

Lower Thames Crossing Schedule 2 Requirements and Explanatory Memorandum

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Lower Thames Crossing

Schedule 2 Requirements and Explanatory Memorandum

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Covering Note

This document is a draft of one of a series of Control Documents that will form part of our planned DCO application. Following this consultation, we will carefully consider your feedback as we finalise the documents for our planned submission of the DCO application for the Lower Thames Crossing later this year.

The Schedule 2 Requirements are similar to conditions for a planning permission. These set out the conditions that we would be required to follow when proceeding with the construction and operation of the development authorised by the DCO. This includes reference to the other securing mechanism documents provided as part of this consultation.

An Explanatory Memorandum has been prepared to clearly explain the effect each of the Requirements.

These documents reflect the changes to the design described in this consultation. Updates may be made to this document to reflect feedback received from stakeholders ahead of submitting the document as part of the DCO application.

As this is a draft control document, there will be references to the upcoming Development Consent Order (DCO). Any documents referenced that will form the DCO will be mentioned with a (REF TBC).

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1 Explanation of Schedule 2 of the Draft Development Consent Order

1.1 Introduction

- 1.1.1 The suite of documents published for the Lower Thames Crossing community impacts consultation includes the current draft of Schedule 2 to the draft Development Consent Order (the Order). The Order is one of the documents that will be included in the application to the Planning Inspectorate.
- 1.1.2 Schedule 2 to the Order sets out the “requirements” that Highways England would comply with if the Order is approved. “Requirements” are the equivalents of planning conditions imposed on Town and Country Planning Act planning permissions and they govern how the Lower Thames Crossing Project (the Project) would be delivered.
- 1.1.3 The current draft of Schedule 2 is therefore being made available as part of community impacts consultation to help consultees understand, and should they wish to provide feedback on, how construction and operation of the Project would be controlled, and how commitments being made by the Project would be secured.
- 1.1.4 The requirements in Schedule 2 reflect the processes and procedures usually employed by Highways England when implementing nationally significant infrastructure schemes like the Project.
- 1.1.5 The requirements provide that the various schemes, details and plans to be approved must reflect the measures and approaches set out in:
- a. the Register of Environmental Actions and Commitments (REAC) which contains all of the environmental mitigation measures Highways England is committing to
 - b. the Code of Construction Practice which is the first iteration of the environmental management plan and which contains construction related measures (and, if the Project is granted consent, will include the REAC)
 - c. the Design Principles
 - d. the outline site waste management plan
 - e. The outline materials handling plan
 - f. the outline landscape and ecology management Plan (the outline LEMP)
 - g. the outline traffic management plan for construction
 - h. the Framework Construction Travel Plan
 - i. the wider networks impacts monitoring and management plan

- 1.1.6 Current drafts of the above “control documents” form part of the forthcoming consultation.
- 1.1.7 Approvals for final details of the Project are to be sought from the Secretary of State for Transport, following consultation with the local planning authority and/or another relevant third party. The Secretary of State is the appropriate discharging authority for the requirements given the number of local authorities across the Project, the need for consistency in decision making, and the complexity of the Project. This is consistent with other highways DCOs.
- 1.1.8 It should be noted that Schedule 2, and the related “control documents”, represent current drafts. Accordingly, they are subject to further change in response to the community impacts consultation, and further refinement of the Project, before the application is submitted.

1.2 Explanation of Requirements

- 1.2.1 The purpose and effect of the requirements are as follows:

Requirement 1: Interpretation

- 1.2.2 Requirement 1 contains a number of definitions used in Part 1 of Schedule 2; this includes definitions of all of the “control documents” mentioned above which contain the commitments.
- 1.2.3 We have also provided the definition of “commencement”. This makes it clear that a number of works (such as ecological investigations and preparatory works) that would constitute a “material operation” may be carried out without meaning that the authorised development has been “commenced”. This enables Highways England to undertake certain preparatory works prior to the submission of relevant details for approval under the requirements contained in Schedule 2, which Highways England considers proportionate and reasonable in the context of delivering nationally significant infrastructure. These activities may in some cases need to be carried out in order to comply with the pre-commencement requirements (for example, to inform assessments and proposals required to be submitted for approval).
- 1.2.4 Highways England’s view is that it is reasonable to carry out low-impact preparatory works following the grant of the Order while it is working to discharge the pre-commencement requirements, thereby helping to minimise the construction timetable. The definition of commencement closely follows the definition contained in the consented M42 Junction 6 Development Consent Order 2020, with the exception that (i) excluded utilities works would not be permissible as pre-commencement works (“excluded utilities works” will be significant utilities works which will be listed in the DCO itself) and (ii) site clearance is limited to vegetation clearance for advanced compound areas shown in the Code of Construction Practice. As explained below, Requirement 4 requires such activities to be carried out with appropriate environmental controls.
- 1.2.5 Paragraph 1(2) of Part 1 of Schedule 2 confirms that references to “part” throughout Schedule 2 are references to a stage or element of the authorised development. Similarly, Paragraph 1(3) confirms that schemes and details may be approved in relation to a specified part of the authorised development (e.g.,

a requirement could be discharged across a number of management plans for different phases or stages of the development, rather than one single management plan for the whole Project).

