on the River Ingrebourne, between Grove Farm and the Weald Brook confluence. Including the restoration of more naturally functioning channel. • A natural river bed will be incorporated into the design of culverts carrying the Weald Brook under the M25 (Weald Brook Culvert extension) and the Ingrebourne River beneath junction 28 (Grove Culvert extension). • Reduction of Scheme footprint on the floodplain by supporting the A12 slip road on a retaining wall instead of a large embankment structure. • Proposed crossing structures have been set as high and wide as feasible to limit adverse geomorphological impacts, conveyance and shading effects to Grove Bridge, Maylands Bridge and Duck Wood Bridge. • Channel crossing and realignments have been planned to limit the need for hard bank protection to reduce potential impacts on aquatic habitats and river morphology at Grove Bridge and Duck Wood Bridge.	Weald Brook and ephemeral ditches – neutral Ingrebourne River – moderate adverse (within the DCO boundary) Ingrebourne River – neutral (within the Ingrebourne Water Framework Directive waterbody)	CEMP LEMP Scheme layout plans (application document TR010029/APP/2.7)

Ref	Impact	ES reference	DCO reference	Mitigation commitments	Residual effect (post mitigation) [not significant, neutral, slight/ moderate/ large adverse, slight/ moderate/ large beneficial]	Proposed plan reference (e.g. Proposed scheme layout plans, etc)
				• Lowering of c. 2,100 m2 of floodplain to create flood compensation area and creation of a backwater to Weald Brook, just upstream of Duck Wood Bridge. • Lowering of c. 7,800 m2 of floodplain connected with Weald Brook in combination with a flood compensation area adjacent to Grove Bridge and Maylands Bridge. • Lowering of c. 3,500 m2 of floodplain, creation of backwaters on the Ingrebourne between Grove Farm and the Weald Brook confluence. • Long-term maintenance works to manage riparian trees along the Weald Brook in a way that creates varied light intensity on the channel and riparian zone of the river. • As part of the Scheme significant lengths of unlined ephemeral drainage ditch will be created to manage 'clean' runoff from non-pavement surfaces. These ditches will generate habitat that mitigates for loss of existing ephemeral drainages ditches to the Scheme. Road drainage has been developed to achieve compliance with relevant EQS/RST toxicity and sediment standards as tested with HAWRAT (further details within Road Drainage and the Water Environment chapter (Chapter 8) in the ES). • Measures to prevent excessive scour or "wash-out" of bed material immediately downstream of Grove culvert extension and Weald Brook culvert extension. Measures likely to include construction of artificial riffle feature downstream of culvert or selective use of bed and bank protection. • During the detailed design of Balancing Pond No. 1 it is required to ensure that a pathway will not be created between the contaminated perched water identified within the historical landfill/recently deposited material and the identified surface water receptors. Potential design solutions could include lining of Balancing Pond No.1 and associated drainage system or further ground investigation to confirm the source of contamination and remediation of the source. • A fish rescue undertaken by a suitably experienced ecologist will be undertaken for the duration of the in-channel works to ensure that any fish found can be safely caught and returned to unaffected sections of the watercourses. In addition, any pumps to be used for dewatering activities will have mesh installed over their ends to prevent fish species from being sucked into the pumps. • The works on the Ingrebourne River and Weald Brook will avoid the main fish spawning season (March to June). • Measures outside of the DCO boundary to enhance riverine habitats elsewhere within the Ingrebourne WFD waterbody (GB106037028130), to be delivered by the Environment Agency (funded by the Applicant).		
BD0.6	Permanent and temporary loss of habitats (outside of designated site)	Ch 7, section 7.9 TR010029/APP/6.1	Requirement 4 and 11	• Retained habitats within the DCO boundary and habitats adjacent to the DCO boundary will be protected against indirect impacts under measures provided in the CEMP, such as pollution control, fencing and buffer areas. The AIA associated Tree Protection Plans will be reviewed, and measures incorporated into CEMP and Arboricultural Method Statement. • Temporary construction areas (contractor's compounds and haul routes) will be reinstated to former habitats after construction. Where practicable, these former habitats will be recreated to provide an increase in the number of species compared to the existing prior to construction. • During establishment, appropriate measures will be adopted to protect new planting from deer.	Short-term slight adverse effect Long term neutral	CEMP LEMP Scheme layout plans (application document TR010029/APP/2.7)
BD0.7	Terrestrial invertebrates – damage to and loss of habitat	Ch 7, section 7.9 TR010029/APP/6.1	Requirements 4 and 5	• Losses of habitat that may have potential to be rich in invertebrate resources will also be avoided where possible. Mitigation measures during construction will be addressed in the CEMP. • Scattered scrub and flower abundant grassland habitat will be created in mitigation areas and on new earthworks, around new ponds and elsewhere within the DCO boundary. This would include plant families that would benefit a wide range of invertebrates such as Fabaceae (especially vetches and trefoils), white Asteraceae (such as ox-eye) and yellow Asteraceae (such as hawkweeds) and	Short-term moderate adverse effect Long term neutral	CEMP LEMP

Ref	Impact	ES reference	DCO reference	Mitigation commitments	Residual effect (post mitigation) [not significant, neutral, slight/ moderate/ large adverse, slight/ moderate/ large beneficial]	Proposed plan reference (e.g. Proposed scheme layout plans, etc)
				Apiaceae and a range of flowering plant species and types from open, broad flat flowers to species with deep corollas. • Scrub species planted to be variety spring blossom species to provide continuity of nectar from February through to June. A series of Prunus specimens will be planted at strategic woodland edge and open situations, to include early flowering Cherry plum. • Some felled trees will be retained on-site and repositioned to benefit invertebrates. Location of repositioned felled trees to take into account the position of retained veteran trees and links between dead wood resources. These felled trees and limbs will be retained in as large a single unit as possible. These trees will not be cut up into rings or sawn up and stacked into log piles. • For stag beetle, at least two large trees that need to be felled will be made into monoliths (large deadwood trunks implanted approximately 1/3 into the ground to provide standing deadwood both above and below the ground surface). • The grassland and scrub matrix (ECA B) will include piles of deadwood or small clusters of standing deadwood posts in sunny situations. • Retained trees will be 'veteranised' to increase dead wood habitat. • Where possible, alder will be planted in suitable damp ground and watercourse edge situations as part of measures to provide suitable habitat for the alder flea weevil (SPI) that may potentially be present. • Grassland, scrub, edge habitat, dead or dying trees and dead wood features will be managed appropriately to ensure they provide suitable habitat and conditions for invertebrates.		
BD0.8	Great crested newts – permanent and temporary loss of terrestrial habitat / killing and injury	Ch 7, section 7.9 TR010029/APP/6.1	Requirements 4, 5 and 7	• Where great crested newts are likely to be present, construction and habitat re-creation/enhancement will be carried out under the remit of a European Protected Species (EPS) mitigation licence from Natural England. • Mitigation and compensation measures for great crested newt including site clearance methodology will be implemented in line with the detail of the method statement and work schedule as set out in the EPS licence. This may require exclusion and translocation of great crested newts. • Retained habitat immediately around pond P2 will be protected throughout construction. • Temporary works affecting habitat close to great crested newt breeding ponds will be programmed to take place in as short a window as possible (ideally in one year), to ensure that habitat reinstatement and creation can take place in these areas as soon as possible following disturbance. • Compensation habitat for great crested newts will be provided in ECA B which will be reinstated following temporary works. This will provide improved terrestrial habitat for great crested newts including tussocky grassland and scrub, wet grassland in lowered ares of floodplain, creation of at least two new ponds, restoration of existing pond (P2) to remove silt build up, removal of non-native invasive species from terrestrial habitat, construction of hibernacula and refuges. These habitats will be managed appropriately for great crested newts under the Outline LEMP (Appendix 7.16 of the ES). • The two proposed new ponds to be designed to be suitable for breeding great crested newt, positioned within the slope and fed by rain water similarly to existing pond P2. The detailed design will consider the need to line the ponds depending on existing ground conditions so that they are more likely to retain water throughout the breeding season. The ponds will not be connected to the existing drain running through ECA B, to avoid any contaminants (such as fertiliser) from the adjacent golf course entering the ponds. • To mitigate the effect of the Scheme on the adjacent Maylands Golf Club, it is necessary to redesign a section of the course in proximity to pond P2. A new green and fairway will be created south (down slope) of P2. Rough grassland and scrub or woodland habitats will be created on existing green and fairway areas to compensate for creation of greens, Design will ensure there is no net loss of habitat suitable for great crested newts in relation to the golf course design.	Short term slight adverse effect. Long term neutral.	CEMP LEMP

Ref	Impact	ES reference	DCO reference	Mitigation commitments	Residual effect (post mitigation) [not significant, neutral, slight/ moderate/ large adverse, slight/ moderate/ large beneficial]	Proposed plan reference (e.g. Proposed scheme layout plans, etc)
				• Other temporary working areas will be reinstated with grassland, scrub and woodland in line with the Preliminary environmental design. • Wide-span overbridges to allow movement of newts into area inside the new loop road to reduce potential terrestrial habitat fragmentation. • The presence of great crested newt will be considered during detailed design of road drainage features to reduce the likelihood of entrapment. • Any activities south of the A12 will be carried out sensitively under a Precautionary Method of Working (PMW) which will detail measures and steps to be taken to minimise any potential impacts to individual great crested newts south of the A12.		
BD0.9	Common reptiles – permanent and temporary loss of habitat / killing and injury	Ch 7, section 7.9 TR010029/APP/6.1	Requirement 4	• A reptile mitigation strategy will be created during detailed design (prior to construction) to avoid harm to low numbers of reptiles present within the DCO boundary. This will include identification of areas of habitat to retain within the DCO boundary outside of the temporary construction footprint and methods to reduce harm to individual reptiles (such as habitat manipulation to temporarily displace reptiles from the construction footprint). This will be set out in a PMW to be included in the CEMP. • Where necessary, additional reptile surveys will be carried out prior to construction (this will be detailed in the reptile mitigation strategy). • Habitat suitable for reptile will be created within ECA B (tussocky grassland and scrub) and in habitat reinstated in temporary working areas.	Short term slight adverse effect Long term neutral	CEMP LEMP
BD0.10	Breeding birds (including kingfisher) – permanent and temporary loss of habitat	Ch 7, section 7.9 TR010029/APP/6.1	Requirements 4 and 5	• Vegetation clearance will be undertaken outside of the bird breeding season (March to August inclusive). • If vegetation removal during the bird nesting season cannot be avoided, then works will be undertaken under a PMW in respect of breeding birds, and pre-clearance checks for nesting birds will be required for all potentially suitable nesting habitats. Due to the potential for kingfisher to nest along the watercourses, a check for nesting kingfisher will be carried out prior to commencement of intrusive works affecting the banks of Weald Brook and River Ingrebourne (or their associated vegetation). • If nesting birds are identified, then protective buffer zones around each nest would be required. Vegetation removal within that buffer will be postponed until all the young have fledged or the nest is abandoned. • Temporary working areas will be reinstated and planted with suitable habitat for nesting birds such as trees, scrub and grassland. • Bird nesting boxes will be installed on suitably mature trees, at least 5 m above ground within retained woodland habitat to replace vegetation lost during construction, principally within Alder Wood, The Grove and retained woodland along Weald Brook. This will include a variety of boxes for different species (at least 20 boxes), including boxes suitable for starling. Long lasting boxes (such as woodcrete boxes) will be provided. The location of where nest boxes will be installed will be included within the CEMP and agreed on site with an ecologist.	Short term slight adverse effect Long term neutral	CEMP LEMP
BD0.11	Bats – potential loss of tree roosts / killing and injury of bats / loss of tree roosting features	Ch 7, section 7.9 TR010029/APP/6.1	Requirements 4 and 7	• Updated surveys to check for roosting bats in trees surveys will be carried out at all trees requiring removal for construction or lie within 50 m of construction to check for potential bat roosts. • Tree removal will follow a PMW in relation to bats that incorporates the following measures: – Removal of trees with potential for roosting bats will be undertaken in either spring (mid-March to the end of April) or autumn (September to late October), to avoid the periods before the young are weaned and independent and the hibernation period. – All trees with high, moderate or low potential that need to be removed will be subject to a climbing inspection by a bat licenced ecologist immediately prior to removal to confirm bats are absent. If the tree cannot be felled on the same day, and bats are absent, the feature will	Short term slight adverse effect Long term neutral	CEMP

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				be blocked to prevent use in the interim period prior to felling. If bats or evidence of a roost is found at any point then measures to protect individual bats and maintain roosting opportunities would be put in place and a suitable licenced bat ecologist will be contacted to reassess the situation including, if required, applying for an EPS mitigation licence. Full details of the bat mitigation licence, including detailed mitigation and compensation measures, will be agreed with Natural England. Mitigation and compensation measures set out in the EPS licence will be adhered to. – Tree 36 (roost present in 2019) will be retained during construction. Measures set out above will be repeated for Tree 36. Pre-construction and during construction surveys will be carried out as necessary, and measures put in place to protect the roost from visual and noise disturbance. A licenced bat ecologist will reassess the situation as necessary including, if required, applying for an EPS mitigation licence • To replace potential roosting features lost during construction, bat boxes will be installed in each of the eastern and western sections of Alder Wood in The Grove wood and along Weald Brook at suitable locations identified by an ecologist. Long lasting boxes will be provided (such as woodcrete). At least 30 bat boxes will be installed of different styles and designs to provide a variety of roosting opportunities. Bat boxes will be installed on suitable retained mature trees, approximately 5 m above ground. The exact locations/orientation of these boxes will be determined during detailed design and recorded in the CEMP.		
BD0.12	Bats – changes to foraging and commuting habitat	Ch 7, section 7.9 TR010029/APP/6.1	Requirements 4, 5 and 7	• Habitat reinstated and planting of woodland corridors around the loop road will mature to provide suitable foraging locations for bats. • Grassland, scrub and aquatic habitat creation and removal of invasive plants in the ECA will provide foraging opportunities for bats. • Operational lighting will be sensitively designed through an appropriate lighting strategy that will take into account the requirements of bats and other nocturnal species and follow best practice guidelines[1], including measure to avoid and minimise light spill onto adjacent habitat, particularly woodland and watercourses. The underside of bridges of the loop road (over watercourses) will not be lit to avoid disturbance to bats, and to encourage bats to pass under the loop road. • During construction, night working will be avoided where possible and measures to reduce light spill into adjacent habitat and protect foraging routes will be implemented (e.g. along Weald Brook, woodland edges and hedgerows) and detailed in the CEMP. During the bat active seasons, a dark corridor will be retained along Weald Brook throughout the works. • During construction, clearance of vegetation along foraging corridors along Weald Brook and hedgerow will be minimised as much as practicable to maintain foraging opportunities during construction. • To monitor the success of habitat reinstatement and creation on foraging bats, a monitoring strategy will be developed and include pre-construction, during construction and post construction surveys. These surveys will cover (but not exclusive to) Weald Brook (and what will be ECA A), woodland edges (The Grove and Alder Wood) and ECA B.	Short term slight adverse effect Long term neutral	CEMP LEMP
BD0.13	Otter - potential disturbance to foraging and commuting routes	Ch 7, section 7.9 TR010029/APP/6.1	Requirements 4, 5 and 7	• Surveys to check for otter resting sites and holts will be carried out prior to vegetation removal or any works to riparian habitats. Where necessary, re-survey and monitoring will take place throughout construction.	Short term moderate adverse effect Long term neutral	CEMP LEMP

[1] Institute of Lighting Professionals and Bat Conservation Trust (2018). Guidance Note 08/18. Bats and artificial lighting in the UK. Bats and the Built Environment Series.

Ref	Impact	ES reference	DCO reference	Mitigation commitments	Residual effect (post mitigation) [not significant, neutral, slight/ moderate/ large adverse, slight/ moderate/ large beneficial]	Proposed plan reference (e.g. Proposed scheme layout plans, etc)
				• If evidence of otter resting sites or holts are recorded, and loss or disturbance to these features cannot be avoided, works will be carried out under an EPS licence. Mitigation and compensation measures set out in any EPS licence will be adhered to. • Realignment of the River Ingrebourne will be designed as naturally as practicable (including meanders) to provide suitable foraging and commuting habitat for otter. The design will include resting areas for otters and scrub planting to provide shelter for this species. • During construction, a dark corridor will be maintained along Weald Brook and the Ingrebourne River to minimise disturbance to otter or other mammals moving along the river corridors. • During construction, open excavations will be suitably fenced to prevent otters falling in. These measures will be detailed in the CEMP. • Should survey work and monitoring prior to and during construction identify the need for additional measures to protect individual otter (e.g. if regular use of the watercourses by otter is recorded), appropriate measure will be employed (such as temporary otter proof fencing during any higher risk construction operations). • Selective coppicing of trees along Weald Brook will be implemented to allow for aquatic plants to colonise the channel and the banks to become colonised by aquatic and marginal species which would provide more suitable habitat for otter within the DCO boundary. • Safe mammal passage through culverts will be included through length of extended and existing culverts. Exclusion fencing will be incorporated as appropriate to prevent otter accessing highways. • Wide-span overbridges will allow movement of otter beneath the loop road along Weald Brook.		
BD0.14	Water vole – potential loss of habitat / damage to resting sites	Ch 7, Section 7.9 TR010029/APP/6.1	Requirements 4 and 7	• No evidence of water vole has been recorded within the DCO boundary. However, due to the potential for water vole to colonise the water courses, a survey to check for the presence of water vole will take place prior to any works within 5 m of water courses or ponds. • If water voles are found to be present, where practicable to do so, loss of burrows will be avoided. This avoidance is not practicable, the appropriateness of temporary displacement of water vole under Natural England class licence into adjacent habitat unaffected by construction will be assessed. • Where displacement is not reasonably practicable, trapping and translocation of individuals will be carried out under licence from Natural England. Where this is the case, the location of receptor sites for water vole will be agreed within the licence.	Species not considered to be present No effect	CEMP
BD0.15	[redacted]	[redacted]	[redacted]	[redacted]	Neutral	CEMP

Ref	Impact	ES reference	DCO reference	Mitigation commitments	Residual effect (post mitigation) [not significant, neutral, slight/ moderate/ large adverse, slight/ moderate/ large beneficial]	Proposed plan reference (e.g. Proposed scheme layout plans, etc)
				• [redacted] • [redacted] [redacted] [redacted] [redacted]		
BD0.16	Non-native invasive species	Ch 7, section 7.9 TR010029/APP/6.1	Requirements 4 and 5	• A method statement for the management and removal of non-native goldenrod and Himalayan balsam will be produced and implemented (as part of the CEMP) to avoid spread of this plant within and outside of the DCO boundary, avoid the spread into further areas of Ingrebourne Valley SMI and to protect reinstated and created habitats from colonisation. Surveys will be carried out prior to construction to map and identify locations of these non-native species to determine the most appropriate approach to management based on the construction programme. • On-going measures to check and control non-native goldenrod and other invasive plant species will be included in the final version of the LEMP (the LEMP will be substantially in accordance with the Outline LEMP, Appendix 7.16 of the ES). • Measures for the appropriate management and humane removal of invasive species of animals, such as signal crayfish, should they be encountered during construction works.	Neutral	CEMP LEMP
Road drainage and the water environment						
RD0.1	Deterioration in surface water and groundwater quality resulting from construction activities	Ch 8, section 8.9 TR010029/APP/6.1	Requirements 4, 6 and 8	• All works to be undertaken in accordance with the Pollution Prevention Guidelines (PPGs[2]). • Temporary works sites, haul roads and other associated works should be designed and maintained to minimise impact. Risk areas identified are the site compounds situated approximately 300 m west of Weald Brook and the satellite compound site approximately 70 m east of Weald Brook. Haul roads and a temporary bridge also cross Weald Brook. • Where temporary watercourse diversions are required or in–channel working, specific mitigation may be needed to ensure the temporary design is in line with the WFD and that temporary impacts are minimised, such as the temporary bridge over Weald Brook to facilitate haul road access. • Areas which may generate contaminated water, such as oil storage areas (such as the main and satellite compound in close proximity to Weald Brook), will be bunded and have water discharged to self-contained units with treatment facilities. There would be no discharge to groundwater. • Tests will be undertaken to ensure contaminated material is identified, isolated and reworked or removed to special landfill to avoid any leachate problems. • Temporary land-take required for construction will include adequate areas of land set aside for robust control measures, for example sustainable drainage control. • A Pollution Prevention Plan, including spillage response measures, will be prepared prior to construction.	Not significant	CEMP