Requirement 2: Time limits

- 1.2.6 Requirement 2 provides that the authorised development must not commence later than five years from the date of the Order coming into force.

Requirement 3: Detailed design

- 1.2.7 Requirement 3 requires the authorised development to be designed in detail and carried out in accordance with the Design Principles document (REF TBC) and the preliminary scheme design shown on the Engineering Drawings and Sections (REF TBC), and the General Arrangement (REF TBC) which will form part of the DCO application unless otherwise agreed in writing by the Secretary of State, provided that any amendments to those documents showing departures from the preliminary scheme design would not give rise to any materially new or materially different environmental effects in comparison with those reported in the environmental assessments which will be submitted with the DCO application.
- 1.2.8 Requirement 3 allows for a proportionate and reasonable level of flexibility in the final design of the Project, something that is considered necessary and appropriate in delivering complex major infrastructure projects such as this. Importantly, that flexibility is limited to the scope of the assessment of effects in the Environmental Statement submitted with the application.

Requirement 4: Construction and handover environmental management plans

- 1.2.9 Requirement 4(1) requires that pre-commencement activities (being activities such as environmental surveys and monitoring) referenced above must be carried out in accordance with a pre-commencement environmental management plan including the measures in the pre-commencement REAC. This will ensure that these pre-commencement activities are carried out in accordance with applicable mitigation measures, even though they will be carried out before the detailed plans and schemes are approved under Schedule 2.
- 1.2.10 Requirement 4(2) requires the preparation of an Environmental Management Plan (EMP) (Second Iteration) in consultation with the relevant planning authority and Natural England for its approval by the Secretary of State. The EMP (Second Iteration) will be based substantially on the Code of Construction Practice prepared as part of the DCO application. The EMP will fulfil the construction-related objectives and measures as outlined in the REAC. The EMP (Second Iteration) will also need to be substantially in accordance with other control documents such as the materials handling plan, and the outline site waste management plan.
- 1.2.11 Following the construction of the relevant parts of the authorised development, the EMP (Second Iteration) would be replaced by an EMP (Third Iteration) which will address the matters set out in the Code of Construction Practice that are relevant to the operation and maintenance of that part of the authorised

development (except if these are covered by Requirement 5). The authorised development must be operated and maintained in accordance with an EMP (Third Iteration).

Requirement 5: Landscaping and ecology

- 1.2.12 Requirement 5 requires the preparation of a landscape and ecological management plan, or “LEMP” covering all hard and soft landscaping and ecological mitigation works. The LEMP must reflect the design principles document and mitigation measures set out in the REAC and must be based on the Environmental Masterplan contained in the Environmental Statement. In relation to a LEMP which includes any land in a Site of Special Scientific Interest, Natural England must also be consulted (in addition to the usual requirement to consult the relevant local planning authorities).

Requirement 6: Contaminated land and groundwater

- 1.2.13 Requirement 6 makes provision for dealing with any contaminated land and groundwater discovered during construction of the works that was not previously identified in the Environmental Statement, in consultation with the relevant planning authority and the Environment Agency. It requires the preparation of a risk assessment and, where remediation is determined to be necessary, a written scheme and programme for the remedial measures must be submitted for approval.

Requirement 7: Protected species

- 1.2.14 Requirement 7 states Highways England must carry out final pre-construction survey work to establish whether European or nationally protected species are present on any of the land affected or likely to be affected by any part of the relevant works, or in any of the trees and shrubs to be lopped or felled as part of the relevant works.
- 1.2.15 Where, following pre-construction survey work or at any time when carrying out the authorised development, the conditions listed in sub-paragraph (2) are met, then the relevant parts of the relevant works must not begin until a scheme of protection and mitigation measures has been submitted to and approved in writing by the Secretary of State. Consultation with Natural England is required unless a qualified ecologist determines that the works in question do not require a protected species licence.

Requirement 8: Surface and foul water drainage

- 1.2.16 Requirement 8 provides that no part of the authorised development can commence until written details of a surface and foul water drainage system, reflecting the mitigation measures in the REAC including means of pollution control, have been prepared in consultation with the relevant planning authority and approved in writing by the Secretary of State.

Requirement 9: Archaeological interests

- 1.2.17 Requirement 9 requires Highways England to prepare a written scheme of investigation of areas of archaeological interest (to be approved by the Secretary of State), and which must reflect the mitigation measures set out in the draft Archaeological Mitigation Strategy and Outline Written Scheme of

Investigation. The requirement also requires Highways England to retain in place any archaeological remains it discovers during the construction of the authorised development which have not previously been identified, and report these to the local planning authority. Temporary limitations are then placed on construction activity within 10 metres of the archaeological remains to allow assessment of whether further investigation is required. If so, the investigation and recording of the remains must be undertaken in accordance with a written scheme approved by the local planning authority unless otherwise agreed by the Secretary of State.

Requirement 10: Traffic management

- 1.2.18 Requirement 10 provides that no part of the authorised development can commence until a traffic management plan for the construction of that part (which is substantially in accordance with the the outline traffic management plan for construction has been prepared and approved by the Secretary of State following consultation with the bodies identified in the outline traffic management plan for construction.