[2] Pollution Prevention Guidelines (PPGs) with particular reference to PPG1 (general guide to the prevention of water pollution), PPG3 (use and design of oil separators in surface water drainage systems), PPG5 (works near or liable to affect watercourses) and PPG6 (working at construction and demolition sites). The PPGs contain a mix of regulatory requirements and good practice advice. They have been withdrawn by the Environment Agency but are still considered good practice advice to avoid pollution of watercourses. All of the PPGs are available from http://webarchive.nationalarchives.gov.uk/20140328084622/http://www.environment-agency.gov.uk/business/topics/pollution/39083.aspx

Ref	Impact	ES reference	DCO reference	Mitigation commitments	Residual effect (post mitigation) [not significant, neutral, slight/ moderate/ large adverse, slight/ moderate/ large beneficial]	Proposed plan reference (e.g. Proposed scheme layout plans, etc)
				• Appropriate method statements for working with and storing oils and chemicals in line with the requirements will be prepared. • An Environmental Incident Control Plan to ensure protective measures are implemented to deal with both normal and emergency situations will be prepared. • Contractors will undertake construction work to best practice standards. • A permanent drainage system will be developed, in consultation with the relevant parties, during the detail design stage by the Principal Contractor before the construction phase commences. • A construction phase Surface Water Management Plan will be prepared. • Where deep foundations extending below the groundwater table are intended to be part of the Scheme, these should be designed in accordance with industry standards - taking into account the site-specific water level and flow monitoring data obtained from intrusive ground investigation for the Scheme. • A Piling Risk Assessment (PRA) will be carried out to ensure the selected piling method does not introduce contamination pathways into groundwater, and where sheet piling is replacing existing retaining walls, the design will not exceed the existing extent and depth of the retaining wall.		
RD0.2	Increased risk of flooding (fluvial, surface water and groundwater) resulting from construction activities	Ch 8, section 8.9 TR010029/APP/6.1	Requirement 4	• No materials or plant will be stored within the floodplain. • The Environment Agency Flood Warning system will be signed up to and a procedure will be put in place to ensure timely evacuation of personnel (and plant if safe to do) from the floodplain. • For any works in ordinary watercourses, such as obstructions to flow, Ordinary Watercourse Consent, will be obtained from Essex County Council. Similar works to any main rivers, or any works within eight metres of a main river, will require an Environmental Permit from the Environment Agency. • A construction phase Surface Water Management Plan will be prepared. • If ground compaction has occurred it will be reinstated as existing. • Haul roads will be constructed so that they do not raise existing ground levels within the floodplain. • Temporary crossings of any watercourse will be designed to ensure there is no adverse impact on flood risk.	Not significant	Flood risk assessment (application document TR010029/APP/6.6)
RD0.3	Depletion of water resources	Ch 8, section 8.9 TR010029/APP/6.1	Requirement 4	• A material efficient design will be adopted and implemented by the Design Team. Measurement will be via a brief statement from the design team estimating the overall quantity of material required through the application of an efficient design. Monitoring will be through confirmation from the Construction Team that the Scheme 'As Constructed' is in accordance with the design. • The CEMP will be developed and implemented to consider methods to manage and reduce water use in construction. Monitoring will be through an appropriate programme of Environmental Auditing and Reporting.	Not significant	CEMP
RD0.4	Damage to riparian and channel features and disruption of natural hydraulic and sediment process resulting from construction/modification of watercourse crossings and construction of highway drainage outfalls	WFD Assessment Ch 5, sections 5.2 - 5.4 TR010029/APP/6.7	Requirements 4 and 5	Implementation of embedded mitigation and enhancement works as follows: • Ingrebourne realignment. Realignment of c 200 m of existing straight channel to new sinuous course between Grove Farm and the Weald Brook confluence. Including the restoration of more naturally functioning channel. • Weald Brook realignments. Realignment of sections of existing straight channel to new sinuous courses on the lower Weald Brook (85 m and 250 m in length). Including the restoration of more natural functioning channel. • Ingrebourne floodplain lowering. Lowering of c 3,500 m^2 of floodplain, creation of backwaters on the Ingrebourne between Grove Farm and the Weald Brook confluence. • Weald Brook floodplain lowering upstream. Lowering of c 2,100 m^2 of floodplain, a flood compensation area and creation of a backwater to Weald Brook, just upstream of Duck Wood Bridge.	Not significant	Scheme layout plans (application document TR010029/APP/2.7) Preliminary environmental design (Figure 2.2,

Ref	Impact	ES reference	DCO reference	Mitigation commitments	Residual effect (post mitigation) [not significant, neutral, slight/ moderate/ large adverse, slight/ moderate/ large beneficial]	Proposed plan reference (e.g. Proposed scheme layout plans, etc)
				• Weald Brook floodplain lowering downstream. Lowering of c 7,800 m^2 of floodplain in combination with a flood compensation area adjacent to Grove Bridge and Maylands Bridge. • Maintenance of riparian trees on Weald Brook. Long term maintenance works to manage riparian trees along the Weald Brook in a way that creates varied light intensity on the channel and riparian zone of the river. • Unlined drainage ditches. As part of the Scheme significant lengths of unlined ephemeral drainage ditch will be created to manage 'clean' runoff from non-pavement surfaces. These ditches will generate habitat that mitigates for loss of existing ephemeral drainage ditches to the Scheme. • Depressed inverts and natural river beds on culvert extensions. A natural river bed will be incorporated into the design of culverts carrying the Weald Brook under the M25 (Weald Brook Culvert extension) and the Ingrebourne beneath junction 28 (Grove Culvert extension). • A12 slip constructed on retaining wall. The effects of the Scheme will be reduced by minimising the footprint on the floodplain by supporting the A12 slip road on a retaining wall instead of a large embankment structure. • Widespan bridge structures. Within the restrictions defined by other constraints, proposed structures have been set as high and wide as feasible to limit adverse geomorphological impacts, conveyance and shading effects. These structures are Grove Bridge, Maylands Bridge and Duck Wood Bridge. • Minimisation of hard bank protection at river crossings. Channel crossings and realignments have been planned to limit the need for hard bank protection to reduce potential impacts on the biological and hydro-morphological quality elements. This affects the following structures: Grove Bridge (over the Ingrebourne) and Duck Wood Bridge. • Improvements to existing road drainage. A drainage system designed to meet WFD toxicity standards at points of discharge to natural waters (see also commitments made in Ch 8, section 8.9 (TR010029/APP/6.1) listed above). Implementation of mitigation (specific) as follows: • Mitigation works, outside of the DCO boundary, delivered by the Environment Agency as part of their programme of works within the Ingrebourne WFD water body. • Measures to prevent excessive scour or "wash-out" of bed material immediately downstream of Grove culvert extension and Weald Brook culvert extension. Measure likely to include construction of artificial riffle feature downstream of culvert or selective use of bed and bank protection. • Measures to facilitate mammal passage through Grove culvert extension and Weald Brook Culvert Extension during higher than normal flows. The form of such measures needs to be determined at detailed design, but often comprise a shelf along which mammals can move, together with ramps for mammal access and egress. Where appropriate adoption of generic guidance on minimising the effect of Scheme components on WFD quality elements as set out in Section 5.4 of TR010029/APP/6.7 during the detailed design process. Appropriate long term management of the following wet habitats, in accordance with the process set out in the Outline LEMP (Appendix 7.16 of the ES): • Ingrebourne realignment • Weald Brook realignment • Ingrebourne floodplain lowering • Weald Brook floodplain lowering upstream • Weald Brook floodplain lowering downstream • Maintenance of riparian trees on Weald Brook		TR010029/APP/6.2) LEMP

Ref	Impact	ES reference	DCO reference	Mitigation commitments	Residual effect (post mitigation) [not significant, neutral, slight/ moderate/ large adverse, slight/ moderate/ large beneficial]	Proposed plan reference (e.g. Proposed scheme layout plans, etc)
				• Maintenance of backwaters on Ingrebourne River and Weald Brook		
RD0.5	Alterations to groundwater flow paths as a result of construction activities	Ch 8, section 8.9 TR010029/APP/6.1	Requirements 4 and 6	• Intrusive ground investigation will be carried out to determine the groundwater flow direction and the depth to groundwater. On the basis of these investigations, alterations will be made to the design of the piles or retaining walls, to ensure they do not form a barrier to groundwater flow. • Deep foundations will be designed in accordance with industry standards – taking into account the site-specific water level and flow monitoring data obtained from instructive ground investigation for the Scheme. • A PRA will be carried out to ensure the selected piling method does not introduce contamination pathways into the aquifer.	Not significant	CEMP
RD0.6	Deterioration in surface water and groundwater quality resulting from the operation of the Scheme	Ch 8, section 8.9 TR010029/APP/6.1	Requirements 4, 6 and 8	• The design of the Highway drainage system for the Scheme will comply with all current standards and sustainable drainage system (SuDS) best practice techniques to ensure that sustainability is a key drainage design criterion. • Highway run-off from Catchments 1, 2 and 3 will pass through an attenuation pond and a ditch before being discharged into the natural environment. By discharging the highway runoff slowly and by allowing suspended solids to settle out, the attenuation ponds and ditches also provide water quality treatment to the highway runoff. These catchments will also incorporate sediment catchpits which will be advantageous to allowing suspended solids to settle. • Highway run-off from Catchments 4, 5a and 5b will pass through sediment catchpits prior being discharged into the natural environment, thereby allowing suspended solids to settle out and thus provide water quality treatment to the highway runoff. • Highway run-off from Catchments 6A, 6B, 6c and 7 will pass through a ditch before being discharged into the natural environment. By discharging the highway runoff slowly and by allowing suspended solids to settle out, the ditches also provide water quality treatment to the highway runoff. With exception of catchment 7, these catchments will also incorporate sediment catchpits which will be advantageous to allowing suspended solids to settle. • A risk assessment will be undertaken using data obtained from the Ground Investigation for the Scheme to determine the need for and type of mitigation on soakaways receiving highway run-off. • Outfalls will be located at less sensitive locations on the watercourses (i.e. not on active, eroding meanders). • Outfall structures will be set flush to the existing bank line to minimise potential erosion around the structure and minimise section of channel bed impacted.	Not significant	Scheme layout plans (application document TR010029/APP/2.7)
RD0.7	Increased risk of fluvial, surface water and groundwater flooding as a result of the operation of the Scheme	Ch 8, section 8.9 TR010029/APP/6.1	Requirement 4	• Run-off from the Scheme will be attenuated before reaching a watercourse for the 1 in 100 annual probability event (1%) taking into account a 20% allowance for climate change and hence there will be no increase in runoff from the site and no increase in flood risk. • Highways drainage discharge will be attenuated prior to outfall, by passage through attenuation ponds/ditches/pipes. • The highway drainage system will be designed in line with the current standards of HD 45/09 (Highways Agency, 2009). • Outfall structures will be set flush to the existing bank line to minimise potential erosion around the structure and minimise section of channel bed impacted. • Deep foundations extending below the groundwater table will be designated in accordance with industry standards considering the site-specific water level and flow monitoring data obtained from the intrusive ground investigation for the Scheme. • Substantial clear spacing between piles and appropriate piling installation methods should be adopted.	Not significant	Scheme layout plans (application document TR010029/APP/2.7)

Ref	Impact	ES reference	DCO reference	Mitigation commitments	Residual effect (post mitigation) [not significant, neutral, slight/ moderate/ large adverse, slight/ moderate/ large beneficial]	Proposed plan reference (e.g. Proposed scheme layout plans, etc)
Landscape and visual						
LV0.1	Visual and landscape impacts on surrounding area	Ch 9, section 9.9 TR010029/APP/6.1	Requirements 4 and 5	Further develop and implement the landscape proposals as set out in the preliminary environmental design plans in accordance with guidance in the Design Manual for Roads and Bridges (DMRB) and associated documents.	Slight adverse in Year 15	Scheme layout plans (application document TR010029/APP/2.7) Preliminary environmental design (Figure 2.2, TR010029/APP/6.2) LEMP
LV0.2	Visual and landscape impacts on surrounding area	Ch 9, section 9.9 TR010029/APP/6.1	Requirements 4 and 5	Maintain and manage landscape works to ensure successful establishment of all elements of the Scheme.	Slight adverse in Year 15	Scheme layout plans (application document TR010029/APP/2.7) Preliminary environmental design (Figure 2.2, TR010029/APP/6.2) LEMP
LV0.3	Impact on vegetation to be retained	Ch 9, section 9.9 TR010029/APP/6.1	Requirement 4	Ensure the protection of all trees including veteran trees and trees and woodland covered by a Tree Preservation Order (TPO) designation and other vegetation to be retained in accordance with BS 55 and other best practice guidance.	N/A	Scheme layout plans (application document TR010029/APP/2.7) Preliminary environmental design (Figure 2.2, TR010029/APP/6.2)
LV0.4	Impact on soils	Ch 9, section 9.9 TR010029/APP/6.1	Requirement 4	Ensure the stripping, storage and maintenance of soils necessary for the Scheme in accordance with best practice guidance and develop a Soil Handling and Management Plan.	Slight adverse in Year 15	Scheme layout plans (application document TR010029/APP/2.7) Preliminary environmental

Ref	Impact	ES reference	DCO reference	Mitigation commitments	Residual effect (post mitigation) [not significant, neutral, slight/ moderate/ large adverse, slight/ moderate/ large beneficial]	Proposed plan reference (e.g. Proposed scheme layout plans, etc)
						design (Figure 2.2, TR010029/APP/6.2)
LV0.5	Stakeholders	Ch 9, section 9.9 TR010029/APP/6.1	Requirement 4	Continue liaison with Natural England and local authorities to ensure that these bodies are content as far as possible with the proposed Scheme.	N/A	CEMP
LV0.6	Landowners	Ch 9, section 9.9 TR010029/APP/6.1	Requirement 4	Maintain liaison with affected landowners to develop landscape proposals that take account of their views where possible.	N/A	CEMP
Geology and soils						
GS0.1	Impacts to human health from disturbance of contaminated soils, groundwater and/or vapours / ground gases	Ch 10, Table 10.15 and section 10.9 TR010029/APP/6.1	Requirements 4 and 6	• In all areas of ground break the final surface will either be hardstanding or constructed landscaping which will remove the dermal contact, ingestion and inhalation of soil, soil derived dust and asbestos fibres pathways between any contamination / asbestos within the soil and the identified sensitive receptors. • Placement of any Made Ground to be reused within the Scheme at depth within embankments or below hardstanding / other soils and documentation of its location. Confirmation of suitability for reuse of excavated materials during construction through further reuse testing and human health risk assessment relating to the specific location of reuse. • Implementation of a watching brief and discovery strategy. If previously unencountered contaminated soils are discovered during construction, further assessment will be undertaken. Following assessment, further mitigation measures will be incorporated, if necessary. • Before starting any work that is likely to disturb asbestos, a suitable and sufficient risk assessment must be prepared by the employer, in line with current legislation and Health & Safety Executive (HSE) guidance. The risk assessment will set out, among others, appropriate control measures. • Implementation of a specific watching brief and discovery strategy in relation to asbestos containing materials (ACM) / asbestos fibres. All workers should be made aware and regularly reminded of potential risks and necessary actions through the implementation of briefings, such as toolbox talks. • Health and Safety Risk Assessment and Method Statements and appropriate Personal Protective Equipment (PPE) for the protection of construction workers, to be managed by their employers. These should specifically cover the potential to encounter ACM / asbestos fibres within Made Ground during the works and elevated concentrations of ground gas recorded at the locations detailed within the Ground Investigation Report (REP1-023 to REP1-025). • Implementation of appropriate dust suppression measures to prevent migration of contaminated dust and asbestos fibres, in line with the asbestos risk assessment~~as appropriate~~. If any additional ACM / asbestos fibres ~~(particularly concentrations > 0.001%)~~ are identified during the works, the asbestos risk assessment will be updated, to ensure that control measures are appropriate at all times during the works.~~consideration should be given to the need for reassurance monitoring on construction personnel and / or at works area / sensitive site boundaries.~~ • Stockpile management (such as water spraying and avoiding over stockpiling to reduce compaction of soil and loss of integrity, covering of stockpiled materials and use of battering of exposed soil slopes) and timely removal of stockpiled soil to prevent windblown dust and entrainment of soil in surface water run-off. • Effective design of traffic control measures to reduce dust generation and minimise the amount of traffic within working areas, use of wheel washes and spraying of working areas and roadways;	Negligible to minor beneficial	CEMP

Ref	Impact	ES reference	DCO reference	Mitigation commitments	Residual effect (post mitigation) [not significant, neutral, slight/ moderate/ large adverse, slight/ moderate/ large beneficial]	Proposed plan reference (e.g. Proposed scheme layout plans, etc)
				• Implementing appropriate pollution incident control measures e.g. plant drip trays and spill kits during construction. • Implementing appropriate and safe storage of fuel, oils and equipment during construction. • Review and assessment of a detailed Unexploded Ordnance (UXO) desk study (relating to the proposed construction works) to assess the UXO hazard level prior to the breaking of ground and adoption of appropriate UXO mitigation measures during construction, if required. • Incorporation of appropriate hazard signage and/ or ground gas protection measures, if detailed design introduces enclosed spaces (e.g. below ground chambers / ducts) within the vicinity of the elevated ground gas concentrations recorded within the Ground Investigation Report (REP1-023 to REP1-025). • Appropriate ventilation of any construction phase temporary structures to be located within the vicinity of the elevated ground gas concentrations recorded within the Ground Investigation Report (REP1-023 to REP1-025). • Adoption of appropriate working practices and PPE by construction workers in the vicinity of the locations of elevated concentrations of ground gas recorded within the Ground Investigation Report (REP1-023 to REP1-025). • Confirmation that excavations in the vicinity of ATK-092 (see Ground Investigation Report (REP1-023 to REP1-025)) will not extend to the depth of the clay at c. 1.45m bgl (potential source of ground gas) and / or cause gas redirection towards the building to the south. Adoption of appropriate mitigation measures, if a potentially significant risk is identified. • Operation of the Scheme in accordance with the relevant regulations and best practice guidance in applying Best Available Techniques (BAT) and pollution prevention. • Exclusion of non-site inducted persons from construction areas during the construction phase.		
GS0.2	Impacts to Controlled Waters from disturbance of contaminated soils, groundwater and/or vapours / ground gases	Ch 10, Table 10.15 and section 10.9 TR010029/APP/6.1	Requirement 4 and 6	• Detailed design of Balancing Pond No. 1 to ensure that a pathway will not be created between the contaminated perched water identified within the historical landfill/recently deposited material and the identified surface water receptors. Potential design solutions could include, lining of Balancing Pond No. 1 and associated drainage system or further ground investigation to confirm the source of contamination and remediation of the source. • Management of perched water within the historical landfill/recently deposited material during construction, e.g. collection and off-site disposal to an appropriate facility or onsite treatment. • Management of material excavated from the historical landfill/recently deposited material during construction to ensure all run off is collected and appropriately managed e.g. collection and off-site disposal to an appropriate facility or onsite treatment. • Confirmation of suitability for reuse of excavated materials during construction through further reuse testing and controlled waters risk assessment relating to the specific location of reuse. • Monitoring of identified sensitive surface water features during construction to demonstrate that the works have not adversely impacted water quality. • Implementation of a watching brief and discovery strategy. If previously unencountered contaminated soils / water are discovered during construction, further assessment will be undertaken. Following assessment, further mitigation measures will be incorporated, if necessary. • Detailed drainage design will consider the land contamination and ground stability risks and designers may be required to use lined drainage systems where potential linkages have been identified. Sustainable urban drainage design aims to make sure the operational phase of a development is an improvement from the baseline with regards to management of potentially polluted surface water run-off (see RD0.6 above in the Road Drainage and the Water Environment section).	Negligible to minor beneficial	CEMP