Requirement 11: Construction travel plans

- 1.2.19 Requirement 11 provides that provides that no part of the authorised development can commence until a construction travel plan for the construction of that part (which is substantially in accordance with the framework construction travel plan has been prepared and approved by the Secretary of State following consultation with the relevant planning authority.

Requirement 12: Fencing

- 1.2.20 Requirement 12 sets out the permanent and temporary fencing and permanent acoustic barriers for highway related works comply with the relevant highways standards.

Requirement 13: Travellers' site in Thurrock

- 1.2.21 Requirement 13 provides that the details and layout of the replacement of the traveller's site in Thurrock must be approved by Thurrock Council. It further provides that any such details must be in accordance with the design principles and any other plans or schemes approved by the Secretary of State. An appeal mechanism to the Secretary of State is provided for in the case of a refusal or a grant subject to conditions.

Requirement 14: Traffic monitoring

- 1.2.22 Requirement 14 requires Highways England to submit a monitoring scheme to the Secretary of State prior to the opening of the Project. This monitoring strategy must be in accordance with the wider impacts monitoring and management plan. This will require Highways England to carry out monitoring of the wider road network, and consider interventions which may be suitable.
- 1.2.23 Part 2 of Schedule 2 provides a clear procedure for the discharge of requirements. It sets out clear time limits for decisions to be made and makes provision for circumstances where the Secretary of State requires further information to be provided in relation to an application for the discharge of a requirement.

- 1.2.24 Paragraph 16(4) is based on the consented A63 (Castle Street Improvement, Hull) Development Consent Order 2020, and ensures that Highways England gives due consideration to any representations made by the relevant planning authority when they are consulted under Schedule 2. It also requires that representations received from statutory bodies or local authorities are provided to the Secretary of State when an application is made in relation to a scheme or plan submitted for their approval.
- 1.2.25 Paragraph 19 establishes an appeal process in circumstances relating to Requirement 13 or where a local authority issues a notice under section 60, or does not grant consent or grants conditional consent under section 61, of the Control of Pollution Act 1974. Its aim is to streamline the appeal process, thereby minimising the potential for unnecessary delay to the Project.
- 1.2.26 Part 2 of Schedule 2 further provides that any anticipatory steps which Highways England takes to comply with the requirements before the Order is made will be treated as effective in complying with the requirements once the Order is made, thereby avoiding the need to repeat such steps.

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2 Schedule 2 Requirements

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“the Manual of Contract Documents for Highway Works” means the document of that name published electronically by or on behalf of the strategic highway authority for England or any equivalent replacement published for that document;

“nationally protected species” means any species protected under the Wildlife and Countryside Act 1981(a);

“outline traffic management plan for construction” means the document of that description referenced in Schedule 16 (documents to be certified) and certified by the Secretary of State;

“outline LEMP” means the outline landscape and ecology management plan referenced in Schedule 16 (documents to be certified) certified by the Secretary of State;

“outline materials handling plan” means the outline materials handling plan referenced in Schedule 16 (documents to be certified) certified by the Secretary of State;

“outline site waste management plan” means the outline site waste management plan referenced in Schedule 16 (documents to be certified) certified by the Secretary of State;

“pre-commencement activities” means the activities which are excluded from the definition of commencement under article 2 of this Order;

“pre-commencement EMP” means section [3] of the Code of Construction Practice;

“pre-commencement REAC” means those measures in the REAC applying to the pre-commencement activities contained in the Code of Construction Practice;

“REAC” means the register of environmental actions and commitments contained in Appendix 2.2 of the environmental statement;

“relevant highway authority” means the highway authority (as defined in the Highways Act 1980) for the area to which the provision relates;

“relevant planning authority” means the planning authority for the area to which the provision relates; and

“wider network impacts monitoring and management plan” means the document of that description referenced in Schedule 16 (documents to be certified) and certified by the Secretary of State.

(2) References in this Schedule to part of the authorised development are to be construed as references to stages, phases or elements of the authorised development in respect of which an application is made by the undertaker under this Schedule, and references to commencement of part of the authorised development in this Schedule are to be construed accordingly.

(3) References to details or schemes approved under this Schedule are to be construed as references to details or schemes approved in relation to a specified part of the authorised development, as the case may be.

Time limits

2. The authorised development must commence no later than the expiration of 5 years beginning with the date that this Order comes into force.

Detailed design

3.—(1) The authorised development must be designed in detail and carried out in accordance with the design principles document and the preliminary scheme design shown on the engineering drawings and sections, and the general arrangement drawings, unless otherwise agreed in writing by the Secretary of State following consultation by the undertaker with the relevant planning authority on matters related to its functions, provided that the Secretary of State is satisfied that any amendments to those documents showing departures from the preliminary scheme design would not give rise to any materially new or materially different environmental effects in comparison with those reported in the environmental statement.

(a) 1981 c. 69.

(2) Where amended details are approved by the Secretary of State under sub-paragraph (1), those details are deemed to be substituted for the corresponding engineering drawings and sections and the undertaker must make those amended details available in electronic form for inspection by members of the public.