Ref	Impact	ES reference	DCO reference	Mitigation commitments	Residual effect (post mitigation) [not significant, neutral, slight/ moderate/ large adverse, slight/ moderate/ large beneficial]	Proposed plan reference (e.g. Proposed scheme layout plans, etc)
				• Working method statements during construction to manage groundwater and surface water appropriately and ensure that there is no run-off from the works, material/waste stockpiles or from storage containers into adjacent surface watercourses. • Stockpile management (such as water spraying and avoiding over stockpiling to reduce compaction of soil and loss of integrity, covering of stockpiled materials and use of battering of exposed soil slopes) and timely removal of stockpiled soil to prevent windblown dust and entrainment of soil in surface water run-off. • Implementing appropriate pollution incident control measures e.g. plant drip trays and spill kits during construction. • Implementing appropriate and safe storage of fuel, oils and equipment during construction and measures to collect any contaminated water. • Appropriate piling design through PRA. • Operation of the Scheme in accordance with the relevant regulations and best practice guidance in applying BAT and pollution prevention.		
GS0.3	Impacts to property from disturbance of contaminated soils, groundwater and/or vapours / ground gases	Ch 10, Table 10.15 and section 10.9 TR010029/APP/6.1	Requirement 4 and 6	• If previously unencountered contaminated soils are discovered during construction, further assessment will be undertaken. Following assessment, further mitigation measures will be incorporated, if necessary. • Review and assessment of a detailed Unexploded Ordnance (UXO) desk study (relating to the proposed construction works) to assess the UXO hazard level prior to the breaking of ground and adoption of appropriate UXO mitigation measures during construction, if required. • Incorporation of appropriate hazard signage and/ or ground gas protection measures, if detailed design introduces enclosed spaces (e.g. below ground chambers / ducts) within the vicinity of the elevated ground gas concentrations recorded within the Ground Investigation Report (REP1-023 to REP1-025). • Appropriate ventilation of any construction phase temporary structures to be located within the vicinity of the elevated ground gas concentrations recorded within the Ground Investigation Report (REP1-023 to REP1-025). • Confirmation that excavations in the vicinity of ATK-092 (see Ground Investigation Report (REP1-023 to REP1-025)) will not extend to the depth of the clay at c. 1.45m bgl (potential source of ground gas) and / or cause gas redirection towards the building to the south. Adoption of appropriate mitigation measures, if a potentially significant risk is identified. • Detailed design of foundation solutions through stability analyses and design calculations for new and modified earthworks and structures using data obtained during the GI.	Negligible to minor beneficial	CEMP
GS0.4	Impacts to geomorphology and ground stability	Ch 10, section 10.9 TR010029/APP/6.1	Requirement 4	• Review and assessment of a detailed UXO desk study (relating to the proposed construction works) to assess the UXO hazard level prior to the breaking of ground and adoption of appropriate UXO mitigation measures during construction, if required. • Detailed design of foundation solutions through stability analyses and design calculations for new and modified earthworks and structures using data obtained during the GI. • Detailed design to ensure the stability of proposed surface water features, e.g. by using a shallow cutting bank batter to construct the ecological compensation ponds. • Implementation of suitable piling methodologies, which will be defined by the PRA. • Inspection of existing infrastructure assets and assessment of movements which can be tolerated. • Design of the temporary and permanent works to minimise movement (including appropriate analysis to predict magnitude of movements) on existing highways infrastructure and known service structures (i.e. Cadent and BPA line).	Neutral	CEMP

Ref	Impact	ES reference	DCO reference	Mitigation commitments	Residual effect (post mitigation) [not significant, neutral, slight/ moderate/ large adverse, slight/ moderate/ large beneficial]	Proposed plan reference (e.g. Proposed scheme layout plans, etc)
				• Monitoring of known service structures during the construction works to measure vibrations, with agreed trigger levels and action plans, if required.. • Limiting the area of earthworks at any one time to reduce temporary effects on topography. • Limiting plant operations as poor trafficability is anticipated due to soft predominantly fine soil ground conditions. • Limiting the duration of soil exposure and timely reinstatement of vegetation or hardstanding to prevent soil erosion.		
GS0.5	Impacts to BMV	Ch 10, section 10.9 TR010029/APP/6.1	Requirement 4	• Demarcation of the construction working corridor once defined, in order to prevent disturbance to adjacent land. • Diversion or restoration of existing land drainage systems affected by the engineering works. • In the flood mitigation areas, topsoil will be replaced on the engineered land. • Restoration of land occupied or disturbed during the construction process that is not permanently acquired for engineering and landscaping to a condition equivalent to its original. It will be subject to an aftercare period (duration to be agreed), during which time problems with settlement, drainage and weed infestation will be rectified. • The quality and quantity of soil on-site will be maintained by implementing appropriate techniques for stripping, stockpiling and reinstatement, in accordance with Defra's 2009 Code of Practice for the Sustainable Use of Soils on Construction Sites. • Land occupied or disturbed during the construction process that is not permanently acquired for engineering and landscaping will be restored to a condition equivalent to its original. • The operational impacts of BMV land loss to the new highway and flood mitigation area will be permanent. There is no environmental mitigation available for permanent land-take.	Slight adverse	CEMP
GS0.6	Impacts to waste and material	Ch 10, section 10.9 TR010029/APP/6.1	Requirement 4	• Implementation of a Materials Management Plan (MMP), Soil Handling Management Plan (SHMP) or Site Waste Management Plan (SWMP). • The quality and quantity of soil on-site will be maintained by implementing appropriate techniques for stripping, stockpiling and reinstatement (in accordance with Defra's 2009 Code of Practice for the Sustainable Use of Soils on Construction Sites).	See Materials and Waste section	CEMP
Cultural heritage						
CH0.1	Removal of archaeological remains	Ch 10, section 10.9 TR010029/APP/6.1	Requirement 9	Preservation of archaeological significance through evaluation, recording, and publication of information contributing to local and regional research objectives in line with the Outline Archaeological Management Plan (TR010020/9.45) which is acting as an overarching Written Scheme of Investigation for the Scheme. The Principal Contractor will be required to prepare a final Archaeological Management Plan (AMP) which is secured under Requirement 9 under the draft DCO.	Slight adverse	AMP CEMP
Materials and waste						
MW0.1	Depletion of primary materials or other resources	Ch 12, section 12.9 TR010029/APP/6.1	Requirement 4	• Adopt a material efficient design, to be implemented by the Design Team as the Scheme's design develops. Measurement will be via a brief statement from the design team estimating the overall quantity of material required through the application of an efficient design. Monitoring will be through confirmation from the Construction Team that the Scheme 'As Constructed' is in accordance with the design. • Use land temporarily reserved for material storage to significantly increase the amounts of materials that can be re-used within the Scheme and therefore reduce the import of primary or recycled materials.	Neutral	CEMP

Ref	Impact	ES reference	DCO reference	Mitigation commitments	Residual effect (post mitigation) [not significant, neutral, slight/ moderate/ large adverse, slight/ moderate/ large beneficial]	Proposed plan reference (e.g. Proposed scheme layout plans, etc)
				• Adopt an efficient delivery system to ensure that materials are brought to site proportional to their use to avoid/reduce potential damage and materials waste. • Develop and implement the CEMP to consider and manage the re-use of materials on-site, off-site secondary/recycled materials, locally sourced materials, and other responsibly sourced materials. The CEMP will include a SWMP and MMP, or equivalent, where required.		
MW0.2	Depletion of local or national waste management capacity	Ch 12, section 12.9 TR010029/APP/6.1	Requirement 4	• Design out waste where possible (e.g. through specification of standard lengths, use of offsite manufactured and modular elements to minimise on-site waste etc.). • Use land temporarily reserved for material storage to significantly increase the quantity of material that can be re-used within the Scheme and therefore reduce the import of primary or recycled materials. • Develop a MMP and a SWMP as part of the CEMP to explore methods to manage waste arising from the construction, demolition and excavation in accordance with the waste hierarchy and Duty of Care. • Segregate waste areas on site to ensure waste is classified correctly and to reduce/avoid cross contamination. • Leave hazardous materials (e.g. tar bound plannings) in situ where safe and feasible to do so to avoid unnecessary generation of hazardous waste arisings. • All wastes will be managed in accordance with the waste hierarchy and Duty of Care.	Construction, demolition and excavation waste - Neutral Hazardous waste - Neutral	CEMP
MW0.3	Re-use of controlled wastes	Ch 12, section 12.8 TR010029/APP/6.1	Requirement 4	• Develop, obtain approval and implement an environmental permit (Waste Recovery Permit) to re-use controlled wastes from Grove Farm area and Brook Street historic landfill on-site. The CEMP includes the requirements and commitments to segregate the controlled wastes from the other Scheme materials, monitor and record placement and deposition at final location, sample and record data as part of the final verification report.	Neutral	CEMP
People and communities						
PC0.1	Access, community severance and engagement	Ch 13, section 13.10 TR010029/APP/6.1	Requirements4 and 10	• Ensure a clear stakeholder plan is established to provide consistent and regular communication with a range of stakeholders. The plan must acknowledge the differing perspectives and issues of each stakeholder. Maintain communication with the general public pre-construction, during construction in line with the Community Engagement Plan. • The contractor will develop the Traffic Management Plan to set out access arrangements for all parties affected by the works during the construction phase. This will set out alternative access arrangements to ensure that access can be maintained at all times during the works. The alternative access arrangements will be communicated to all affected parties in good time so that they are aware of and can comment on the arrangements. • To ensure public transport routes and bus stops along the A12 are maintained and disruption is managed. Potential disruption should be discussed with local authorities, public bus companies and providers well in advance. Potential for temporary delays due to construction to be mitigated with appropriate traffic management. • Ensure the 498 bus route is maintained and disruption is managed. • During the operational stage, there will be no interference with the availability of existing access to identified receptors.	Slight Adverse	Scheme layout plans (application document TR010029/APP/2.7) Traffic Management Plan CEMP
PC0.2	NMU routes and PRoWs during construction stage	Ch 13, section 13.10 TR010029/APP/6.1	Requirement 4	• Construction works should be programmed so that affected PRoW, footpaths or cycleways remain open for the construction period, and so that new routes are available when existing routes require alteration. This applies primarily to the pedestrian footpath along the A12 off slip. The new A12 off slip should be constructed with associated footpath and be made available for use prior to the closure of the existing A12 off slip footpath.	Neutral	Scheme layout plans (application document TR010029/APP/2.7)

Ref	Impact	ES reference	DCO reference	Mitigation commitments	Residual effect (post mitigation) [not significant, neutral, slight/ moderate/ large adverse, slight/ moderate/ large beneficial]	Proposed plan reference (e.g. Proposed scheme layout plans, etc)
				• A clear and consistent signage strategy will be designed and implemented where necessary, to direct users during construction and support access to community and recreational facilities using footpaths and cycleways. • Existing crossings and routes only to be diverted or closed once alternative routes are in place.		CEMP
PC0.3	Drivers and driver stress during construction stage	Ch 13, section 13.10 TR010029/APP/6.1	Requirement 10	• Clear signage and provision of access information for all users during construction and before operation. • During the construction phase, a traffic management plan and site traffic management plan would be implemented to reduce any increase in stress caused by the roadworks. This would include temporary signage which would be put in place to reduce uncertainty and frustration.	Neutral	Traffic Management Plan
PC0.4	Land take during construction stage	Ch 13, section 13.10 TR010029/APP/6.1	Requirement 4	• Land acquired temporarily for construction compounds and working areas will be restored to a condition equivalent to its original before being returned to its owner. • Land within the DCO boundary that is not required for the Scheme permanently will be restored to its original use in agreement with landowners. • Restoration of land occupied or disturbed during the construction process that is not permanently acquired for engineering and landscaping to a condition equivalent to its original. It will be subject to an aftercare period, of a duration to be agreed, during which time problems with settlement, drainage and weed infestation will be rectified.	Significant adverse	Scheme layout plans (application document TR010029/APP/2.7) CEMP
PC0.5	Residential receptors during construction stage	Ch 13, section 13.10 TR010029/APP/6.1	Requirements 4 and 10	• Liaison to be managed with Grove Farm to ensure they can access and egress their property at all times during the construction. • Adherence to the noise and air quality mitigation measures set out in the CEMP and Traffic Management Plan as noted within this REAC including the use of lower noise road surfacing. • Use of a communication plan to provide a method of communication from affected residents.	Significant adverse	Scheme layout plans (application document TR010029/APP/2.7) Traffic Management Plan CEMP
PC0.6	Community receptors during construction stage	Ch 13, section 13.10 TR010029/APP/6.1	Requirement 4	Use of a communication plan to ensure affected community receptors have a method of communication with construction team.	Slight adverse	Scheme layout plans (application document TR010029/APP/2.7) CEMP
PC0.7	Golf course accommodation works	Ch 7, section 7.8 TR010029/APP/6.1	Requirement 4	Highways England would undertake the accommodation works necessary to provide a replacement golf hole 2 at Maylands Golf Course. The design should include the creation of habitat suitable [redacted] such as rough grassland/scrub/woodland) on existing green and fairway areas that will become redundant (e.g. fairway of existing golf hole 2) to result in no net loss of foraging and sheltering opportunities for these species in connection with the golf course mitigation.	Neutral	Scheme layout plans (application document TR010029/APP/2.7)
Climate						
C0.1	Global warming	Ch 14, section 14.11 TR010029/APP/6.1	Requirement 4	• Reduce material consumption and waste generation. • Reduce transport distances for materials and waste.	Not significant	CEMP

Ref	Impact	ES reference	DCO reference	Mitigation commitments	Residual effect (post mitigation) [not significant, neutral, slight/ moderate/ large adverse, slight/ moderate/ large beneficial]	Proposed plan reference (e.g. Proposed scheme layout plans, etc)
				• Select low-carbon, recycled and site-won materials where practicable. • Reduce transport distances of site workers. • Minimise energy consumption onsite as far as possible by using low-emission and high-efficiency construction plant. • Minimise water consumption onsite as far as possible by using efficient plant and processes. • Employ the Highways England Carbon Tool to monitor greenhouse gas emissions against Key Performance Indicators (KPIs).		

Table 1.2: REAC Part 2: Environmental action plan – Actions required before start of construction (i.e. during detailed design stage or before construction)

Ref.	ES ref.	Environmental objective	Action/commitment (including specific locations, if applicable and any assumptions of the action/commitment)	Action/commitment implementation methods (incl. stakeholder agreements)	Required monitoring details	Responsible person	Achievement criteria and reporting requirement	Completion record	Notes/further action
General									
GN1.1	N/A	Minimise effects on the environment	Preparation of a CEMP: • The Principal Contractor must prepare a CEMP for their works prior to the commencement of their works and which details the measures that shall be undertaken prior to, and during construction of, the Scheme. • The construction of the authorised development must be carried out in accordance with the approved CEMP. • No part of the authorised development is to commence until a CEMP, substantially in accordance with the Outline CEMP, for that part has been submitted to and approved in writing by the Secretary of State, following consultation with the relevant planning authority and local highway authority to the extent that it relates to matters relevant to its functions. • The CEMP must be written in accordance with ISO14001 and so far as is relevant to that part of the authorised development, must reflect the mitigation measures set out in this REAC and must include the management plans as set out in Requirement 4(2). • A HEMP must be developed and completed by the end of the construction, commissioning and handover stage of the authorised development, in accordance with the process set out in the approved CEMP. • The authorised development must be operated and maintained in accordance with the HEMP.	The CEMP must be submitted and approved in writing by the Secretary of State, following consultation with the relevant local authority and local highway authority to the extent that it relates to matters relevant to its functions.	N/A	Principal Contractor	N/A	Initial: Date:	N/A
Air quality									
AQ1.1	Ch 5, section 5.9	Plan the construction works to limit and control emissions to air	Develop the CEMP to ensure the works shall be carried out in accordance with the best practical means (BPM), as described in Section 79(9) of the Environmental Protection Act 1990, to reduce fumes or emissions which may affect air quality.	Local authorities to be consulted on mitigation measures outlined in the CEMP, and the methodology and locations for monitoring surveys.	Set up pre-construction monitoring of dust deposition three months before construction	Principal Contractor	An agreed plan to carry out the works in accordance with the agreement with the local authority. No justified complaints of dust nuisance from	Initial: Date:	N/A

Ref.	ES ref.	Environmental objective	Action/commitment (including specific locations, if applicable and any assumptions of the action/commitment)	Action/commitment implementation methods (incl. stakeholder agreements)	Required monitoring details	Responsible person	Achievement criteria and reporting requirement	Completion record	Notes/further action
							receptors in the vicinity of the Scheme. Daily site audits.		
Noise and vibration									
NV1.1	Ch 6, section 6.9	Agree construction phase noise and vibration levels with local authorities	Consult with local authorities regarding construction noise and vibration limit levels and Section 61 applications. Undertake any further baseline noise and vibration monitoring at residential locations as requested by the local authorities.	Agreement with London Borough of Havering and Brentwood Council on the methodology for surveys and monitoring.	N/A	Designer/Principal Contractor	Agree with the local authorities.	Initial: Date:	To be completed before any site work undertaken. Local authorities normally require noise and vibration monitoring immediately before construction.
NV1.2	Ch 6, section 6.9	Mitigate construction phase noise and vibration if required	Identify in the CEMP activities that could result in significant noise and vibration levels.	Consult on activities and locations with London Borough of Havering and Brentwood Council.	N/A	Highways England/ Designer/Principal Contractor	Agreement on locations and activities with the local authorities and Highways England.	Initial: Date:	To occur after Detailed Design - before start of construction. The requirement for mitigation measures is expected. This would be reconsidered after detailed construction programme and plant details.
Biodiversity									
BD1.1	Ch 7, section 7.9	To avoid the spread of non-native invasive species such as early goldenrod and Himalayan balsam and protect reinstated and created habitats from colonisation by these non-native species	Conduct invasive species surveys, identify all invasive species and their locations within the DCO boundary. Prepare an invasive species control method statement. Implement requirements as detailed in the invasive species control method statement.	Method to be advised by Principal Contractor and agreed with the Designer/Client.	To be advised by Principal Contractor	Competent subcontractor to be appointed by the Principal Contractor to manage invasive plant species.	Produce a detailed map indicating the locations of invasive species within the DCO boundary. Invasive species control method statement to conform to best practice guidelines and relevant legislation. Effectively remove the risk of spreading the invasive species within and outside of the Scheme. Produce a suitable method to comply with during construction to prevent spread.	Initial: Date:	Further actions may be required during construction to prevent the spread of invasive species. Presence of protected species to be taken into account during all management activities.
BD1.2	Ch 7, section 7.9	Continue to monitor fauna within the DCO boundary	[redacted]). React to a change in locations and population size of notable species by re-evaluating mitigation recommendations to ensure they continue to be sufficient.	Undertake surveys in accordance with approved methodology in agreement with the Designer/Client during survey season following method used to establish baseline. Ensure that any monitoring surveys required prior to	N/A	Principal Contractor's appointed Ecologist /Designer as required.	Complete record of species to enable works to be carried out without contravening legislation/guidance.	Initial: Date: Initial: Date:	Continue to observe the habitat for any change in species distribution during the construction phase as required.