Construction and handover environmental management plans

4.—(1) The pre-commencement activities must be carried out in accordance with pre-commencement EMP (including the measures in the pre-commencement REAC).

(2) No part of the authorised development is to commence until a EMP (Second Iteration), substantially in accordance with the Code of Construction Practice, for that part has been submitted to and approved in writing by the Secretary of State, following consultation by the undertaker with the relevant planning authority and Natural England to the extent that it relates to matters relevant to their respective functions.

(3) The EMP (Second Iteration) must be written in accordance with ISO14001, reflect the mitigation measures set out in the REAC and must include plans for the management of—

- (a) site waste (substantially in accordance with the outline site waste management plan);
- (b) materials (substantially in accordance with the outline materials handling plan);
- (c) noise and vibration;
- (d) air quality;
- (e) soils;
- (f) contaminated land;
- (g) substances hazardous to health; and
- (h) pollution prevention controls.

(4) The construction of the authorised development must be carried out in accordance with an approved EMP (Second Iteration).

(5) An EMP (Third Iteration) must be developed and completed by the end of the construction, commissioning and handover stage of any part of the authorised development, in accordance with the process set out in the Code of Construction Practice.

(6) The EMP (Third Iteration) must address the matters set out in the EMP (Second Iteration) that are relevant to the operation and maintenance of the authorised development and must, except where contained in a LEMP approved under paragraph 5 of this Schedule, contain—

- (a) the environmental information needed for the future maintenance and operation of the authorised development;
- (b) the commitments to aftercare, monitoring and maintenance activities relating to the environmental features and mitigation measures that will be required to ensure the continued long-term effectiveness of the environmental mitigation measures and the prevention of unexpected environmental impacts during the operation of the authorised development; and
- (c) a record of the consents, commitments and permissions resulting from liaison with statutory bodies.

(7) The authorised development must be operated and maintained in accordance with an EMP (Third Iteration).

Landscaping and ecology

5.—(1) Each part of the authorised development must be landscaped in accordance with a LEMP which sets out details of all proposed hard and soft landscaping works for that part and which has been submitted to and approved in writing by the Secretary of State, following consultation by the undertaker with—

- (a) the relevant planning authority; and

- (b) Natural England in respect of a LEMP which is proposed to include any land in the Shorne and Ashenbank Woods Site of Special Scientific Interest and/or the South Thames Estuary and Marshes Site of Special Scientific Interest,

on matters related to their respective functions.

(2) A LEMP prepared under sub-paragraph (1) must be substantially in accordance with the outline LEMP and must—

- (a) reflect the design principles document and the mitigation measures set out in the REAC;
- (b) be based on the environmental masterplan annexed to the environmental statement; and
- (c) include details of—
 - (i) location, number, species mix, size and planting density of any proposed planting;
 - (ii) cultivation, importing of materials and other operations to ensure plant establishment;
 - (iii) existing trees and vegetation to be retained, with measures for their protection during the construction period;
 - (iv) proposed finished ground levels;
 - (v) implementation timetables for landscaping works;
 - (vi) commitments to aftercare, monitoring and maintenance activities relating to the landscaping and ecological features; and
 - (vii) measures for the replacement, in the first available planting season, of any tree or shrub planted as part of the LEMP that, within a period of 5 years or such period as may be specified in the LEMP after the completion of the part of the authorised development to which the relevant LEMP relates, dies, becomes seriously diseased or is seriously damaged in the construction of the authorised development.

(3) All landscaping works must be carried out to a reasonable standard in accordance with the relevant recommendations of appropriate British Standards or other recognised codes of good practice.

Contaminated land and groundwater

6.—(1) In the event that contaminated land, including groundwater, is found at any time when carrying out the authorised development which was not previously identified in the environmental statement, it must be reported as soon as reasonably practicable to the Secretary of State, the relevant planning authority and the Environment Agency, and the undertaker must complete a risk assessment of the contamination in consultation with the relevant planning authority and the Environment Agency.

(2) Where the undertaker determines that remediation of the contaminated land is necessary, a written scheme and programme for the remedial measures to be taken to render the land fit for its intended purpose must be submitted to and approved in writing by the Secretary of State, following consultation by the undertaker with the relevant planning authority on matters related to its function and the Environment Agency.

(3) Remediation must be carried out in accordance with the scheme approved under sub-paragraph (2).

Protected species

7.—(1) No part of the authorised development is to commence until for that part final pre-construction survey work has been carried out to establish whether European or nationally protected species are present on any of the land affected or likely to be affected by that part of the authorised development, or in any of the trees and shrubs to be lopped or felled as part of the relevant works.

(2) Following pre-construction survey work or at any time when carrying out the authorised development, where—

- (a) a protected species is shown to be present, or where there is a reasonable likelihood of it being present;
- (b) application of the relevant assessment methods used in the environmental statement show that a significant effect is likely to occur which was not previously identified in the environmental statement; and
- (c) that effect is not addressed by any prior approved scheme of protection and mitigation established in accordance with this paragraph,

the relevant parts of the relevant works must cease until a scheme of protection and mitigation measures has been submitted to and approved in writing by the Secretary of State.