Ref.	ES ref.	Environmental objective	Action/commitment (including specific locations, if applicable and any assumptions of the action/commitment)	Action/commitment implementation methods (incl. stakeholder agreements)	Required monitoring details	Responsible person	Achievement criteria and reporting requirement	Completion record	Notes/further action
			Establishment of an ecological survey and monitoring programme to be agreed with Highways England specialist and third parties as appropriate and in accordance with the ES. Where monitoring required prior to construction (e.g. for bats), this plan should be agreed prior to construction so that measures can be implemented. For habitats, agreement for post-construction monitoring can be agreed during the construction period.	commencement of construction are carried out (e.g. for bats).				Initial: Date:	The monitoring programme to be agreed with all stakeholders, in particular to decide what the indicators of success would be. This could include the successful establishment of certain species, or % cover of certain botanical species. See Table 1.4 for post construction requirements.
BD1.3	Ch 7, Section 7.9	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted] Initial: Date:	[redacted] N/A
BD1.4	Ch 7, section 7.9	Temporary displacement of reptiles	Create a method statement / mitigation strategy / PMW that follows legislation and best practice guidelines for the displacement of common species of reptile from the construction footprint.	Input into detailed design and landscape strategy	N/A	Principal Contractor's appointed Ecologist	The successful displacement of species that will be affected. The affected area is clear of protected species so work can commence without committing legal offenses.	Initial: Date:	N/A
BD1.5	Ch 7, section 7.9	Removal of bat roost features (trees). Replacement roosting features (if required by bat licence)	Undertake checks for roosting bats. If roosting bats are found, apply for an EPS licence. Ensure works undertaken in accordance with a bat licence as issued by Natural England. Appropriate mitigation to be implemented as detailed in licence (if required). Ensure that replacement roosting features are provided as detailed in licence (if required).	Timing and method of works in accordance with licence as agreed with Natural England (if required).	To be advised by Natural England	Principal Contractor's appointed Ecologist (licence holder)	The successful closure of bat roosts that will be affected, and the provision of mitigation measures, so work can commence without committing legal offenses. Adherence to method statement of licence (if required) and licence conditions. Records of all licensable actions to be kept and reviewed.	Initial: Date:	N/A
BD1.6	Ch 7, section 7.9	Protection of retained bat roosts (including Tree 36)	Ensure measures to protect retained roosts (such as Tree 36) from visual and noise disturbance are included in the CEMP.	Via CEMP (or licence from Natural England if required)	As agreed in CEMP	Principal Contractor's appointed Ecologist	The successful protection of roosts.	Initial: Date:	N/A

Ref.	ES ref.	Environmental objective	Action/commitment (including specific locations, if applicable and any assumptions of the action/commitment)	Action/commitment implementation methods (incl. stakeholder agreements)	Required monitoring details	Responsible person	Achievement criteria and reporting requirement	Completion record	Notes/further action
			Ensure roost is reassessed by a licenced bat ecologist and an EPS licence applied for if risk to roost can not be avoided.						
BD1.7	Chapter 7, section 7.9	Safe mammal passage through culverts	Safe mammal passage through culverts will be included through length of extended and existing culverts, including otter fencing as required to deter otter from crossing the carriageway.	Developed during detailed design	N/A	Designer	Agreed detailed design	Initial: Date:	Designed to standard requirements for safe mammal passage.
BD1.8	Chapter 7, section 7.9	Provide appropriate reinstated and created habitats	Develop detailed design of habitats based on the preliminary environmental design and Outline LEMP, taking into account requirements for mitigation for protected species as set out in Table 1.1. Where necessary, carry out soil tests or surveys to develop appropriate species mixes.	Developed during detailed design as part of the landscape scheme	N/A	Designer / Principal Contractor's ecologist	Agreed detailed design	Initial: Date:	N/A
BD1.9	Chapter 7, Section 7.9	Provide appropriate long-term management and monitoring of habitats	Preparation of a final version of the LEMP: • In conjunction with detailed design, the Principal Contractor must prepare an updated LEMP for implementation following completion of the authorised development. • The LEMP must be substantially in accordance with the habitat management objectives, targets and prescriptions set out in Outline LEMP.	Developed during detailed design. May require engagement with LPA.	As set out in the LEMP	Designer / Principal Contractor	Agreed LEMP	Initial: Date:	LEMP
BD1.10	Chapter 7, section 7.9	Protection of trees, including veteran trees Compensation for loss of veteran tree resource and habitat for terrestrial invertebrates	Review Arboricultural Impact Assessment and associated Tree Protection Plans. Ensure measures incorporated into CEMP and Arboricultural Method Statement. Identify suitable trees for 'veteranisation'. Identify locations for creation of dead wood 'monoliths' and locations to move some felled trees will be retained on-site and repositioned to benefit invertebrates.	To be included in CEMP	As set out in CEMP	Principal Contractor's ecologist	As per CEMP.	Initial: Date:	N/A
BD1.11	Chapter 7, section 7.9	Protection of habitats and species	Input into CEMP, including plans to protect retained habitats through construction (including veteran trees and all other retained trees), creation of PMWs for species. Ensure CEMP includes relevant measures to create committed mitigation features such as dead wood for invertebrates.	To be included in CEMP	As per each method statement or habitat/species protection plan/PMW	Principal Contractor's ecologist	As per CEMP.	Initial: Date:	N/A

Ref.	ES ref.	Environmental objective	Action/commitment (including specific locations, if applicable and any assumptions of the action/commitment)	Action/commitment implementation methods (incl. stakeholder agreements)	Required monitoring details	Responsible person	Achievement criteria and reporting requirement	Completion record	Notes/further action
Road drainage and the water environment									
RD1.1	Ch 8, section 8.9	To comply with the DMRB guidance, ensure discharges from the road do not lead to a deterioration in the classification status of receiving waterbodies	Develop a detailed drainage design in agreement with the Environment Agency in relation to the treatment of road runoff pollutants.	N/A	N/A	Designer	Agreed detailed design.	Initial: Date:	N/A
RD1.2	Ch 8, section 8.9		Undertake appropriate levels of assessment in line with the DMRB to assess the effects of routine runoff on surface waters, groundwaters and the likelihood and effects of spillage assessed.	Develop drainage design during detailed design phase to ensure DMRB standards are still met.	Agreement to design with Environment Agency	Designer	Agreed detailed design, compliance with standards or agreed derogation with Environment Agency.	Initial: Date:	N/A
RD1.3	Ch 8, section 8.9		Develop Pollution Prevention Plan, including spillage response measures and incorporate in the CEMP.	Agreement of Pollution Prevention Plan with Environment Agency	N/A	Principal Contractor	Pollution Prevention Plan in place prior to construction.	Initial: Date:	N/A
RD1.4	Ch 8, section 8.9		Prepare appropriate method statements for working with and storing oils and chemicals in line with the requirements of the Control of Pollution (Oil Storage) (England) Regulations 2001.	Agreement of method statement with Environment Agency			Appropriate method statements in place prior to construction.	Initial: Date:	N/A
RD1.5	Ch 8, section 8.9		Design an Environmental Incident Control Plan for the construction period on site to ensure protective measures are implemented to deal with both normal and emergency situations.	Agreement of Incident Control Plan with Environment Agency			Environmental Incident Control Plan in place prior to construction.	Initial: Date:	N/A
RD1.6	Ch 8, section 8.9		Agree a Drainage Strategy for the construction site.	Agreement of Drainage Strategy with Environment Agency			Agreement of drainage strategy with Environment Agency.	Initial: Date:	N/A
RD1.7	Ch 8, section 8.9		Complete a groundwater risk assessment will be completed to determine the impact of the Scheme on groundwater quality and whether any mitigation measures are required.	Agreement with Environment Agency	N/A	Designer	Approval of groundwater risk assessment with Environment Agency.	Initial: Date:	N/A
RD1.8	Ch 8, section 8.9	To avoid impacts on surface water and provide mitigation and betterment in the form of SuDS during operation	The drainage design will provide mitigation in the form of SuDS. The choice of the system is dependent on the physical environment of the Scheme and needs to consider the availability of land, climate and rainfall characteristics, soil permeability, topography and spillage risk.	Agreement on drainage design with Environment Agency	N/A	Designer	Approval from Environment Agency.	Initial: Date:	N/A
RD1.9	Ch 8, section 8.9	Prevent adverse effects on flood risk	Prepare a construction phase Surface Water Management Plan.	Discuss and consult with the relevant planning authorities	N/A	Principal Contractor	Surface Water Management Plan in place prior to construction, approved by SoS as part of the final CEMP under Requirement 4.	Initial: Date:	N/A

Ref.	ES ref.	Environmental objective	Action/commitment (including specific locations, if applicable and any assumptions of the action/commitment)	Action/commitment implementation methods (incl. stakeholder agreements)	Required monitoring details	Responsible person	Achievement criteria and reporting requirement	Completion record	Notes/further action
RD1.10	Ch 8, section 8.9		Develop detailed drainage design that provides adequate capacity and green field run-off rate.	Discuss and agree with the relevant planning authorities~~Environment Agency~~	N/A	Designer/Principal Contractor	Agreement of detailed drainage design with the relevant planning authorities~~Environment Agency~~.	Initial: Date:	N/A
RD1.11	Ch 8, section 8.9		Secure an Environmental Permit from the Environment Agency for the works on Ingrebourne River and Weald Brook associated with the relevant construction works, including the construction of bridges required for the loop road.	Discuss and agree with Environment Agency	N/A	Designer/Principal Contractor	Issue of Environmental Permit from EA before construction phase.	Initial: Date:	N/A
RD1.12	Ch 8, section 8.9		Sign up to the Environment Agency flood warning system put in place a procedure to ensure timely evacuation of personnel (and plant if safe to do) from the floodplain. Locate site compounds outside 1 in 100 (1%) annual probability flood extents. No plant or materials to be stored within the 1 in 100 (1%) annual probability flood extents based	N/A	N/A	Designer/Principal Contractor	Flood Warning system signed up to	Initial: Date:	N/A
RD1.13	Ch 8, section 8.9		An appropriate method statement for potential water ingress into excavations will be prepared.	N/A	N/A	Designer/Principal Contractor	N/A	Initial: Date:	N/A
RD1.14	Ch 8, section 8.9	Prevent adverse effects on groundwater flow	Detailed piling design will ensure that groundwater flow is not adversely effected and that no barrier to groundwater flow is created.	Assessment of impact within PRA followed by agreement with Environment Agency	All actions agreed with the Environment Agency will be carried out	Designer/Principal Contractor	The PRA will be submitted to the Environment Agency for approval and agreement prior to commencement of the construction phase.	Initial: Date:	N/A
RD1.15	Ch 8, section 8.9	Comply with Water Framework Directive	To review and update the WFD compliance assessment when any changes to the design likely to have an impact at a waterbody scale are made to ensure that the Scheme is WFD compliant.	Discussion with and input from Environment Agency	N/A	Designer	Inclusion of mitigation measures stated in the Water Framework Directive assessment in the design.	Initial: Date:	N/A
RD1.16	Ch 8, section 8.9		Ensure Environment Agency agree with the Water Framework Directive compliance assessment.	Agreement with Environment Agency				Initial: Date:	N/A
RD1.17	Ch 8, section 8.9		Confirm method and programme of off-site mitigation works to be undertaken by EA.	Agreement with Environment Agency	N/A	Designer	Agreed detailed design.	Initial: Date:	N/A
RD1.18	Ch 8, section 8.9	Prevent pollution of aquifers and prevent pollution of surface waters	Drainage design will consider the risks from any residual contamination.	Environmental controls will be included within the CEMP and implemented through the construction phase.	N/A	Designer	Agreed detailed design.	Initial: Date:	N/A
Landscape									
LV1.1	Ch 9, section 9.9	Mitigation planting to replace lost vegetation	Prepare detailed landscape and ecological design including planting		N/A	Designer/Principal Contractor	Approval of documents by Highways England after	Initial: Date:	N/A

Ref.	ES ref.	Environmental objective	Action/commitment (including specific locations, if applicable and any assumptions of the action/commitment)	Action/commitment implementation methods (incl. stakeholder agreements)	Required monitoring details	Responsible person	Achievement criteria and reporting requirement	Completion record	Notes/further action
LV1.2	Ch 9, section 9.9	Mitigation planting to integrate the Scheme design	schedules and specification documentation.	Share design proposals with Natural England and local authorities.			consultation with third parties statutory bodies as appropriate.	Initial: Date:	N/A
LV1.3	Ch 9, section 9.9	Mitigation planting to provide screening functions						Initial: Date:	N/A
LV1.4	Ch 9, section 9.9	Mitigation planting to provide habitat replacement and/or enhancement						Initial: Date:	N/A
LV1.5	Ch 9, section 9.9	Mitigation grass seeding to replace and integrate lost verge grass and incorporate new species rich grassland areas						Initial: Date:	N/A
LV1.6	Ch 9, section 9.9	Mitigation planting to balancing ponds						Initial: Date:	N/A
LV1.7	Ch 9, section 9.9	Mitigation planting to replace lost woodland and trees associated with the construction of the Scheme						Initial: Date:	N/A
LV1.8	Ch 9, section 9.9	Mitigation planting to screen the Scheme from sensitive receptors						Initial: Date:	N/A
LV1.9	Ch 9, section 9.9	Ensure protection of trees covered by TPO's, Ancient Woodland and veteran trees is undertaken prior to construction	Landscape input into the fencing design and Principal Contractor's implementation programme to ensure a suitable security fence is proposed around the sensitive locations.	Consultation with Forestry Commission Woodland Trust and local authorities on methods.	N/A.	Designer/Principal Contractor	Confirmation of method with consultees.	Initial: Date:	N/A
LV1.10	Ch 9, section 9.9	Ensure earthworks design suitable for planting and seeding and to determine requirement for soil retention	Landscape input into detailed design of all slope gradients/earthworks. Landscape to consider requirement for soil retention on any slopes steeper than 1:2.5.	Approval of earthworks design by environmental designer.	N/A	Designer/Principal Contractor	Approval of documents by Highways England.	Initial: Date:	N/A
Geology and soils									
GS1.1	Ch 10, section 10.9	Prevent adverse effects to identified on-site and off-site receptors associated with the disturbance of potential soil or groundwater contamination or ground gas/vapours	Completion of a Contaminated Land Management Plan (CLMP) to capture all required actions and ensure implementation. Identification, during detailed design, of locations of any proposed enclosed spaces (e.g. below ground chambers / ducts) and temporary structures during construction to allow confirmation of any ground gas protection requirements. Also see GS1.4, GS1.5 & GS1.6.	The CLMP will be produced following consultation with the Environment Agency and the relevant planning authority. Ground gas protection measures will be proposed following consultation with the relevant planning authority.	N/A	Designer/ Principal Contractor	The CLMP will be produced following consultation with the Environment Agency and the relevant planning authority.	Initial: Date:	N/A

Ref.	ES ref.	Environmental objective	Action/commitment (including specific locations, if applicable and any assumptions of the action/commitment)	Action/commitment implementation methods (incl. stakeholder agreements)	Required monitoring details	Responsible person	Achievement criteria and reporting requirement	Completion record	Notes/further action
GS1.2	Ch 10, section 10.9	Limit permanent removal of soils during earthworks and foundation construction and reuse of excess materials	A SWMP, MMP and SHMP will be outlined at pre-construction to ensure that measures to reduce the volumes of waste and materials permanently removed from the site are considered whilst planning construction works. It is also proposed that controlled wastes from Grove Farm area and Brook Street historic landfill are re-used under a Waste Recovery Permit (WRP). Human health / controlled waters risk assessment and development of reuse criteria to ensure that reuse of material on site does not pose a risk to controlled waters or human health at specific locations of reuse.	Mitigation measures and environmental controls will be included within the CEMP, MMP, WRP, SWMP and SHMP and implemented through the construction phase.	Mitigation measures as set out in the CEMP, MMP, SRMP and SWMP and the SHMP will be monitored during the construction phase.	Principal Contractor/ Designer	SHMP, SRMP, SWMP and CEMP (including an MMP where required).	Initial: Date:	N/A
GS1.3	Ch 10, section 10.9	Prevention of spread of possible contamination within site soils, surface waters or groundwater due to construction activities and prevention of spills and leaks of hazardous substances	Work to be planned in accordance with appropriate guidelines and best practices as far as is reasonably practicable. ~~Construction works should be planned to consider best practice guidance with relation to the following.~~	Environmental controls will be included within the CEMP and implemented through the construction phase.	Mitigation measures and environmental controls within the SHMP, CEMP (including MPP where required) and outlined in the Detailed Design will be monitored during construction	Designer Principal Contractor	CEMP	Initial: Date:	N/A
GS1.4	Ch 10, section 10.9	Prevent pollution of aquifers and prevent pollution of surface waters	Work will be undertaken in accordance with appropriate guidelines and best practices. PRA will be undertaken in line with relevant Environment Agency guidance to assess the risk from piling and to determine appropriate piling design. Detailed design of Balancing Pond No. 1 and associated drainage system to ensure that a pathway will not be created between the contaminated perched water identified within the historical landfill/recently deposited material and the identified surface water receptors.	Environmental controls will be included within the CEMP and CLMP and implemented through the construction phase. PRA will be submitted to and agreed by the Environment Agency. Design proposals will be shared with the Environment Agency.	Mitigation measures and environmental controls within the SHMP, CEMP (including MPP where required) and outlined in the Detailed Design will be monitored during construction	Designer Principal Contractor	Mitigation measures to be included in the detailed design as well as the CEMP, CLMP and PRA	Initial: Date:	N/A
GS1.5	Ch 10, section 10.9	Protection of identified on-site and off-site human health receptors from exposure to potentially contaminated soil, dust or fibres through ingestion/ inhalation/ dermal contact	Detailed design to ensure that the final surface of all areas of ground break will be either hardstanding or constructed landscaping and implementation during construction. Detailed design to ensure placement of any Made Ground to be reused within the Scheme is at depth within embankments or below hardstanding / other soils.	Environmental controls will be included within the CEMP and CLMP and implemented through the construction phase.	Mitigation measures and environmental controls laid out within the CEMP will be monitored during construction	Designer Principal Contractor	Mitigation measures to be included in detailed design as well as the CEMP. CLMP, SHMP and MMP	Initial: Date:	N/A

Ref.	ES ref.	Environmental objective	Action/commitment (including specific locations, if applicable and any assumptions of the action/commitment)	Action/commitment implementation methods (incl. stakeholder agreements)	Required monitoring details	Responsible person	Achievement criteria and reporting requirement	Completion record	Notes/further action
GS1.6	Ch 10, section 10.9	Prevent adverse impacts to on-site or off-site property receptors associated with the presence of potential aggressive constituents in soil or groundwater	The ground investigation indicated that the aggressivity of the soil to concrete within the study area has a classification ranging from DS-1 AC-1 to DS-4 AC-4. The detailed design needs to consider the aggressivity of the soil and ensure that each structure is appropriate for the identified soil aggressivity.	Appropriate design measures to be included at detailed design and implemented during construction.	CEMP to include measures to ensure appropriate materials are being utilised	Designer/ Principal Contractor	Geotechnical Design Report approved by Highways England	Initial: Date:	N/A
GS1.7	Ch 10, section 10.9	Prevent injury/death to human receptors and/or damage to property receptors associated with the potential discovery and unplanned/ uncontrolled detonation of Unexploded Ordnance (UXOs)	The assessment of UXO risks has been undertaken in a phased approach (preliminary and main assessment). To further assess the UXO hazard level within the Scheme, a detailed UXO desk study was obtained prior to undertaking any ground investigation and a UXO survey was completed. A further detailed UXO desk study will be undertaken in relation to the proposed construction works. Mitigation measures identified through the above assessment to reduce the risk, including the need for any additional assessments/surveys, will be detailed in the CEMP accordingly. Future work relating to UXO risks will follow CIRIA C681 guidelines, including the need to include and control UXO risks through the site Health and Safety File, Construction Phase Plan and site Emergency Response Plan.	Review of the UXO detailed desk study and UXO survey to determine further actions and required mitigation measures prior to the breaking of ground. All required mitigation measures and recommendations will be agreed prior to the start of construction.	N/A	Client/Designer/ Principal Contractor	Mitigation measures laid out within the CEMP and in the site Health and Safety file, Construction Phase Plan and site Emergency Response Plan as required.	Initial: Date:	N/A
GS1.8	Ch 10, section 10.9	Prevent adverse effects from ground stability / settlement as a result of the Scheme	Detailed design of foundation solutions through stability analyses and design calculations for new and modified earthworks and structures using data obtained during the GI. Detailed design to ensure the stability of proposed surface water features. Inspection of existing assets and infrastructure and assessment of movements which can be tolerated. Design of the temporary and permanent works to minimise movement (including appropriate analysis to predict magnitude of movements) on existing highways infrastructure and known service structures (Cadent and BPA line).	The detailed design will be agreed and signed off by Highways England in line with the DMRB	• Monitoring of known service structures during the construction works to measure vibrations, with agreed trigger levels and action plans, if confirmed required during detailed design	Designer/ Principal Contractor	Geotechnical Design Reports approved by Highways England	Initial: Date:	N/A
Cultural heritage									

Ref.	ES ref.	Environmental objective	Action/commitment (including specific locations, if applicable and any assumptions of the action/commitment)	Action/commitment implementation methods (incl. stakeholder agreements)	Required monitoring details	Responsible person	Achievement criteria and reporting requirement	Completion record	Notes/further action
CH1.1	Ch 11, section 11.9	Identify archaeological remains that may be encountered during construction and achieve preservation by record	The Scheme shall seek to avoid direct impacts on known heritage assets during enabling and construction works. This can be achieved through careful design, including well designed screening, to site works away from heritage assets. Prepare an Archaeological Management Plan to cover the identification, evaluation and recording of significant archaeological material in advance of and during construction (or other means as appropriate) following agreement with the Archaeological Officers of the Greater London Archaeology Advisory Service and Essex County Council.	Agreement with Archaeological Officers of the Greater London Archaeology Advisory Service and Essex County Council Archaeological Advisor.	As determined necessary by methodologies outlined in the Archaeological Management Plan. Archaeological monitoring required in all areas identified by local planning policy as areas of high archaeological potential	Designer/Principal Contractor	Agreement with the Archaeological Officers of the Greater London Archaeology Advisory Service and Essex County Council on content of the Written Scheme of Investigation and Archaeological Management Plan.	Initial: Date:	Archaeological Management Plan and any required Written Schemes of Investigation to be prepared by an appropriate archaeological specialist or specialists.
Materials and waste									
MW1.1	Ch 12, section 12.9	Reduce import of primary materials or other resources and maximise re-use of materials through design and planning	Adopt material efficient design.	Design decisions that have reduced the materials required for the Scheme have been recorded in the Environmental Statement. Any further revisions to the Scheme's design should consider using materials efficiently.	N/A	Designer	Statement from Design Team estimating the overall quantity of material required through the application of an efficient design.	Initial: Date:	N/A
			Implement good materials management and good practice construction methods, including use of temporary materials storage areas.	Development of a SWMP as part of the CEMP. Organising deliveries so materials arrive on-site as they are needed to reduce the possibility of damage and wastage occurring.	N/A	Principal Contractor	Approval of a CEMP and SWMP by Highways England. Confirmation that a Construction Traffic and Logistics Management Plan has been produced and approved by Highways England prior to implementation.	Initial: Date:	
			Use sustainable materials and re-use site-won materials within the Scheme to reduce use impact on primary materials or other resources where feasible to do so.	Development of MMP, use of materials under WRAP Quality Protocol (aggregates from inert waste) or other means of demonstrating end-of-waste status to enable re-use of soil and aggregates within the Scheme. The MMP will identify temporary land available for storage of materials. Supply the MMP to the Environment Agency ahead of a formal application.	N/A	Principal Contractor	Confirmation that an MMP has been produced during the pre-construction phase. Consult with the Environment Agency and local authority on the MMP prior to implementation. Documentation and evidence in relation to materials re-use should be included in the verification report upon completion of the works.	Initial: Date:	N/A

Ref.	ES ref.	Environmental objective	Action/commitment (including specific locations, if applicable and any assumptions of the action/commitment)	Action/commitment implementation methods (incl. stakeholder agreements)	Required monitoring details	Responsible person	Achievement criteria and reporting requirement	Completion record	Notes/further action
				Use precast and off-site assembled components where applicable.					
MW1.2	Ch 12, section 12.9	Minimise waste generation and off-site waste management through design and planning	Design out waste from the Scheme, where possible.	Review and revise the Scheme in next stages to reduce waste.	N/A	Designer	Updated statement in SWMP from Design Team estimating the overall quantity of waste reduced through the application of designing out waste measures.	Initial: Date:	N/A
			Consider good materials management and good practice construction methods, including use of temporary materials storage areas. Segregate waste at source, to reduce mixing of wastes and ensure wastes are disposed correctly.	Develop a SWMP as part of the CEMP in the pre-construction phase to explore methods to manage waste arising from the construction in accordance with the waste hierarchy. Waste classification and disposal to be done in accordance with Duty of Care.	N/A	Principal Contractor	Approval of SWMP and CEMP by Highways England. Record waste volumes generated and Duty of Care information.	Initial: Date:	N/A
MW1.3	Ch 12, section 12.9	Reduce impacts associated with importing materials and exporting waste through design and planning	Identify nearby sources of materials and suitable local or regional waste management facilities. Consider good practice construction methods and reduce haulage distances and/or need to travel.	Develop an MMP and SWMP, as part of the CEMP, considering the proximity principle and the social or environmental impacts of transporting waste and materials. Construction Traffic Logistics Management Plan to consider materials and waste transport options based on their sustainability.	N/A	Principal Contractor	Confirmation that a CEMP, SWMP, MMP and Construction Traffic and Logistics Management Plan have been produced and approved by Highways England during the pre-construction phase. Approval of the WRP by the Environment Agency. Details of materials used, imported, and removed from site (wastes) should be reported in the verification report upon completion of the works, and provided to Highways England, local authority and Environment Agency for approval.	Initial: Date:	N/A
People and communities									
PC1.1	Ch 13, section 13.9	To mitigate the impacts of construction on communities and people	Ensure a clear and easy to access complaints and advice helpline and ensure that complaints are responded to, investigated and addressed promptly. Establish a clear stakeholder plan to provide consistent and regular communication with a range of stakeholders. The plan must	Community Liaison Plan	Community Liaison Plan to be reviewed every six months	Principal Contractor	Good community relations. Downward trend in complaints over the course of the Scheme. Annual report to Highways England and the local authorities.	Initial: Date:	N/A

Ref.	ES ref.	Environmental objective	Action/commitment (including specific locations, if applicable and any assumptions of the action/commitment)	Action/commitment implementation methods (incl. stakeholder agreements)	Required monitoring details	Responsible person	Achievement criteria and reporting requirement	Completion record	Notes/further action
			acknowledge the differing perspectives and issues of each stakeholder. Limit the extent of direct, permanent land take and severance affecting identified individual receptors.						
PC1.2	Ch 13, section 13.9	To mitigate the impacts of construction on private residential receptors	Review the Traffic Management Plan to ensure that access to all properties will be maintained during the course of the works. Alternative access arrangement to be made available prior to construction works commencing to ensure no interruption to access.	Update the Traffic Management Plan after discussions	Access to be reviewed as required	Principal Contractor	No objections to access arrangement from residents and emergency services.	Initial: Date:	N/A
PC1.3	Ch 13, section 13.9	To mitigate the impacts of construction on Community Assets	Ensure the 498 bus route is maintained and disruption is minimised. Establish a clear stakeholder plan to provide consistent and regular communication with a range of stakeholders. The plan must acknowledge the differing perspectives and issues of each stakeholder.	Community Liaison Plan	Operation of bus routes reviewed quarterly during construction	Principal Contractor	No reduction of bus services during construction. Highways England kept informed of discussions.	Initial: Date:	N/A
PC1.6	Ch 13, section 13.9	To mitigate the impacts of construction on NMU	Construction works will be programmed so that affected PRoW, footpaths or cycleways remain open or suitable alternative diversions are planned for duration, of the construction period, and so that other routes can act as a diversion route for those affected. A clear and consistent signage strategy will be designed, to direct users during construction and support access to community and recreational facilities using footpaths and cycleways. Users of affected PRoW, footpaths and cycleways should be notified of planned diversions, with signs along sections to be closed during construction, at least one month prior to the works.	Include PRoW measures in the Community Liaison Plan.	N/A	Principal Contractor	No complaints regarding amendments to NMU routes	Initial: Date:	N/A
PC1.7	Ch 13, section 13.9	To mitigate the impacts of construction on Vehicle Travellers	A Traffic Management Plan, produced by the contractor, will be prepared and updated as necessary to mitigate a number of negative effects for road users during construction and to ensure the businesses that require customer, supply chain and delivery access are not impacted significantly. Review the design to minimise effects upon vehicular travellers during construction through traffic management measures. All diversion routes and any temporary or	Agreement of Traffic Management Plan with local authorities and emergency services and CPS.	To be reviewed in line with the customer care plan	Principal Contractor	Traffic Management Plan agreed with local authorities and emergency services.	Initial: Date:	N/A

Ref.	ES ref.	Environmental objective	Action/commitment (including specific locations, if applicable and any assumptions of the action/commitment)	Action/commitment implementation methods (incl. stakeholder agreements)	Required monitoring details	Responsible person	Achievement criteria and reporting requirement	Completion record	Notes/further action
			permanent closures of roads would need suitable signage to minimise adverse effects on driver stress.						
Climate									
C1.1	Ch 15, section 15.11	Reduce greenhouse gas emissions from material production and transport to site	• Design out materials, where possible; • Specify low-carbon alternative materials, where practicable; • Specify materials that can be sourced locally; • Specify materials in standard quantities, to prevent over-supply and wastage; • Incorporate site-won materials where possible; • Employ the HE Carbon Tool to monitor carbon emissions against KPIs.	Design review to identify ways of reducing material usage.	N/A	Designer	HE Carbon Tool to assess carbon emissions against KPIs.	Initial: Date:	N/A
C1.2		Reduce greenhouse gas emissions from waste generation and transport from site	• Review design to specify materials in standard quantities, to prevent over-supply and wastage; • Incorporate site-won materials where possible; • Employ the Highways England Carbon Tool to monitor carbon emissions against KPIs.	Design review to identify ways of reducing material usage.	N/A	Designer	Highways England Carbon Tool to assess carbon emissions against KPIs.	Initial: Date:	N/A
C1.3	Ch 15, section 15.11	Reduce greenhouse gas emissions from construction processes	Review design with energy and water efficiency construction processes in mind.	N/A	N/A	Designer	Highways England Carbon Tool to assess carbon emissions against KPIs.	Initial: Date:	N/A
C1.4	Ch 14, section 14.24	To prevent: • Hotter summers damaging materials and reducing asset lives • Heavier rain and wetter winters from weakening soil beneath the carriageway causing damage to assets	Review the detailed design to ensure that the: • Materials selected are robust enough to endure a range of extreme climate futures; • Structures are designed to adapt to the expected variations in temperature.	Design review	N/A	Designer	Statement from Design Team confirming the detailed design is complaint with the DMRB requirements and confirmation that appropriate consideration was given to the projected future changes to climate.	Initial: Date:	N/A
C1.5	Ch 14, section 14.24	To prevent increased sedimentation during hotter drier summers from reducing the design capacity of drainage infrastructure	Review the detailed design to ensure that the: • Landscape design is appropriate; • Drainage design is appropriate.	Design review	N/A	Designer	Statement from Design Team confirming the detailed design is complaint with the DMRB requirements and confirmation that appropriate consideration was given to the projected future changes to climate.	Initial: Date:	N/A

Ref.	ES ref.	Environmental objective	Action/commitment (including specific locations, if applicable and any assumptions of the action/commitment)	Action/commitment implementation methods (incl. stakeholder agreements)	Required monitoring details	Responsible person	Achievement criteria and reporting requirement	Completion record	Notes/further action
C1.6	Ch 14, section 14.24	To ensure embankment stability during hotter drier summers	Review the detailed embankment design to ensure it accounts for hotter drier summers and check the associated proposed geology and soils mitigation has been implemented.	Design review	N/A	Designer	Statement from Design Team confirming the detailed design is complaint with the DMRB requirements and confirmation that appropriate consideration was given to the projected future changes to climate.	Initial: Date:	N/A
C1.7	Ch 14, section 14.24	To prevent assets being damaged by more frequent storms in the future (in particular lighting and electronic display equipment)	Review the detailed designs level of protection against transient overvoltage (lightning strikes).	Design review	N/A	Designer	Statement from Design Team confirming the detailed design is complaint with the DMRB requirements and confirmation that appropriate consideration was given to the projected future changes to climate.	Initial: Date:	N/A
C1.8	Ch 14, section 14.24	To prevent flood risk increasing beyond acceptable limits in the future as a result of climate change (wetter winters and heavier rain)	Review the climate change allowance incorporated into the detailed drainage design.	Design review	N/A	Designer	Statement from Design Team confirming the detailed design is complaint with the DMRB requirements and confirmation that appropriate consideration was given to the projected future changes to climate.	Initial: Date:	N/A
C1.9	Ch 14, section 14.24	To protect the water environment from impacts associated with climate change	Review the detailed drainage design to ensure any connections to the water environment include sufficient pre-treatment to protect receptors against more intense first flush impacts in the future. Also check the design accounts for the fact that river flows could reduce in the future.	Design review	N/A	Designer	Statement from Design Team confirming the detailed design is complaint with the DMRB requirements and confirmation that appropriate consideration was given to the projected future changes to climate.	Initial: Date:	N/A

Table 1.3: REAC Part 2: Environmental action plan – Actions required during construction

Ref.	ES/ DCO ref.	Environmental objective	Action/Commitment (including specific locations, if applicable and any assumptions of the action/commitment)	Action/Commitment implementation methods (including stakeholder agreements)	Required monitoring details	Responsible person	Achievement criteria and reporting requirement	Completion record	Notes/further action
Air quality									
AQ2.1	Ch 5, section 5.9	Limit and control emissions to air during construction	Develop a management plan that shall take into account the principles of prevention and mitigation and London Borough of Havering's Air Quality Action Plan, Air Quality Planning Guidance, and Local Plan, and Brentwood Borough Council's Local Plan to prevent dust and pollutant emissions as far as reasonably and practically possible. To limit and control emissions to air during construction, works shall be carried out in accordance with the BPM, as described in Section 79(9) of the Environmental Protection Act 1990, to reduce fumes or emissions which may impact upon air quality. The Principal Contractor will undertake mitigation measures to address construction dust from the site, taking into account the impact of site preparation and construction works on residential and business uses. These measures include but will not be limited to: • Regular water-spraying and sweeping of unpaved and paved roads to minimise dust and remove mud and debris. • Spraying water during cutting/grinding operations (i.e. cutting curb slabs). • Removing mud and other debris from wheels and chassis of vehicles leaving the site where appropriate to minimise the amount of mud and debris deposited on the roads using wheel washes, shaker bars or rotating bristles. • Ensuring that all vehicles with open loads of potential dusty materials are securely sheeted or enclosed. • Enforcing and maintaining a low speed limit on site i.e. unmade surfaces to minimise dust entrainment and dispersion. • Ensuring any temporary site roads are no wider than necessary to minimise their surface area. • Damping down of surfaces prior to their being worked particularly in dry conditions. • Storing dusty materials away from site boundaries and in appropriate containment (e.g. sheeting, sacks, barrels etc.). • Minimising the height of stockpiles and profiling to minimise wind-blown dust emissions and risk of pile collapse. • Locating stockpiles out of the wind (or cover, seed or fence) to minimise the potential for dust generation; All vehicle engines and plant motors shall be switched off when not in use. • Ensuring all Non Road Mobile Machinery meets the requirements for London's Low Emission Zone.	Prepare Dust, Noise and Nuisance Management Plan as part of the CEMP and consult with local authorities.	Daily observations by environmental manager	Principal Contractor	Daily Site Audits. No justified complaints of emissions to air, such as dust, from receptors in the vicinity of the Scheme. Dust issues to be included in monthly environmental reports.	Initial: Date:	N/A

Ref.	ES/ DCO ref.	Environmental objective	Action/Commitment (including specific locations, if applicable and any assumptions of the action/commitment)	Action/Commitment implementation methods (including stakeholder agreements)	Required monitoring details	Responsible person	Achievement criteria and reporting requirement	Completion record	Notes/further action
AQ2.2	Ch 5, section 5.9	Limit and control emissions to air during construction	Ensure all Non Road Mobile Machinery (NRMM) meets the requirements for London's Low Emission Zone	Contractor to prepare plan in consultation with local authorities to demonstrate how they will ensure all NRMM meets the necessary requirements and how this will be monitored. This could form part of the Dust, Noise and Nuisance Management Plan. Details of NRMM to be registered with GLA via the NRMM website (https://nrmm.london/) in advance of it being used.	Checks on NRMM by environmental manager as required and agreed with local authorities	Principal Contractor	All NRMM meets the requirements at all times during construction. Results of checks can be provided to GLA and local authorities if required.	Initial: Date:	N/A
Noise and vibration									
NV2.1	Ch 6, section 6.9	Limit noise emissions during construction	• Consult with the Environmental Health Departments at the local authorities to obtain guidance on their requirements for managing and controlling noise and vibration from construction works. • Monitor construction noise and vibration levels as required by the local authority. If noise/vibration levels are elevated locally mitigate, change method of working, temporary re-house, insulate property, etc. • Submit a Section 61 application under the Control of Pollution Act 1974 for some construction works, especially if night-time working is proposed. • Keep local residents and other affected parties informed of the progress of the works, including when and where the noisiest activities will be taking place and how long they are expected to last. • Use good working practices namely use of exhaust silencers in all vehicles and plant, engineering controls (e.g. acoustic covers, mufflers or suppressors) for plant and equipment like generators, compressors, pneumatic percussive tools etc., to reduce noise where relevant to their activities to prevent nuisance. Other good practices include intermittent shutdown of equipment when not in use, avoiding operation of noise generating plant and equipment close to noise-sensitive buildings as far as practicable, avoiding cleaning of concrete mixers by hammering the drums, installing temporary noise barriers and careful handling of materials to prevent generation of noise shall be adopted during the construction phase.	Prepare Dust, Noise and Nuisance Management Plan, as part of the CEMP, and consult with local authorities. Agree measures with Highways England, local authorities and local residents.	Maintain noise and vibration monitoring locations throughout construction and report on a monthly basis. Works to be stopped where agreed levels are exceeded until alternative methods to reduce to acceptable levels are developed	Principal Contractor	Daily site audits, Section 61 consent, letter drop, community liaison. Provide monitored data to local authorities. If necessary, agree updated mitigation strategy.	Initial: Date:	Any assessment based on agreed noise and vibration limits with local authorities.

Ref.	ES/ DCO ref.	Environmental objective	Action/Commitment (including specific locations, if applicable and any assumptions of the action/commitment)	Action/Commitment implementation methods (including stakeholder agreements)	Required monitoring details	Responsible person	Achievement criteria and reporting requirement	Completion record	Notes/further action
			• In addition to the above good working practices, where piling is required, the piling method should be selected carefully to minimise noise and vibration impacts at receptors by generating low levels of vibration, methodologies such as rotary bored piling should be considered first. • Selection of routes and programs for the transportation of construction materials, spoil and personnel to minimise noise and vibration at sensitive receptors. • Avoiding vehicles waiting or queuing on the Public Highway with engines running; and • Designing and construction of temporary infrastructure to minimise noise and vibration. • Temporary noise barriers or solid fencing will be used for Grove Farm, ~~and~~ Maylands Cottages and Putwell Bridge Caravan Park (for Cadent gas works) during construction.						
Biodiversity									
BD2.1	Ch 7, section 7.9	Preservation of woodland, scrub, grassland and notable habitats	• Undertake and manage works in accordance with licence/ consent relevant to protected/notable species/habitat. • Clearly mark vegetation which is to be lost or retained with a pre-agreed marking system. • Veteran trees will be identified and protected. • All retained trees to be protected as per the CEMP and Arboricultural Method Statement.	Works to be carried out in accordance with the CEMP, LEMP and with the Series 3000 specification for the works.	In accordance with the CEMP and LEMP	Principal Contractor with guidance from the suitably qualified Ecological Clerk of Works (ECoW). Arboricultural specialist as required.	Minimise and prevent unnecessary loss of vegetation to be retained. Mitigation measures as included in the CEMP, assents/consents and outlined in the Detailed Design.	Initial: Date:	Post monitoring and post construction care required for the predetermined time frame. Subject to Statement of Common Ground with Natural England and local authorities.
BD2.2	Ch 7, section 7.9	Management and reinstatement of habitats	• Habitat will be reinstated or created in the first suitable season following completion of construction in any area. • [redacted]	[redacted].	In accordance with the LEMP, landscape specification Series 3000 and any species licences.	Principal Contractor with guidance from the suitably qualified ECoW.	Plant trees as per the specification, time works to ensure habitat reinstated or created as soon as possible following completion of works in appropriate planting season. Increase the quality of the habitat thus increasing the area's biodiversity.	Initial: Date:	Post monitoring and post construction care required for the predetermined time frame. Subject to Statement of Common Ground with Natural England and local authorities. The Series 3000 and LEMP will set out management and monitoring prescriptions for habitats.
BD2.4	Ch 7, section 7.9	Minimise disturbance to protected species	• Undertake and manage works in accordance with licence/ consent relevant to protected species. • When construction is occurring in close proximity to known protected species sites the ECoW will be present as much as possible.	Construction team to adhere to method statements with support of ECoW.	Regular reporting on progress as specified in the method statement – details to be advised	Principal Contractor appointed ECoW	Method statements / licences adhered to and actions recorded.	Initial: Date:	Additional action maybe required if the distribution of protected species was to change. An ecologist's advice

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Ref.	ES/ DCO ref.	Environmental objective	Action/Commitment (including specific locations, if applicable and any assumptions of the action/commitment)	Action/Commitment implementation methods (including stakeholder agreements)	Required monitoring details	Responsible person	Achievement criteria and reporting requirement	Completion record	Notes/further action
									should be sort if during construction a protected species is located.
BD2.5	Ch 7, section 7.9	[redacted]	• [redacted] • Inspection of temporary amphibian fencing (if installation required by licence). • [redacted] • No holes or trenches to be left open over night without battered sides, covered or use of ramps.	Construction team to adhere to in licence with support of licence named ecologist.	Regular reporting on progress as specified in the method statement – details to be advised	Principal Contractor licence named ecologist	Method statement of licence adhered to and actions recorded.	Initial: Date:	Works must be carried out in accordance with the agreed great crested newt licence. Any changes may require a modification to the licence.
BD2.6	Ch 7, section 7.9	Mitigation of impact on common reptiles	• Undertake and manage works in accordance with method statement / reptile mitigation strategy. • Inspection and maintenance of reptile fencing during the construction phase (if fencing required by mitigation strategy). • Protection of retained reptile habitats / reptile receptor sites. • No holes or trenches to be left open over night without battered sides, covered or use of ramps.	Construction team to adhere to method statements with support of ECoW.	Regular reporting on progress as specified in the method statement – details to be advised	Principal Contractor and ECoW	Method statement / mitigation strategy adhered to and actions recorded.	Initial: Date:	Reptile method statement may require updating throughout construction.
BD2.7	Ch 7, section 7.9	Mitigation of potential impact on otter	• Undertake and manage works in accordance with otter PMW or licence (if required). • Inspection and maintenance of any temporary otter fencing (if fencing required by licence). • Regular monitoring of otter activity. • Continued passage of otter through construction sites when they are not active will be facilitated (including dark zones along watercourses during night time construction works).	Construction team to adhere to method statements with support of ECoW.	Regular reporting on progress as specified in the method statement – details to be advised	Principal Contractor and ECoW	Method statement / licence adhered to and actions recorded.	Initial: Date:	PMW (or licence, if required) may require update / modification throughout construction.
BD2.8	Ch 7, section 7.9	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
BD2.9	Ch 7, section 7.9	Mitigation of impact on bats	• Undertake and manage works in accordance with bat licence (if required) or PMW Statement. • Climbing inspection and sensitive felling under bat licenced ecologist supervision for all trees with bat roost potential within the Scheme footprint needing to be cleared during construction phase.	Construction team to adhere to method statement or method statement in licence with support of ECoW / licence named ecologist	Regular reporting on progress as specified in the method statement – details to be advised	Principal Contractor and ECoW / licence named ecologist.	Method statement / licence adhered to and actions recorded..	Initial: Date:	PMW (or licence, if required) may require update / modification throughout construction.