(3) The undertaker must consult with Natural England on the scheme referred to in sub-paragraph (2) prior to submission to the Secretary of State for approval, except where a suitably qualified and experienced ecologist, holding where relevant and appropriate a licence relating to the species in question, determines that the relevant works do not require a protected species licence.

(4) The relevant works under sub-paragraph (2) must be carried out in accordance with the approved scheme, unless otherwise agreed by the Secretary of State after consultation with Natural England, and under any necessary licences.

Surface and foul water drainage

8.—(1) No part of the authorised development is to commence until for that part written details of the surface and foul water drainage system, reflecting the mitigation measures set out in the REAC including means of pollution control, have been submitted and approved in writing by the Secretary of State following consultation by the undertaker with the relevant planning authority on matters related to its function.

(2) The surface and foul water drainage system must be constructed in accordance with the approved details, unless otherwise agreed in writing by the Secretary of State following consultation by the undertaker with the relevant planning authority on matters related to its function, provided that the Secretary of State is satisfied that any amendments to the approved details would not give rise to any materially new or materially different environmental effects in comparison with those reported in the environmental statement.

Archaeological interests

9.—(1) No part of the authorised development is to commence until for that part a written scheme for the investigation of areas of archaeological interest, reflecting the relevant mitigation measures set out in the AMS-OWSI, has been submitted to and approved in writing by the Secretary of State, following consultation by the undertaker with the relevant planning authority on matters related to its function.

(2) The authorised development must be carried out in accordance with the scheme referred to in sub-paragraph (1) unless otherwise agreed in writing by the Secretary of State.

(3) A copy of any analysis, reporting, publication or archiving required as part of the written scheme referred to in sub-paragraph (1) must be deposited with the Historic Environment Record of the relevant planning authority within one year of the date of completion of the authorised development or such other period as may be agreed in writing by the relevant planning authority or specified in the written scheme referred to in sub-paragraph (1).

(4) Any archaeological remains not previously identified which are revealed when carrying out the authorised development must be retained in situ and reported to the relevant planning authority as soon as reasonably practicable from the date they are identified.

(5) No construction operations are to take place within 10 metres of the remains referred to in sub-paragraph (4) for a period of 14 days from the date of any notice served under sub-paragraph (4) unless otherwise agreed in writing by the Secretary of State.

(6) If the relevant planning authority determines in writing that the archaeological remains require further investigation, no construction operations are to take place within 10 metres of the

remains until provision has been made for the further investigation and recording of the remains in accordance with details to be submitted in writing to, and, unless otherwise agreed by the Secretary of State, approved in writing by, the relevant planning authority, such approval not be unreasonably withheld or delayed.

(7) In this paragraph, “AMS-OWSI” means the draft Archaeological Mitigation Strategy and Outline Written Scheme of Investigation [(Appendix 6.9 of the environmental statement, application document TR010032/APP/6.3)].

Traffic management

10.—(1) No part of the authorised development is to commence until a traffic management plan for the construction of that part which is substantially in accordance with the outline traffic management plan for construction has been submitted to and approved in writing by the Secretary of State, following consultation by the undertaker with the relevant highway authorities, relevant planning authorities and other bodies identified in the outline traffic management plan for construction on matters related to their function.

(2) The authorised development must be carried out in accordance with the traffic management plan referred to in sub-paragraph (1).

Construction travel plans

11.—(1) No part of the authorised development is to commence until a construction travel plan for the construction of that part which is substantially in accordance with the framework construction travel plan has been submitted to and approved in writing by the Secretary of State, following consultation by the undertaker with the relevant highway authority and where different, the relevant planning authority on matters related to its function.

(2) The authorised development must be carried out in accordance with the construction travel plan referred to in sub-paragraph (1).

Fencing

12. Any permanent and temporary fencing and other means of enclosure for the authorised development must be constructed and installed in accordance with Volume 1, Series 0300 of the Manual of Contract Documents for Highway Works unless—

- (a) the fencing and other means of enclosure relates to non-highway works;
- (b) otherwise specified in the REAC; or
- (c) any departures from that manual are agreed in writing by the Secretary of State in connection with the authorised development, following consultation by the undertaker with the relevant planning authority on matters relates to its functions.

Travellers’ site in Thurrock

13.—(1) The replacement of the travellers’ site in Thurrock (Work No. 7R) must not commence until details of its layout and design have been submitted and approved in writing by the local planning authority, such approval not to be unreasonably withheld or delayed, following consultation by the undertaker with any persons it considers appropriate.

(2) The details submitted and approved under paragraph (1) must be in accordance with—

- (a) the design principles document; and
- (b) any plans, details or schemes approved by the Secretary of State under this Schedule.

(3) Work No. 7R must be carried out in accordance with the details approved under paragraph (1) or determined under an appeal under paragraph 19 of this Schedule.

(4) If the local planning authority which receives an application for approval under sub-paragraph (1) fails to notify the undertaker of its decision before the end of the period of 28 days

beginning with the date on which the application was made, it is deemed to have granted approval.