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			• Protection of any roosts recorded, including Tree 36. • RAMS from subcontractors will be reviewed and authorised by the Principal Contractor's environment team before work commences to ensure the requirements above are understood, incorporated into working methods and adhered to. • High noise level and high impact machinery and operations, particularly during hibernation period shall be avoided wherever possible. • Retention of features with potential to provide bat roosting sites where possible (i.e. mature trees and suitable structures). • Clearance of vegetation along foraging corridors including Weald Brook and hedgerows will be minimised as much as practicable to maintain foraging opportunities. • Provision of a sensitive lighting design during construction that takes bats and other wildlife into account, including measures to reduce light spill foraging routes (e.g. maintain a dark zone along Weald Brook, woodland edges and hedgerows during the bat active season). • Any night lighting (relating to site compound security or for night time working) to be directed and avoid illumination of key foraging areas during construction, should not produce UV light, has a narrow wavelength, and avoids blue-white colour of light. Warm white lighting should be used if possible.						
BD2.10	Ch 7, section 7.9	Mitigation of impact on breeding birds	• Vegetation to be retained/lost (including trees and scrubs) would be clearly demarcated with an agreed marking system with the Principal Contractor to avoid encroachment into areas of high value bird habitat. • Avoid nesting season for vegetation clearance, where possible. Where this is not possible, works to occur under the watching brief of an ecologist who will conduct nesting bird checks and set up protective areas around nest until the nest has been abandoned or the chicks have fledged. • All birds, their nests and eggs are protected by Wildlife and Countryside Act 1981 under which it is an offence to intentionally kill, injure, disturb or take any wild bird. This legislation and its requirements should be highlighted in staff inductions, toolbox talks and signed by all contractors, operators and subcontractors during pre- construction and construction phase; and • If nesting birds are encountered during construction, contractors are to stop work immediately and contact the Principal Contractor's ecologists for advice and the production of a suitable revised method statement.	Construction team to adhere to method statements with support of ECoW.	Regular reporting on progress as specified in the method statement – details to be advised	Principal Contractor	Method statement adhered to and actions recorded.	Initial: Date:	PMW may require update throughout construction.

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BD2.11	Ch 7, section 7.9	Terrestrial invertebrates	• Dead wood habitat to be created from trees removed for construction as per requirements in Table 1.1. • Retained trees will be 'veteranised' to increase dead wood habitat. • Some felled trees will be retained on-site and repositioned to benefit invertebrates. These felled trees and limbs will be retained in as large a single unit as possible. These trees will not be cut up into rings or sawn up and stacked into log piles. Some will be used to create 'monoliths' (using material from felled trees (including potentially the two felled veteran trees)	Construction team to adhere to method statements with support of ECoW.	Regular reporting on progress as specified in the method statement - details to be advised	Principal Contractor	Provision of continuity of dead wood habitat.	Initial: Date:	In accordance with CEMP and tree protection plans. Monitoring in accordance with LEMP.
BD2.12	Ch 7, section 7.9	Fish	• Undertake and manage works in accordance with method statement for fish rescue. • Any pumps to be used for dewatering activities will have mesh installed over their ends to prevent fish species from being sucked into the pumps.	Construction team to adhere to method statements with support of ECoW.	Regular reporting on progress as specified in the method statement - details to be advised	Principal Contractor	Method statement / strategy adhered to and actions recorded.	Initial: Date:	
BD2.13	Ch 7, section 7.9	Prevent spread of non-native invasive species	• Construction methods to follow agreed method statement. • Invasive species management plan and control measures acted upon prioritising avoidance.	Construction team to adhere to method statements with support of ECoW.	Regular reporting on progress as specified in the method statement - details to be advised	Competent subcontractor to be appointed by Principal Contractor to manage invasive plant species.	No additional spread of invasive species on site as a result of the Scheme	Initial: Date:	An appropriate management plan should be produced by a suitably competent subcontractor to ensure the proposed works can be undertaken within the provisions of appropriate legislation and Codes of Practice. The management plan would detail methods of control and disposal. The implementation of any management plan would be addressed through measures detailed in the CEMP.
Road drainage and the water environment									
RD2.1	Ch 8, section 8.9	Prevent adverse impacts on water quality	• Adopt good working practices and follow the relevant Environment Agency Pollution Guidance as noted in the ES; • Establish the permanent drainage system for the Scheme early in the construction process to reduce the temporary risks of pollution to the water environment during construction; • Make spill kits available at appropriate locations and that site personnel have been trained in their use; • Comply with the Environmental Incident Control Plan on site during the works;	Contractor to conform to good working practices and Environmental Clerk of Works (EnvCoW) to review at regular intervals.	Compliance with agreed Pollution Prevention Guidance notes	Principal Contractor	No detrimental effect on water quality during the construction phase. No environmental incidents arising from the construction works. Monthly reporting.	Initial: Date:	N/A

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			• Where possible, ensure storage of construction materials or temporary stockpiling of excavated soils away from surface waterbodies and drains; • Materials, chemicals, and fuels shall be stored in suitable areas as per the COSHH requirements and Control of Pollution (Oil Storage) Regulations 2001. to prevent harm to Human Health and Environment.; and • Construction plant must be refuelled in designated areas on an impermeable surface, away from drains and watercourses.						
RD2.2	WFD Assessment (TR010029/APP6.7) Ch 5, sections 5.2 - 5.3	Comply with Water Framework Directive	Implementation of embedded mitigation works as follows: • Ingrebourne realignment. Realignment of c 200 m of existing straight channel to new sinuous course between Grove Farm and the Weald Brook confluence. Including the restoration of more naturally functioning channel. • Weald Brook realignments. Realignment of three sections of existing straight channel to new sinuous courses on the lower Weald Brook (70 m, 85 m and 250 m in length). Including the restoration of more natural functioning channel. • Ingrebourne floodplain lowering. Lowering of c 3,500 m^2 of floodplain, creation of backwaters on the Ingrebourne between Grove Farm and the Weald Brook confluence. • Weald Brook floodplain lowering upstream. Lowering of c 2,100 m^2 of floodplain, a flood compensation area and creation of a backwater to Weald Brook, just upstream of Duckwood Bridge. • Weald Brook floodplain lowering downstream. Lowering of c 7,800 m^2 of floodplain in combination with a flood compensation area adjacent to Grove Bridge and Maylands Bridge. • Unlined drainage ditches. As part of the scheme significant lengths of unlined ephemeral drainage ditch will be created to manage ‘clean’ runoff from non-pavement surfaces. These ditches will generate habitat that mitigates for loss of existing ephemeral drainages ditches to the Scheme. • Depressed inverts and natural river beds on culvert extensions. A natural river bed will be incorporated into the design of culverts carrying the Weald Brook under the M25 (Weald Brook Culvert extension) and the Ingrebourne beneath junction 28 (Grove Culvert extension). • A12 slip constructed on retaining wall. The effects of the Scheme will be reduced by minimising the footprint on the floodplain by supporting the A12 slip road on a retaining wall instead of a large embankment structure.	Sign off by EnvCoW.	Mitigation measures to be signed off by Designer on completion	Principal Contractor	Works implemented to a design agreed with the WFD Competent Authority (Environment Agency)	Initial: Date:	N/A

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			• Widespan bridge structures. Within the restrictions defined by other constraints, proposed structures have been set as high and wide as feasible to limit adverse geomorphological impacts, conveyance and shading effects. These structures are Grove Bridge, Maylands Bridge and Duckwood Bridge. • Minimisation of hard bank protection at river crossings, channel crossings and realignments have been planned to limit the need for hard bank protection to reduce potential impacts on the biological and hydro-morphological quality elements. This affects the following structures: Grove Bridge (over the Ingrebourne) and Duck Wood Bridge. • Improvements to existing road drainage A drainage system designed to meet WFD toxicity standards at points of discharge to natural waters (see commitments made in Ch 8, section 8.9 (TR010029/APP/6.1) listed above). Implementation of additional mitigation (specific) – EA as follows: • Funding of mitigation works, outside of the DCO boundary that will be delivered by the EA as part their programme of works within the Ingrebourne WFD water body. Implementation of additional mitigation (specific) – Highways England as follows: • Measures to prevent excessive scour or “wash-out” of bed material immediately downstream of Grove culvert extension and Weald Brook culvert extension. Measure likely to include construction of artificial riffle feature downstream of culvert or selective use of bed and bank protection. • Measures to facilitate mammal passage through Grove culvert extension and Weald Brook Culvert Extension during higher than normal flows. The form of such measures needs to be determined at detailed design, but often comprise a shelf along which mammals can move, together with ramps for mammal access and egress.						
RD2.3	Ch 8, section 8.9	To limit the impact on the water environment as a result of works over or adjacent to water bodies	• The placing of any wet concrete in or close to any watercourse would be controlled in order to minimise the risk of leakage of wet cement into the watercourse. • The washing of any concrete mixing plant or ready-mix lorries would be carried out in a way that prevents cleaning effluent to flow into any watercourse or drain. • Haul roads on the site and the approaches to the watercourse would be cleaned regularly in order to prevent the build-up of mud. • Before any discharge of water were to be made from the site, adequate provisions for preventing pollution would be made, such as by incorporating silt	Contractor to conform to good working practices and EnvCoW to review at regular intervals.	Reviewed at regular intervals during construction	Principal Contractor	No detrimental effect on water quality during the construction phase. No environmental incidents arising from the construction works. Monthly reporting.	Initial: Date:	N/A

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			settlement techniques. The techniques employed would be chosen as appropriate for each specific site. Techniques may include settlement lagoons, use of straw bales for silt trapping and use of flocculants. • pH, chemical, and sediment to be managed and monitored in line with relevant permits or Memorandums of Understanding for all works near watercourses and suitable treatment implemented if necessary. • Areas of bare soil would be kept to a minimum to reduce silty runoff. • Areas which may generate contaminated water would need to be bunded and have water discharged to self-contained units with treatment facilities. There would be no discharge to groundwater. • Tests would be undertaken to ensure contaminated material is identified, isolated and reworked or removed to special landfill to avoid any leachate problems.						
RD2.4	Ch 8, section 8.9	To limit impacts arising from disturbance of silt	• All pumped drainage from the construction works, including areas used for temporary storage of construction materials or excavated soils, would be passed through silt settlement treatment prior to discharge to surface watercourses or drains. • All roads and hard standings would be kept clean and tidy in order to prevent the build-up of oil and dirt that may be washed into a watercourse or drain during heavy rainfall. • Where appropriate, watercourses would be shielded by bunds and/or silt fencing in order to prevent contamination from surface water runoff. • The use of water sprays for reducing dust or washing construction areas would be carefully regulated in order to avoid washing substantial quantities of silt (etc.) into surface water drains. Where large quantities of gravel, mud or other such material required clearing, the area would be swept clean prior to any subsequent hosing down.	Contractor to conform to good working practices and EnvCoW to review at regular intervals.	Reviewed at regular intervals during construction	Principal Contractor	No detrimental effect on water quality during the construction phase. No environmental incidents arising from the construction works. Monthly reporting.	Initial: Date:	N/A
RD2.5	Ch 8, section 8.9	To limit impacts arising from contamination of water bodies by wet cement or concrete, oil or other liquids as a result of accidental spillage or discharge	• Manholes and catch pits would be covered to prevent concrete/cement ingress. • Concreting at watercourse culvert sites would be closely supervised to prevent concrete contamination of the watercourses. • The washing of any concrete mixing plant or ready-mix lorries would be carried out so as to prevent the resulting effluent from being allowed to discharge/flow into any watercourse or drain. • Materials to be stored in line with the Resources Management Plan, and in line with the Control of Pollution (Oil Storage) (England) Regulations 2001 and COSHH 2002.	Contractor to conform to good working practices and EnvCoW to review at regular intervals.	Reviewed at regular intervals during construction	Principal Contractor	No detrimental effect on water quality during the construction phase. No environmental incidents arising from the construction works. Monthly reporting.	Initial: Date:	N/A

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			• Small plants such as pumps, concrete mixers, air compressors shall be provided with drip trays. • All drums and barrels containing fuel, chemical, oil shall be stored on paved and bund-shield (impermeable bunds with a capacity of 110%) surfaces with sheds and shall be properly labelled with flow control taps. • An emergency response plan shall be incorporated in the CEMP/EMS prior to the construction phase to handle any spillage or leakage of potentially contaminating substances. • Spill kits shall be provided at all locations where hazardous substances are stored with special focus to the areas close to drains and waterbodies.						
RD2.6	Ch 8, section 8.9	To avoid potentially contaminated runoff from the highway during construction and operation	Appropriate drainage to collect, treat or contain runoff during construction and operation to be provided.	Principal Contractor to carry out all works as set out in the SWMP. EnvCoW to review.	Reviewed at regular intervals during construction	Principal Contractor	Appropriate mitigation measures set out in CEMP to collect any contaminated water.	Initial: Date:	N/A
RD2.7	Ch 8, section 8.9	To limit impacts arising upon groundwater during earthwork	• Operations to be carried out under the Environmental Permitting Regulations (Abstraction and Discharge Permits) and other relevant legislation such as Groundwater Investigation Consent. • Groundwater would be pumped from excavations into lagoons/settlement tanks in order to enable sediment to drop out, and if necessary, sediment removal would be aided by the addition of flocculants, subject to the agreement of the Environment Agency. After sediment removal, water would be discharged to a watercourse subject to agreement/permit with the Environment Agency. • Subsoil would be exposed for a minimum length of time after topsoil strip. Cut-off trenches, where necessary, would be excavated in order to prevent massive surface water runoff into watercourses. Cut-off trenches would discharge into sediment lagoons, with discharge to watercourses subject to prior consent of the Environment Agency. • Topsoil/vegetation along watercourses would be retained in order to aid attenuation and sediment infiltration. • Construction phase operations would be carried out in accordance with the guidance contained within the Environment Agency Pollution Prevention Guidelines, and with due regard to the Environment Agency Policy and Practice for the Protection of Groundwater. • Consideration would be given to Piling and Penetrative Ground Improvement Methods on Land Affected by Contamination: Guidance on Pollution Prevention. Piling operations would be subject to Risk Assessment and any measures to prevent	EnvCoW to review.	Reviewed at regular intervals during construction	Principal Contractor	Mitigation measures as included in the CEMP.	Initial: Date:	N/A

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			pollution to the aquifer would be covered by piling method statements.						
RD2.8	Ch 8, section 8.9	To prevent adverse effects on flood risk	• Implement construction phase Surface Water Management Plan. • During culvert works monitor water levels within the watercourse, put in procedures to evacuate personnel (and plant, if safe to do so) to areas of higher ground if water levels are almost at bank full/start to overtop. • Floodplain compensation will be required prior to construction of the Scheme elements that would affect floodplain storage. A suitable phasing plan prior to construction commencing is discussed in the hydraulic modelling report (Appendix A of the Flood risk assessment (application document TR010029/APP/6.6) where only limited parts of the Scheme can be constructed until both compensation areas have been excavated and are providing sufficient mitigation.	EnvCoW to review.	Reviewed at regular intervals during construction	Principal Contractor	No increase in flood risk during the construction phase.	Initial: Date:	N/A
Landscape									
LV2.1	Ch 9, section 9.9	To limit visual intrusion and impacts upon landscape character during construction and to limit impacts upon existing trees and vegetation	• Ensure any loss of vegetation is kept to a minimum by careful siting of site compounds, haulage routes and stockpiles/storage areas. • Prepare method statement for earth movements and soil storage. • Limit stockpiles of materials and deliveries to an as and when needed basis wherever possible. • Welfare units and temporary site offices in a colour that would aid integration with the surrounding landscape where possible. • Use limited and/or directional lighting wherever possible to restrict night time impacts.	Adhering to guidance outlined in respective project documents. Principal Contractor to set out methods and gain approval from Client/Designer	Daily site audits.	Principal Contractor	Principal Contractor's method statement approved by Highways England. No transgressions of agreed working arrangements.	Initial: Date:	N/A
LV2.2	Ch 9, section 9.9	Minimise impacts of site clearance to prevent damage to trees, significant vegetation and habitat	• EnvCoW to oversee all site clearance and environmental implementation works. • Ensure suitable habitat protection fencing is erected prior to site clearance and commencement of construction. • Arborist/Ecologist input on requirement for tree works and tree protection of important/mature trees to BS 5837:2012 Trees in relation to construction. • Prevent damage to roots, stem and branches of existing trees to be retained.	Method Statement for tree protection works to be prepared. Consult on tree protection methods with Woodland Trust, Wildlife Trust and local authorities in accordance with industry standards.	Maintenance of tree protection during construction to form part of EnvCoW weekly reporting	Principal Contractor	Identification of all vegetation for protection and protection fencing in accordance with BS 5837:2012. Confirmed within Principal Contractor's method statement.	Initial: Date:	N/A

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LV2.3	Ch 9, section 9.9	Soil handling and mitigation planting in accordance with detailed landscape and ecology design contract documents	• Soils to be handled in accordance with an approved Soil Handling and Management Strategy prepared by a specialist in soil management. • EnvCoW to ensure subsoil and topsoil profiles are of appropriate depths and soils meet specification (soil analysis) prior to commencement of planting and seeding works. • Ensure all gradients and final levels are correct and in line with the Scheme design. Make sure there are no areas susceptible to waterlogging through poor drainage. • Ensure soil is prepared in line with the landscape and ecology specification (ground preparation, cultivation). • Supply and sow seeds at the correct time of year for each specified seed mix (Mar-May) and in accordance with the specification. • Supply and plant trees/shrubs in accordance with the specification during the next available planting season after completion of earthworks (Oct-March).	Prepare project Soil Handling and Management Strategy and consult with Natural England on contents Adhering to guidance outlined in respective project documents and the Proposed Scheme Layout Plans.	Weekly inspection and reporting by EnvCoW	Principal Contractor	Soil management operations to be approved by designer's soil specialist Obtain adequate subsoil and topsoil analysis prior to spreading. EnvCoW to confirm soil and planting methods during planting works and carry out inspection on completion. Planting to be in accordance with BS 4428:1989, BS8545:2014, BS3882:2015 where relevant.	Initial: Date:	Scheme layout plans (application document TR010029/APP/2.7)
Geology and soils									
GS2.1	Ch 10, section 10.9	Limit permanent removal of soils during earthworks and foundation construction and reuse of excess materials	The CRMP, MMP, SWMP and SHMP will be regularly reviewed and updated during construction as appropriate. Where practicable, treatment of 'unacceptable' material (i.e. material not suitable for use in engineering works) on-site to render it acceptable for use in the works (for example, by treatment with lime or cement). Confirmation of suitability for reuse of excavated materials during construction through further reuse testing and assessment.	Environmental controls will be included within the CEMP, MMP, SWMP and SHMP.	Monitoring measures shall be detailed within the CEMP, MMP, SWMP and SHMP	Principal Contractor	Adequate earthworks balance achieved. Disposal off-site reduced as much as possible.	Initial: Date:	N/A
GS2.2	Ch 10, section 10.9	Maintenance of quality of stockpiled soils and protection of soil structure	• Highways England will provide the Principal Contractor with all relevant land quality data to inform reinstatement specification, including chemical and geotechnical information; • All temporarily acquired land occupied or disturbed during the construction process, shall be restored/reinstated to a condition equivalent to its original state as agreed pre-construction by Highways England; • If spoil is to be spread on land intended for farming, addition of topsoil will be undertaken, and the land will need an aftercare period of at least five years to rectify settlement and compaction. Use appropriate machinery to minimise soil compaction; • The quality and quantity of soil on-site should be maintained by implementing appropriate techniques for stripping, stockpiling and reinstatement. Disturbed soils should be reinstated to their original quality using a SHMP;	Environmental controls will be included within the CEMP and SHMP.	Monitoring measures shall be detailed within the CEMP and SHMP	Highways England/ Principal Contractor	Approval and acceptance of soil areas by EnvCoW and land owners.	Initial: Date:	This action is continued in those to be undertaken after the end of construction.