Traffic monitoring

14.—(1) Before the tunnels are open for traffic, the undertaker must submit written details of a traffic impact monitoring scheme substantially in accordance with the wider network impacts monitoring and management plan for approval by the Secretary of State following consultation by the undertaker with the local highway authorities and bodies identified in the that plan.

(2) The scheme under paragraph (1) must include—

- (a) a before and after survey to assess the changes in traffic;
- (b) the locations to be monitored and the methodology to be used to collect the required data;
- (c) the periods over which traffic is to be monitored;
- (d) the method of assessment of traffic data; and
- (e) baseline traffic levels.

(3) The scheme approved under sub-paragraph (1) must be implemented by the undertaker.

Amendments to approved details

15. With respect to any requirement which requires the authorised development to be carried out in accordance with the details or schemes approved under this Schedule, the approved details or schemes are taken to include any amendments that may subsequently be approved in writing by the Secretary of State, or in the case of any approval under paragraph 13, the local planning authority.

PART 2

PROCEDURE FOR DISCHARGE OF REQUIREMENTS

Applications made to the Secretary of State under Part 1

16.—(1) Where an application has been made to the Secretary of State for any consent, agreement or approval required by a requirement (including consent, agreement or approval in respect of part of a requirement) included in this Order the Secretary of State must give notice to the undertaker of the decision on the application within a period of 8 weeks beginning with—

- (a) the day immediately following that on which the application is received by the Secretary of State;
- (b) the day immediately following that on which further information has been supplied by the undertaker under paragraph 17 (further information); or
- (c) such longer period as may be agreed between the parties.

(2) Subject to sub-paragraph (3), in the event that the Secretary of State does not determine an application within the period set out in sub-paragraph (1), the Secretary of State is taken to have granted all parts of the application (without any condition or qualification at the end of that period).

(3) Where—

- (a) an application has been made to the Secretary of State for any consent, agreement or approval required by a requirement included in this Order;
- (b) the Secretary of State does not determine such application within the period set out in sub-paragraph (1); and
- (c) the application is accompanied by a report from a body required to be consulted by the undertaker under the requirement that considers it likely that the subject matter of the

application would give rise to any materially new or materially different environmental effects in comparison with those reported in the environmental statement,
the application is taken to have been refused by the Secretary of State at the end of that period.

(4) Where any paragraph in this Schedule requires the undertaker to consult with any authority or statutory body, the undertaker must—

- (a) provide all information to that authority or statutory body subsequently to be submitted to the Secretary of State as constituting the undertaker's proposed application;
- (b) give due consideration to any representations made by that authority or statutory body about the proposed application; and
- (c) include with its application to the Secretary of State copies of any representations made by that authority or statutory body about the proposed application, and a written account of how any such representations have been taken into account in the submitted application.

Further information

17.—(1) In relation to any part of an application made under this Schedule, the Secretary of State has the right to request such further information from the undertaker as is necessary to enable the Secretary of State to consider the application.

(2) In the event that the Secretary of State considers such further information to be necessary the Secretary of State must, within 21 business days of receipt of the application, notify the undertaker in writing specifying the further information required and (if applicable) to which part of the application it relates. In the event that the Secretary of State does not give such notification within that 21 business day period the Secretary of State is deemed to have sufficient information to consider the application and is not subsequently entitled to request further information without the prior agreement of the undertaker.

(3) Where further information is requested under this paragraph in relation to part only of an application, that part is treated as separate from the remainder of the application for the purposes of calculating the time periods referred to in paragraph 14 (applications made to the Secretary of State under Part 1) and in this paragraph.

(4) In this paragraph, "business day" means a day other than Saturday or Sunday which is not Christmas Day, Good Friday or a bank holiday under section 1 (bank holidays) of the Banking and Financial Dealings Act 1971(a).

Register of requirements

18.—(1) The undertaker must, as soon as practicable following the making of this Order, establish and maintain in an electronic form suitable for inspection by members of the public a register of those requirements contained in Part 1 of this Schedule that provide for further approvals to be given by the Secretary of State.

(2) The register must set out in relation to each such requirement the status of the requirement, in terms of whether any approval to be given by the Secretary of State has been applied for or given, providing an electronic link to any document containing any approved details.

(3) The register must be maintained by the undertaker for a period of 3 years following completion of the authorised development.

Appeals to the Secretary of State

19.—(1) The undertaker may appeal to the Secretary of State in the event that a local planning authority—

- (a) refuses an application for any approval required by paragraph 13(1) of this Schedule or grants such an approval subject to conditions; or

(a) 1971 c. 80.