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			• Strip topsoil and subsoil when weather and soil conditions are suitable. Separate storage and management of topsoil and subsoil storage heaps. Return topsoil and subsoil to the original plots where possible. If the stockpile has remained for more than 6 months, then it shall be remediated in accordance with agreed reinstatement parameters by Highways England; • Work will be undertaken in accordance with appropriate guidelines and best practices (e.g. Defra's 2009 Code of Practice for Sustainable Use of Soils on Construction Sites, BS 3882:2015 Specification for topsoil); • A Resources Management Plan shall be included as part of the EMS to reduce the amount of material permanently removed from the area of the Scheme; • Define access routes to all working areas and restrict access to only these areas; and • Include drainage at the toe of embankment slopes.						
GS2.3	Ch 10, section 10.9	Prevention of spread of possible contamination within site soils. Prevention of spills and leaks of hazardous substances	• Implementation of CL:AIRE MMP, including an Inspection and Discovery Strategy; • Hazardous substances, including contaminated soil, fuels, chemicals, waste and construction material, will be stored, handled, transported and disposed of, according to relevant legislation and best practice guidance to mitigate spillages and leaks; • Implementation of appropriate pollution incident control e.g. plant drip trays and spill kits; and safe storage of fuel, oils and equipment during construction; • Valves and trigger guns will be protected from vandalism and kept locked when not in use. • Implementation of working method statements during construction to manage groundwater and surface water appropriately to ensure that there is no run-off from the works, any material/waste stockpiles and storage containers into adjacent/nearby surface watercourses. • Stockpile management (such as water spraying and avoiding over stockpiling to reduce compaction of soil and loss of integrity) and timely removal of stockpiled soil to prevent windblown dust and surface water run-off.	Environmental controls will be included within the CEMP, MMP, SHMP and Contaminated Land Management Plan (CLMP)	Mitigation measures and environmental controls within the SHMP, CEMP (including MPP where required) and outlined in the Detailed Design will be monitored during construction	Principal Contractor	No significant pollution incidents during the works. Matters to be reported each month.	Initial: Date:	N/A
GS2.4	Ch 10, section 10.9	Prevent pollution of Secondary aquifers and Secondary Undifferentiated aquifers. Prevent pollution of surface water features	• Where piling or penetrative ground improvement is required through contaminated ground, especially in the vicinity of designated aquifers, works will be carried out in accordance with the Environment Agency's "Piling into contaminated sites" guidance and "Piling and Penetrative Ground Improvement Method on Land Affected by Contamination: Guidance on Pollution Prevention" and a Foundation Work Risk Assessment may be required to be	Environmental controls will be included within the CEMP and CLMP and as per discussions with the Environment Agency and implemented	Monitoring measures shall be detailed within the CEMP and as per discussions with the Environment Agency Mitigation measures and	Designer Principal Contractor	No significant pollution incidents during the works. Matters to be reported each month. Mitigation measures as included in the CEMP, CLMP and PRA.	Initial: Date:	N/A

Ref.	ES/ DCO ref.	Environmental objective	Action/Commitment (including specific locations, if applicable and any assumptions of the action/commitment)	Action/Commitment implementation methods (including stakeholder agreements)	Required monitoring details	Responsible person	Achievement criteria and reporting requirement	Completion record	Notes/further action
			undertaken addressed within the PRA. Appropriate piling methods will be adopted in line with the recommendations of the PRA and Environment Agency guidance. • Hazardous substances, including contaminated land, fuels, chemicals, waste and construction material, will be stored, handled, transported and disposed of, according to relevant legislation and best practice guidance to mitigate spillages and leaks. • Open trench construction will be adopted. • Management of perched water within the historical landfill/recently deposited material during construction, e.g. collection and off-site disposal to an appropriate facility or onsite treatment. • Management of material excavated from the historical landfill/recently deposited material during construction to ensure all run off is collected and appropriately managed e.g. collection and off-site disposal to an appropriate facility or onsite treatment. • Monitoring of identified sensitive surface water features during construction to demonstrate that the works have not adversely impacted water quality. • Stockpile management (such as water spraying and avoiding over stockpiling to reduce compaction of soil and loss of integrity, covering of stockpiled materials and use of battering of exposed soil slopes) and timely removal of stockpiled soil to prevent windblown dust and entrainment of soil in surface water run-off. • Working method statements during construction to manage groundwater and surface water appropriately and ensure that there is no run-off from the works, material/waste stockpiles or from storage containers into adjacent surface watercourses.	through the construction phase.	environmental controls within the SHMP, CEMP (including MPP where required) and outlined in the Detailed Design will be monitored during construction				
GS2.5	Ch 10, section 10.9	Protection of future site users from the short-term risk of exposure to potentially contaminated dust and/or fibres through ingestion/ inhalation/ dermal contact	• Dust/fibres will be suppressed using best practice methods which also aim to prevent spread of potentially contaminated windblown material. Dust suppression measures shall include wheel washing for vehicles leaving the site and re-vegetation of earthworks and exposed areas; • Use dust suppression system in the area of any mobile screening and crushing plant. • Implementation of appropriate dust suppression measures to prevent migration of contaminated dust and asbestos fibres, in line with the asbestos risk assessment~~as appropriate~~. If any additional ACM / asbestos fibres ~~(particularly concentrations > 0.001%)~~ are identified during the works, the asbestos risk assessment will be updated, to ensure that control measures are appropriate at all times during the works.~~consideration should be given to the need for reassurance monitoring at works area / sensitive site boundaries.~~	Methods as specified in best practice guidance. Environmental controls will be included within the CEMP and CLMP and implemented through the construction phase.	As required and in consultation with relevant bodies. Mitigation measures and environmental controls laid out within the CEMP will be monitored during construction	Principal Contractor	No reported incidents. Monthly reporting to Client. Mitigation measures as included in the CEMP and CLMP	Initial: Date:	N/A

Ref.	ES/ DCO ref.	Environmental objective	Action/Commitment (including specific locations, if applicable and any assumptions of the action/commitment)	Action/Commitment implementation methods (including stakeholder agreements)	Required monitoring details	Responsible person	Achievement criteria and reporting requirement	Completion record	Notes/further action
			• Health and Safety Risk Assessments and Environmental Risk Assessments within Method Statements. • Stockpile management (such as water spraying and avoiding over stockpiling to reduce compaction of soil and loss of integrity) and timely removal of stockpiled soil to prevent windblown dust.						
GS2.6	Ch 10 section 10.9	Prevent adverse temporary effects to BMV land	• Limiting the area of earthworks at any one time to reduce temporary effects on soil compaction and erosion. • Demarcation of the construction working corridor once defined, in order to prevent disturbance to adjacent land. • Diversion or restoration of existing land drainage systems affected by the engineering works. • In the flood mitigation areas, topsoil will be replaced on the engineered land. • Restoration of land occupied or disturbed during the construction process that is not permanently acquired for engineering and landscaping to a condition equivalent to its original.	Environmental controls will be included within the CEMP	Monitoring measures shall be detailed within the CEMP	Principal Contractor	Mitigation measures as included in the CEMP	Initial: Date:	N/A
GS2.7	Ch 10, section 10.9	Prevent adverse effects to identified on-site and off-site receptors associated with the disturbance of potential soil or groundwater contamination or ground gas/vapours	• Implementation of a watching brief and discovery strategy. If previously unencountered contaminated soils are discovered during construction, further assessment will be undertaken. Following assessment, further mitigation measures will be incorporated, if necessary. • Update the CLMP, if necessary. • Ensure the final surface of all areas of ground break is either hardstanding or constructed landscaping. • Placement of any Made Ground to be reused within the Scheme at depth within embankments or below hardstanding / other soils and documentation of its location. • Incorporation of appropriate hazard signage and/ or ground gas protection measures, if detailed design introduces enclosed spaces (e.g. below ground chambers / ducts) within the vicinity of the elevated ground gas concentrations recorded within the GIR. • Confirmation that excavations in the vicinity of ATK-092 (see Ground Investigation Report (REP1-023 to REP1-025)) will not extend to the depth of the clay at c. 1.45m bgl (potential source of ground gas) and / or cause gas redirection towards the building to the south. Adoption of appropriate mitigation measures, if a potentially significant risk is identified. • Exclusion of non-site inducted persons from construction areas during the construction phase.	Any additional risk assessment / mitigation measures required during construction must be carried out in consultation with the Environment Agency and the relevant planning authority. The CLMP will be produced following consultation with the Environment Agency and the relevant planning authority	If need identified during watching brief	Designer/ Principal Contractor	Additional ground investigation, risk assessment and mitigation measure / remediation and verification reporting if required. Reports to be made following consultation with the Environment Agency and the relevant planning authority	Initial: Date:	N/A

Ref.	ES/ DCO ref.	Environmental objective	Action/Commitment (including specific locations, if applicable and any assumptions of the action/commitment)	Action/Commitment implementation methods (including stakeholder agreements)	Required monitoring details	Responsible person	Achievement criteria and reporting requirement	Completion record	Notes/further action
GS2.8	Ch 10, section 10.9	Prevent adverse effects to construction workers associated with the disturbance of potential soil or groundwater contamination or ground gas/vapours	The works will be carried out in accordance with the Construction Design Management (CDM) Regulations 2015 and in accordance with appropriate guidelines and best practices. • Health and safety Risk Assessment Method Statements (RAMS) will be produced and appropriate Personal Protective Equipment (PPE) will be adopted for the protection of construction workers in accordance with the Control of Substances Hazardous to Health (COSHH) Regulations 2002. These should specifically cover the potential to encounter ACM / asbestos fibres within Made Ground during the works and elevated concentrations of ground gas recorded at the locations detailed within the Ground Investigation Report (REP1-023 to REP1-025). • Appropriate ventilation of any construction phase temporary structures to be located within the vicinity of the elevated ground gas concentrations recorded within the GIR. • Adoption of appropriate working practices and PPE by construction workers in the vicinity of the locations of elevated concentrations of ground gas recorded within the Ground Investigation Report (REP1-023 to REP1-025). • Confirmation that excavations in the vicinity of ATK-092 (see Ground Investigation Report (REP1-023 to REP1-025)) will not extend to the depth of the clay at c. 1.45m bgl (potential source of ground gas). Adoption of appropriate mitigation measures, if a potentially significant risk is identified. • Before starting any work that is likely to disturb asbestos, a suitable and sufficient risk assessment must be prepared by the employer, in line with current legislation and Health & Safety Executive (HSE) guidance. The risk assessment will set out, among others, appropriate control measures. • Implementation of a specific watching brief and discovery strategy in relation to asbestos containing materials (ACM) / asbestos fibres. All workers should be made aware and regularly reminded of potential risks and necessary actions through the implementation of briefings, such as toolbox talks. • Implementation of appropriate dust suppression measures to prevent migration of contaminated dust and asbestos fibres, in line with the asbestos risk assessment ~~as appropriate~~. If any additional ACM / asbestos fibres ~~(particularly concentrations > 0.001%)~~ are identified during the works, the asbestos risk assessment will be updated, to ensure that control measures are appropriate at all times during the works.~~consideration should be given to the need for reassurance monitoring on construction~~	Principal Contractor to plan and organise the job and work together with others involved to make sure that the work is carried out without risks to health and safety.	N/A	Principal Contractor	Principal Contractor to prepare a Construction Phase Plan and RAMS.	Initial: Date:	N/A

Ref.	ES/ DCO ref.	Environmental objective	Action/Commitment (including specific locations, if applicable and any assumptions of the action/commitment)	Action/Commitment implementation methods (including stakeholder agreements)	Required monitoring details	Responsible person	Achievement criteria and reporting requirement	Completion record	Notes/further action
			~~personnel and / or at works area / sensitive site boundaries.~~						
GS2.9	Ch 10, section 10.9	Maintenance of quality of stockpiled soils, prevention of soil erosion, limiting effects on topography, and protection of soil structures during earthworks activities	• All temporarily acquired land occupied or disturbed during the construction process shall be restored/reinstated to a condition equivalent to its original (in agreement with the landowners) • The construction working corridor will be demarcated once defined in order to prevent disturbance to adjacent land. • If spoil is to be placed on land intended for farming, then the addition of topsoil will be undertaken and the land will need an aftercare period (duration to be agreed) to rectify settlement and compaction. • The area of earthworks at any one time will be kept to a minimum to reduce temporary effects on topography, soil compaction and erosion. • The duration of soil exposure will be minimised and timely reinstatement of vegetation or hardstanding will be implemented to prevent soil erosion. • The quality and quantity of soil on site will be maintained by implementing appropriate techniques for stripping, stockpiling and reinstatement, in accordance with Defra's 2009 Code of Practice for the Sustainable Use of Soils on Construction Sites, as far as reasonably practicable. • Over stockpiling will be avoided to reduce compaction of soil and loss of integrity. • Disturbed soils should be reinstated to their original quality using a SHMP. • Restored soils will be inspected and treated, if necessary, for the presence of noxious weeds. • Damage to field drains will be rectified by diversion or replacement. • Work will be undertaken in accordance with appropriate guidelines and best practices (e.g. Defra's 2009 Code of Practice for Sustainable Use of Soils on Construction Sites, BS 3882:2015 Specification for topsoil), as far as is reasonably practicable. • If required, a CL:AIRE MMP will be included within the CEMP to reduce the amount of material permanently removed from the area of the Scheme.	Mitigation measures and environmental controls will be included within the SHMP, CEMP and outlined in the Detailed Design.	Mitigation measures and environmental controls within the SHMP, CEMP (including MPP where required) and outlined in the Detailed Design will be monitored during construction	Principal Contractor / EnvCoW	SHMP, CEMP (including an MMP where required) and Detailed Design	Initial: Date:	N/A
GS2.10	Ch 10, section 10.9	Prevent injury/death to human receptors and/or damage to property receptors associated with the potential discovery and unplanned/uncontrolled detonation of Unexploded Ordnance (UXOs)	• Adoption of appropriate UXO mitigation measures during construction, if identified as required in the detailed UXO desk study. • Site Health and Safety File, Construction Phase Plan and site Emergency Response Plan to be adhered to during construction.	Site Health and Safety File, Construction Phase Plan and site Emergency Response Plan to be reviewed periodically to ensure that measures continue to be appropriate and	N/A	Client/Designer/ Principal Contractor	Mitigation measures laid out within the CEMP and in the site Health and Safety file, Construction Phase Plan and site Emergency Response Plan as required.	Initial: Date:	N/A

Ref.	ES/ DCO ref.	Environmental objective	Action/Commitment (including specific locations, if applicable and any assumptions of the action/commitment)	Action/Commitment implementation methods (including stakeholder agreements)	Required monitoring details	Responsible person	Achievement criteria and reporting requirement	Completion record	Notes/further action
				reflect working practice.					
GS2.11	Ch 10, section 10.9	Prevent adverse effects from ground stability / settlement as a result of the Scheme	• Monitoring of known service structures during the construction works to measure vibrations, with agreed trigger levels and action plans, if required. • Implementation of suitable piling methodologies, as defined by the PRA. • Limiting the area of earthworks at any one time to reduce temporary effects on topography. • Limiting plant operations as poor trafficability is anticipated due to soft predominantly fine soil ground conditions. Limiting the duration of soil exposure and timely reinstatement of vegetation or hardstanding to prevent soil erosion.	Mitigation measures and controls will be included within the CEMP and outlined in the Detailed Design. Suitable piling methodologies detailed in the PRA, which will be submitted to and agreed by the Environment Agency.	Monitoring measures shall be detailed within the CEMP	Principal Contractor	Findings of monitoring to be recorded and shown to be within agreed trigger levels, with record of appropriate actions taken if not.	Initial: Date:	N/A
Cultural heritage									
CH2.1	Ch 11, section 11.9	Preservation by record of archaeological remains	Highways England will develop a program of archaeological investigation (i.e. an Archaeological Management Plan acting as an overarching Written Scheme of Investigation) to be undertaken in areas affected by the Scheme, including construction compounds and access routes, where there is a potential for significant archaeological remains to survive. The scope and extent of such investigations should be developed in consultation with the Archaeological Officers of the Greater London Archaeology Advisory Service and Essex County Council Archaeological Advisor, and associated with a specific Written Scheme of Investigation subject to their approval. This work may comprise a geophysical survey in the first instance, followed by evaluation trenching and/or a programme of archaeological stripping and recording. Implement the works identified in the Archaeological Management Plan in accordance with the Written Scheme of Investigation and Archaeological Management Plan prepared under action CH1.1.	Agreement with Archaeological Officers of the Greater London Archaeology Advisory Service and Essex County Council.	As determined necessary by methodologies outlined in the Archaeological Management Plan and any Written Schemes of Investigation. Archaeological monitoring required in all areas identified by local planning policy as areas of high archaeological potential	Principal Contractor Heritage Specialist	Consultation with the local authority Archaeological Advisor. Production of an Archaeological management Plan and any task-specific Written Schemes of Investigation identified therein. Appointment of an archaeological subcontractor to undertake the agreed works. Completion of the works in accordance with the relevant Written Scheme of Investigation and Archaeological Management Plan and to the satisfaction of the Archaeological Officers of the Greater London Archaeology Advisory Service and Essex County Council.	Initial: Date:	Archaeological works to be monitored by a specialist archaeological consultant. Opportunity to be given to the Archaeological Officers of the Greater London Archaeology Advisory Service and Essex County Council to visit site.
Materials and waste									
MW2.1	Ch 12, section 12.9	Minimise material use and impact of material use from the Scheme	Procurement of materials shall ensure optimal quantity of material delivery on-time to prevent over supply and waste generation on site. Where practicable, standardisation of materials and building elements will be incorporated into the Scheme design to minimise required material resources and the production of waste, e.g. the use of prefabricated components. In addition, where practicable, the materials required for the Scheme shall be sourced from local suppliers with responsible sourcing certifications. Ensure all timber	A Scheme-wide MMP will be developed to ensure that materials imported to site and site-won materials are managed effectively. This document will be updated during the construction phase.	Under the CL:AIRE Definition of Waste: Development Industry Code Practice, an MMP must be reviewed by a Qualified Person and a declaration signed. The MMP will be regularly reviewed and updated during	Principal Contractor	Confirmation from the Principal Contractor that the Scheme 'As Constructed' is in accordance with the design. Where soil or aggregate is reused on-site under an MMP, a verification report will need to be produced and kept for 2 years.	Initial: Date:	N/A