- (b) issues a notice further to sections 60 or 61 of the Control of Pollution Act 1974^(a).
- (2) The appeal process applicable under sub-paragraph (1) is as follows—
 - (a) any appeal by the undertaker must be made within 42 days of the date of the notice of the decision, or the date by which a decision was due to be made, as the case may be;
 - (b) the undertaker must submit the appeal documentation to the Secretary of State and must on the same day provide copies of the appeal documentation to the local authority and affix a notice to a conspicuous object on or near the site of the works which are the subject of such appeal, which must give details of the decision of the local authority and notice that an appeal has been made together with the address within the locality where the appeal documents may be inspected and details of the manner in which representations on the appeal may be made;
 - (c) as soon as is practicable after receiving the appeal documentation, the Secretary of State must appoint a person to consider the appeal (“the appointed person”) and must notify the appeal parties of the identity of the appointed person, a start date and the address to which all correspondence for their attention should be sent;
 - (d) the local authority must submit their written representations to the appointed person in respect of the appeal within 10 business days of the start date and must ensure that copies of their written representations and any other representations as sent to the appointed person are sent to each other and to the undertaker on the day on which they are submitted to the appointed person;
 - (e) the appeal parties must make any counter-submissions to the appointed person within 10 business days of receipt of written representations under sub-paragraph (d); and
 - (f) the appointed person must make a decision and notify it to the appeal parties, with reasons, as soon as reasonably practicable but in any event no later than 10 business days from receipt of written representations under sub-paragraph (e).

(3) The appointment of the person under sub-paragraph (2)(c) may be undertaken by a person appointed by the Secretary of State for this purpose instead of by the Secretary of State.

(4) In the event that the appointed person considers that further information is necessary to enable the appointed person to consider the appeal, the appointed person must as soon as practicable notify the appeal parties in writing specifying the further information required, the appeal party from whom the information is sought, and the date by which the information is to be submitted.

(5) Any further information required under sub-paragraph (4) must be provided by the party from whom the information is sought to the appointed person and to other appeal parties by the date specified by the appointed person.

(6) The appointed person must notify the appeal parties of the revised timetable for the appeal on or before that day.

(7) The revised timetable for the appeal must require submission of written representations to the appointed person within 10 business days of the agreed date but must otherwise be in accordance with the process and time limits set out in sub-paragraphs (2)(c) to (e).

(8) On an appeal under this paragraph, the appointed person may—

- (a) allow or dismiss the appeal; or
- (b) reverse or vary any part of the decision of the local authority (whether the appeal relates to that part of it or not),

and may deal with the application as if it had been made to the appointed person in the first instance.

(9) The appointed person may proceed to a decision on an appeal taking into account such written representations as have been sent within the relevant time limits and in the sole discretion

(a) 1974 c. 40.

of the appointed person such written representations as have been sent outside the relevant time limits.

(10) The appointed person may proceed to a decision even though no written representations have been made within the relevant time limits, if it appears to the appointed person that there is sufficient material to enable a decision to be made on the merits of the case.

(11) The decision of the appointed person on an appeal is final and binding on the parties, and a court may entertain proceedings for questioning the decision only if the proceedings are brought by a claim for judicial review.

(12) Except where a direction is given under sub-paragraph (13) requiring some or all of the costs of the appointed person to be paid by the local authority, the reasonable costs of the appointed person must be met by the undertaker.

(13) The appointed person may give directions as to the costs of the appeal and as to the parties by whom such costs are to be paid.

(14) In considering whether to make any such direction and the terms on which it is to be made, the appointed person must have regard to the relevant Planning Practice Guidance published by the Ministry for Housing, Communities and Local Government or such guidance as may from time to time replace it.

Anticipatory steps towards compliance with any requirement

20. If before the coming into force of this Order the undertaker or any other person has taken any steps that were intended to be steps towards compliance with any provision of Part 1 of this Schedule, those steps may be taken into account for the purpose of determining compliance with that provision if they would have been valid steps for that purpose had they been taken after this Order came into force.

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Lower Thames Crossing

Outline Site Waste Management Plan

DATE: June 2021

VERSION: 0.2

Lower Thames Crossing

Outline Site Waste Management Plan

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Covering Note

This document is a draft of one of a series of Control Documents that will form part of our planned DCO application. Following this consultation we will carefully consider your feedback as we finalise the documents for our planned submission of the DCO application for the Lower Thames Crossing later this year.

The Outline Site Waste Management Plan (oSWMP) sets out the key principles and procedures for managing waste during the construction of the new road. The plan also defines specific roles and responsibilities to ensure waste is managed effectively and covers all phases of work (enabling, demolition, highways and tunnelling) within the Order Limits during construction.

The following contains a draft copy of this document to provide an example of how mitigation and commitments would be secured within the DCO application when it is submitted.

The oSWMP reflects the changes to the design described in this consultation. Updates may be made to this document to reflect feedback received from stakeholders ahead of submitting the document as part of the DCO application

As this is a draft control document, there will be references to the upcoming Development Consent Order (DCO). Any documents referenced that will form the DCO will be mentioned with a (REF TBC).