Ref.	ES/ DCO ref.	Environmental objective	Action/Commitment (including specific locations, if applicable and any assumptions of the action/commitment)	Action/Commitment implementation methods (including stakeholder agreements)	Required monitoring details	Responsible person	Achievement criteria and reporting requirement	Completion record	Notes/further action
			products are sourced from sustainable sources. Where possible timber procured for the Scheme will be obtained from recycled, reclaimed sources or be accredited to meet sustainable forestry standard, such as the Forestry Stewardship Council. Any remaining timber not sourced through the above will target a known temperate source using the Defra central point of expertise in timber as a guideline. Consider re-use of materials within the Scheme at all stages of construction. Soil and aggregate will be generated during construction, demolition and excavation works. This should be re-used within the Scheme where it is suitable and practical to store it. The possibility of using the material on other local Schemes should also be explored.		the construction phase		Monitor through programme of Environmental Auditing and Reporting.		
MW2.2	Ch 12, section 12.9	Minimise waste generation and impact of wastes arising from the Scheme	Implement good materials management and good practice construction methods to minimise waste generation. Wastes that are generated will be segregated and stored in dedicated areas. All wastes will be managed in accordance with the waste hierarchy. Wastes generated during the construction phase of the Scheme will be sampled and characterised to determine the appropriate waste classification, i.e. inert, non-hazardous or hazardous. Compliance with waste Duty of Care will be ensured to prevent negative environmental impacts arising from handling, storing, transporting and disposing of wastes arising from the Scheme. Transfer of waste off-site will be carried out by a licensed waste carrier and with the appropriate documentation including: • a written description of the waste and the waste code; • non-hazardous waste will be accompanied by a transfer note or appropriate season ticket; and • hazardous waste will be accompanied by a consignment note. Checks will be made by the Principal Contractor or waste holder to ensure the receiving facility is authorised to receive the waste and undertake the required waste activity. Where safe and appropriate to do so, road plannings may be left in situ to avoid unnecessary generation of hazardous waste arisings requiring disposal. This activity will require an exemption or environmental permit. An appropriate exemption or environmental permit will be sought for storing, treating, using or disposing of waste as part of the Scheme. For example, crushing of demolition waste may be required to produce an aggregate which can be used. It is anticipated that controlled wastes from Grove Farm area and Brook Street historic landfill will be re-used	A SWMP will be implemented by the Principal Contractor. The document will identify personnel and their roles and responsibilities relating to waste. This includes maintaining records of waste transfers. All personnel working on the site should be aware of waste management procedures. The Principal Contractor will manage construction, demolition and excavation wastes in accordance with the SWMP.	Waste transfer notes and consignment notes will be kept on record during the construction phase and as required by the legislation. Waste carrier licences and waste management facility permits will be checked to ensure they are authorised to undertake the waste activity. Records related to the re-use of the controlled wastes within the permanent works of the Scheme to, include (but not limited to): types and volumes of wastes, source and deposition plans, data to demonstrate compliance with environmental requirements, etc	Principal Contractor	Confirmation from the Principal Contractor that the Scheme 'As Constructed' is in accordance with the design. Implement CEMP, MMP and SWMP, with all construction workers aware of measures identified in plans. Monitor through programme of Environmental Auditing and Reporting.	Initial: Date:	N/A

Ref.	ES/ DCO ref.	Environmental objective	Action/Commitment (including specific locations, if applicable and any assumptions of the action/commitment)	Action/Commitment implementation methods (including stakeholder agreements)	Required monitoring details	Responsible person	Achievement criteria and reporting requirement	Completion record	Notes/further action
			within the permanent works of the Scheme, under a Waste Recovery Permit. The re-use of controlled wastes and therefore the area to which the Waste Recovery Permit (WRP) extends is proposed to be a specific designated area within the Scheme. A dedicated Waste Manager from the Principal Contractor shall be responsible for all the waste strategy and management measures including segregation, collection, storage, transportation and disposal/treatment of hazardous and non-hazardous wastes arising from the Scheme. The Principal Contractor must ensure that Waste Electrical and Electronic Equipment produced in the construction, demolition and excavation should be segregated and managed separately from other wastes.						
MW2.3	Ch 12, section 12.9	Reduce effects of importing materials and exporting waste	Give preference to nearby sources of materials and suitable local or regional waste management facilities. Implement good practice construction methods and reduce haulage distances and/or need to travel.	The CEMP will consider sources of construction materials. The CEMP and SWMP will consider suitable waste management facilities.	The CEMP and SWMP will be reviewed and updated on a regular basis	Principal Contractor	Implement CEMP, MMP, SWMP and traffic management plan, with all construction workers aware of measures identified in plans. Monitor through programme of Environmental Auditing and Reporting.	Initial: Date:	N/A
People and communities									
PC2.1	Ch 13, section 13.9	To mitigate the impacts of construction on communities and people	BPM approach to be taken to daytime and night-time construction works to minimise noise, vibration and dust disposal impacts at residential and community receptors.	Measures as set out in the Community Liaison Plan Agreement with local residents	Community Liaison Plan to be reviewed every six months	Principal Contractor	Good community relations. Downward trend in complaints over the course of the Scheme. Annual report to Highways England and the local authorities.	Initial: Date:	N/A
PC2.2	Ch 13, section 13.9	To mitigate the impacts of construction on Private Residential receptors	• Alternative access arrangements will be made for properties, should the existing accesses be temporarily closed during the construction phase. • Liaison to be managed with Grove Farm to ensure they can access and egress their property at all times during the construction works. • Ensure emergency vehicle access to local residents at all times.	Agreement to access arrangements with local residents and emergency services.	Access to be reviewed quarterly	Principal Contractor	No objections to access arrangement from residents and emergency services.	Initial: Date:	N/A
PC2.3	Ch 13, section 13.9	To mitigate the impacts of construction on Community Assets	• Liaison to be managed with Maylands Golf Club through a communication plan. • Ensure the 498 bus route is maintained and disruption is minimised.	Discuss and agree with Maylands Golf Club	Operation of bus routes reviewed quarterly during construction	Principal Contractor	Implementation of measures outlined in the Detailed Design, the Traffic and Transport Management Plan and CEMP. No reduction of bus services during construction.	Initial: Date:	N/A
PC2.4	Ch 13, section 13.9	To mitigate the impacts of construction on Development Land	Land acquired temporarily for construction compounds and working areas will be restored to a condition equivalent to its original before being returned to its owner.	Community Liaison Plan Agreement with local landowners.	Quarterly liaison with land owners	Principal Contractor	Confirmation from land owners that they are satisfied with the proposals.	Initial: Date:	N/A

Ref.	ES/ DCO ref.	Environmental objective	Action/Commitment (including specific locations, if applicable and any assumptions of the action/commitment)	Action/Commitment implementation methods (including stakeholder agreements)	Required monitoring details	Responsible person	Achievement criteria and reporting requirement	Completion record	Notes/further action
PC2.5	Ch 13, section 13.9	To mitigate the impacts of construction on NMUs	• Ensure pedestrian linkages and accessibility are maintained. • Construction works should be programmed so that affected PRoW, footpaths or cycleways remain open for the duration of the construction period, and so that other routes can act as a diversion route for those affected.	Agreement with local authorities, as set out in the Community Liaison Plan Agreement with Highways England.	Record feedback from users of NMU/PRoW.	Principal Contractor	Implementation of measures outlined in the Detailed Design, the Traffic and Transport Management Plan and CEMP. NMU access/ connectivity maintained	Initial: Date:	N/A
Climate									
C2.1	Ch 13, section 13.9	Reduce greenhouse gas emissions from material production and transport to site	• Procure materials in optimal quantities to prevent over-supply. • Give preference to local sources of materials. • Prioritise the use of secondary/recycled materials. • Incorporate site-won materials back into construction where possible. • Employ the Highways England Carbon Tool to monitor carbon emissions against KPIs.	To be detailed within the CEMP	Employ the Highways England Carbon Tool to monitor carbon emissions against KPIs	Principal Contractor	Employ the Highways England Carbon Tool to monitor carbon emissions against KPIs.	Initial: Date:	N/A
C2.2	Ch 15, section 15.11	Reduce greenhouse gas emissions from waste generation and transport from site	• Procure materials in optimal quantities to prevent over-supply. • Give preference to local waste disposal companies. • Incorporate site-won materials back into construction where possible. • Employ the Highways England Carbon Tool to monitor carbon emissions against KPIs.	To be detailed within the CEMP	Employ the HE Carbon Tool to monitor carbon emissions against KPIs	Principal Contractor	Employ the Highways England Carbon Tool to monitor carbon emissions against KPIs.	Initial: Date:	N/A
C2.3	Ch 15, section 15.11	Reduce greenhouse gas emissions from transport of workers	• Give preference to local workers/subcontractors. • Encourage sustainable modes of transport and lift sharing of workers. • Ensure the minimum number of workers are onsite at any one time, to minimise transport.	To be detailed within the CEMP	Worker travel surveys Labour planning and numbers on site	Principal Contractor	Worker travel surveys. Labour planning and numbers on site.	Initial: Date:	N/A
C2.4	Ch 15, section 15.11	Reduce greenhouse gas emissions from construction processes	• Minimise energy consumption onsite as far as possible by using low-emission and high-efficiency construction plant. • Set suitable energy consumption targets, and monitor/report consumption against these targets. • Minimise water consumption onsite as far as possible by using efficient plant and processes. • Consider alternate construction techniques to reduce greenhouse gas emissions. • Set suitable water consumption targets, and monitor/report consumption against these targets.	To be detailed within the CEMP	Site energy and water consumption monitoring	Principal Contractor	Reporting of site energy and water consumption, compared against targets.	Initial: Date:	N/A

Table 1.4: REAC Part 2: Environmental action plan – Actions required after the end of construction (i.e. during operation)

Ref.	ES/ DCO ref.	Environmental objective	Action/commitment (including specific locations, if applicable and any assumptions of the action/commitment)	Action/commitment Implementation methods (incl. stakeholder agreements)	Required monitoring details	Responsible person	Achievement criteria and reporting requirement	Completion record	Notes/Further action
Air Quality									
N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Noise and vibration									
NV3.1	Ch 6, section 6.9	Based upon final Scheme design and as built drawings, meet requirements of Land Compensation Act 1973, Part 2. Reassess the properties that meet the eligibility criteria of The Noise Insulation Regulations 1975	• Publish list of properties within 300 m that qualify for noise insulation, or statement that no properties qualify. • Make offers of insulation to eligible properties before construction commences.	Consult with local residents.		Highways England/ Designer/ Principal Contractor	Highways England approval of the eligible properties. Residents accepting offers on insulation.	Initial: Date:	Legal requirement under the Land Compensation Act 1973, Part 2.
NV3.2	Ch 6, section 6.9	Assess changes in noise and vibration levels post construction works	• Undertake noise monitoring at residential locations to establish post construction Scheme noise levels.	Consult with local residents and local authority.	As required by the local authority or Highways England	Designer/ Principal Contractor	Highways England approval of the detailed noise levels.	Initial: Date:	There is no requirement to undertake noise measurements, however Highways England generally request post opening noise monitoring.
Biodiversity									
BD3.1	Ch 7, section 7.9	Minimisation of impact of habitat loss and disturbance on Ingrebourne Valley SMI and protected and priority species	Development of the LEMP must be substantially in accordance with the management objectives, targets and prescriptions in the Outline LEMP. Management and monitoring to be carried out in accordance with the LEMP. Establishment of a post-construction ecological survey and monitoring programme to be agreed with Highways England specialist and third parties as appropriate and in accordance with the ES. • Monitor the success of the planting proposals, especially woodland and shrub/scrub planting. • Inspection surveys of species habitat creation and enhancement measures to ensure success in the post construction period and during the aftercare period. Monitoring and management of great crested newt habitat in accordance with the great crested newt licence (may include golf course mitigation area). • Monitoring and management of species / habitat in accordance with any other species licences if they were required for construction.	In accordance with the LEMP and in agreement with Natural England and local authority.	In accordance with the LEMP	ECoW/ Principal Contractor's Ecologist	To ensure the mitigation and enhancements has minimised the overall effect of the Scheme on biodiversity.	Initial: Date:	The monitoring programme to be agreed with all stakeholders, in particular to decide what the indicators of success would be. This could include the successful establishment of certain species, or % cover of certain botanical species. The monitoring programme would also include actions to resolve any failures in the mitigation or enhancement measures.

Ref.	ES/ DCO ref.	Environmental objective	Action/commitment (including specific locations, if applicable and any assumptions of the action/commitment)	Action/commitment Implementation methods (incl. stakeholder agreements)	Required monitoring details	Responsible person	Achievement criteria and reporting requirement	Completion record	Notes/Further action
Road drainage and the water environment									
RD3.1	Ch 8, section 8.9	Maintenance of attenuation pond/ditches/sediment catch pits/drainage	Remove contaminated sediment periodically from the attenuation ponds, soakaways and other drainage features. Undertake regular inspections to ascertain when this action would need to be taken. The long term management and maintenance regime of drainage assets including sediment catchpits, ditches, and attenuation ponds will be developed by Highways England and contained within the Handover Environmental Management Plan (HEMP) for the Scheme. The HEMP is likely to comprise a cyclic maintenance of drainage assets to: • Prolong asset life; • Deliver sustained performance; • Keep assets safe for customers. Based on industry guidance (DMRB, GM 701, March 2020) the following cyclic regime is proposed: • Sediment catchpits – Clear/empty silt and debris from catchpits annually;. • Ditches – Clear ditches by removing material that could impair operation – every 5 years;. • Balancing / attenuation ponds – Clear silt and all material that could impair operation – every 10 years. Highways England has a legal obligation under the Highways Act 1980 and the Infrastructure Act 2015 to maintain its assets appropriately.	Arrange schedule of inspections and reporting with Highways England. ~~Agreement with Brentwood District Council~~Consult with affected land/asset owners if necessary	Status log for ~~attenuation ponds~~drainage assets to be maintained	Principal Contractor (1 year of operation) Highways England's maintainer thereafter	Successful operation of ~~ponds~~drainage assets. Annual reporting by the Principal ~~c~~Contractor and Highways England's maintainer~~ing~~ agent.	Initial: Date:	N/A
RD3.2	WFD Assessment (TR010029/APP6.7) Ch 5, sections 5.2-5.4	Long term management of wet mitigation habitats	Appropriate long term management of the following wet habitats, in accordance with the process set out in the Outline LEMP (Appendix 7.16 of the ES): • Ingrebourne realignment. • Weald Brook realignment. • Ingrebourne floodplain lowering. • Weald Brook floodplain lowering upstream. • Weald Brook floodplain lowering downstream. • Maintenance of riparian trees on Weald Brook.	In accordance with the LEMP and in agreement with Natural England and local authority	In accordance with the LEMP	ECoW/ Principal Contractor's Ecologist	To ensure the mitigation and enhancements has minimised the overall effect of the Scheme on biodiversity.	Initial: Date:	N/A
Landscape									
LV3.1	Ch 9, section 9.9	Mitigation planting to replace lost vegetation, integrate Scheme and provide screening functions	Aftercare requirement for all landscape planting for minimum of 5 years or term as set out in Management Plans prior to handover to managing agent or landowner.	Operations to be in accordance with the Series 3000 specification and CEMP.	Monitoring requirements as set out in Series 3000 specification and CEMP	Principal Contractor and Scheme Landscape Architect	Regular inspections of planting by the EnvCoW to approve thriving specimens and achievement of growth in accordance with contract document specifications.	Initial: Date:	. N/A

Ref.	ES/ DCO ref.	Environmental objective	Action/commitment (including specific locations, if applicable and any assumptions of the action/commitment)	Action/commitment Implementation methods (incl. stakeholder agreements)	Required monitoring details	Responsible person	Achievement criteria and reporting requirement	Completion record	Notes/Further action
LV3.2	Ch 9, section 9.9	Ensure successful establishment of landscape and ecology mitigation measures	Installation and establishment requirements for all landscape and ecology measures for minimum of 5 years or term as set out in Landscape and Ecology Management Plans prior to handover to managing agent or landowner.	Operations to be in accordance with the Series 3000 specification and LEMP.	Monitoring requirements as set out in Series 3000 specification and LEMP	Principal Contractor and Scheme Landscape Architect	Regular inspections of planting by the EnvCoW to approve thriving specimens and achievement of growth in accordance with contract document specifications.	Initial: Date:	. N/A
LV3.3	Ch 9, section 9.9	Ensure long term maintenance of landscape works and planted areas	Prepare HEMP and data for EnvIS/soft estate management.	Operation in HEMP to be in accordance with Management Plans as discussed with Managing Agent, Natural England, and affected landowners.	Monitoring requirements as developed and set out in HEMP	Principal Contractor, Managing Agent	Successful establishment of landscape mitigation - achievement criteria as set out in Management Plans.	Initial: Date:	N/A
Geology and soils									
GS3.1	Ch 10, section 10.9	To avoid deterioration of soil resources	Aftercare of restored soils if required, during which time problems with settlement, drainage and weed infestation will be rectified. Appropriate cropping of restored soils, for example a temporary grass ley if required, and associated soil nutrient requirements.	To be detailed within CEMP and SHMP for the Scheme.	To be detailed within the CEMP and SHMP for the Scheme.	Highways England/ Principal Contractor	Retain soil resources potential to support plant growth and maintain quality of agricultural land/soils.	Initial: Date:	N/A
GS3.2	Ch 10, section 10.9	Prevent adverse effects to identified on-site and off-site receptors associated with the disturbance of potential soil or groundwater contamination or ground gas/vapours	Where required and as informed by appropriate assessments following the GI, there may be a requirement for post-construction confirmatory monitoring to confirm residual risk levels.	Monitoring Strategies, if required, to be submitted to and agreed by Environment Agency and relevant planning authority.	Details to be provided in Monitoring Strategies, if required	Designer/ Principal Contractor	Results of monitoring will be reported as per requirements outlined in Monitoring Strategies and agreed with the Environment Agency and relevant planning authority.	Initial: Date:	N/A
GS3.3	Ch 10, section 10.9		The Scheme will be operated in accordance with the relevant regulations and best practice guidance in applying BAT and pollution prevention.	To be detailed within Operational EMP for the Scheme.		Highways England	Minimal pollution incidents and efficient reporting and clean up of incidents, if required.	Initial: Date:	N/A
Cultural heritage									
CH3.1	Ch 11, section 11.9	Complete actions required to achieve preservation by record of heritage features in accordance with relevant Written Scheme of Investigations and the Archaeological Management Plan, ES commitments and agreements with Historic England and the Archaeological Officers of the Greater London Archaeology Advisory	Implement post-fieldwork analysis and processing of records, samples, artefacts etc. obtained through implementation of pre-construction and post-construction actions, in accordance with any relevant Written Scheme of Investigations and the Archaeological Management Plan.	Agreement with Archaeological Officers of the Greater London Archaeology Advisory Service and the local authorities	None required	Principal Contractor	Report(s) accepted for publication if appropriate; archive reports accepted as satisfactory by the Archaeological Officers of the Greater London Archaeology Advisory Service and Elmbridge and the local authorities.	Initial: Date:	Post-excavation and reporting works to be monitored by a specialist archaeological consultant.
CH3.2			Prepare records, samples, artefacts etc. as an archive or series of archives for deposition in a museum or other appropriate repository in accordance with any relevant Written Scheme of Investigation and the Archaeological Management Plan, and implement the deposition.			Principal Contractor	Archives transferred to appropriate museum or other repository.	Initial: Date:	

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		Service and the local authorities	Charges for deposition will apply.						
Materials and waste									
N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
People and communities									
N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Climate									
C3.1	Ch 14, section 14.24	To maintain the design level of flood protection	Regular inspection of drainage infrastructure and clearance of sediment traps.	To be detailed within CEMP and HEMP	To be detailed within the CEMP	Managing Agent	Ongoing effective operation of drainage infrastructure. No flooding following rainfall events within design limits.	N/A	N/A
C3.2	Ch 14, section 14.25	To ensure extreme climate events are not having unexpected impacts	Monitoring and evaluation of the Scheme's major assets resilience to climate shall be part of regular asset inspections to inform climate change adaptation decision-making in the future.	To be detailed within CEMP and HEMP	To be detailed within the CEMP	Managing Agent	To ensure in an ongoing manner that the embedded mitigation has/is minimising the overall effect of climate change on the Scheme.	N/A	N/A

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