1 Executive summary

- 1.1.1 The A122 Lower Thames Crossing (the Project) is a proposed new motorway connecting Kent, Thurrock and Essex via a tunnel beneath the River Thames.
- 1.1.2 The Project would provide a connection between the A2 and M2 in Kent, east of Gravesend, crossing under the River Thames through two bored tunnels, before joining the M25 south of junction 29.
- 1.1.3 The A122 road would be approximately 23km long, 4.25km of which would be in tunnel. On the south side of the River Thames, the Project route would link the tunnel to the A2 and M2. On the north side, it would link to the A13 and junction 29 of the M25. The tunnel portals would be located to the east of the village of Chalk on the south of the River Thames and to the west of East Tilbury on the north side.
- 1.1.4 Waste would arise from many locations within the Project footprint including the enabling works, construction, demolition and excavation activities. The principles of how waste and materials will be transported both internally within the Project order limits, using a combination of the existing highway network and dedicated haul routes, and externally on the surrounding highway network, are detailed in the Outline Materials Handling Plan (oMHP). The oMHP is included, in draft, as part of the consultation material and would be submitted in support of the Development Consent Order application.
- 1.1.5 The purpose of this Outline Site Waste Management Plan (oSWMP) is to set out the overarching principles and procedures that would be applied for the management of waste during the construction of the Project.
- 1.1.6 The oSWMP also defines specific roles and responsibilities to ensure waste is managed effectively.
- 1.1.7 The Project is committed to implementing circular economy principles throughout design and construction, including the waste hierarchy, moving waste management practices as far up the hierarchy as practicable and minimising impacts on waste infrastructure receptors.

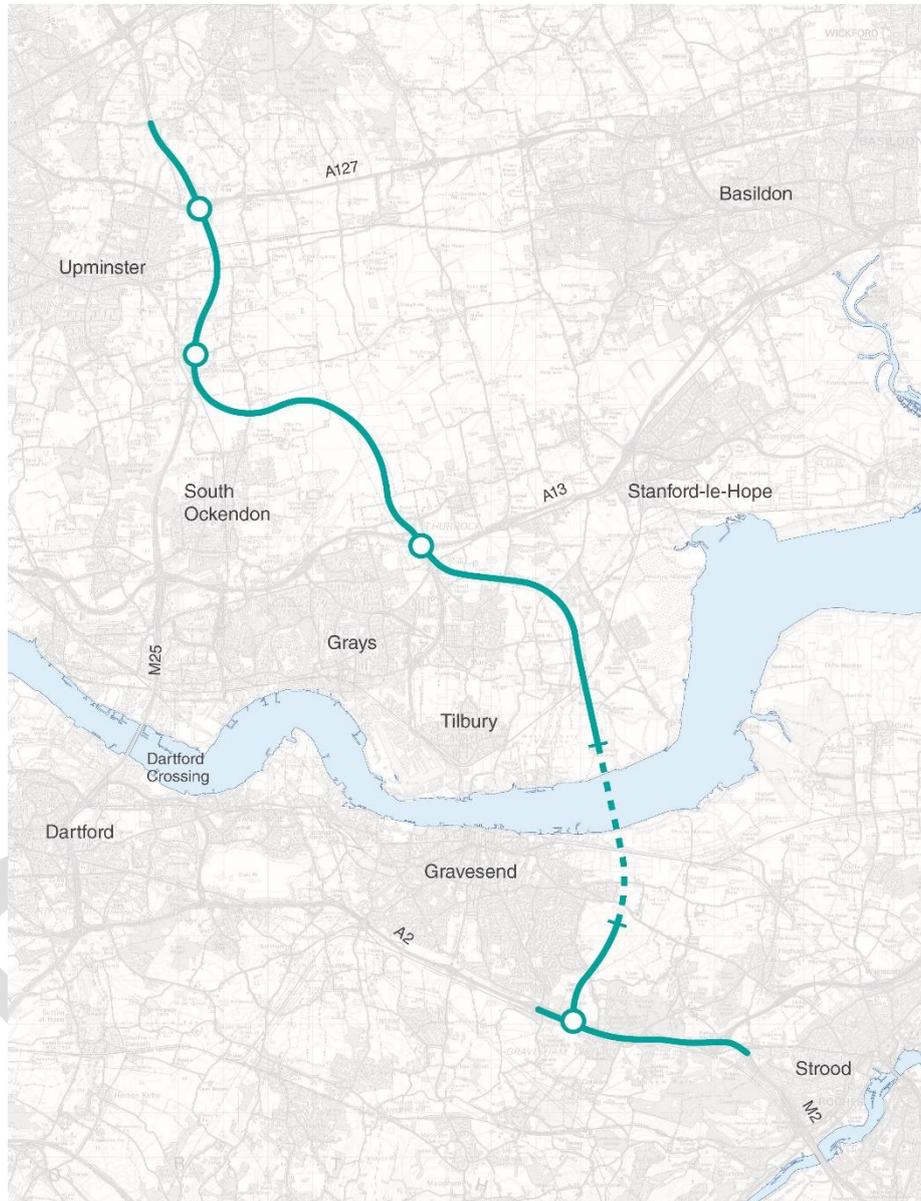
2 Introduction

2.1 The Project

- 2.1.1 The A122 Lower Thames Crossing (the Project) would provide a connection between the A2 and M2 in Kent, east of Gravesend, crossing under the River Thames through a tunnel, before joining the M25 south of junction 29. The Project route is presented in Plate 2.1.
- 2.1.2 The A122 road would be approximately 23km long, 4.25km of which would be in tunnel. On the south side of the River Thames, the Project route would link the tunnel to the A2 and M2. On the north side, it would link to the A13 and junction 29 of the M25. The tunnel entrances would be located to the east of the village of Chalk on the south of the River Thames and to the west of East Tilbury on the north side.
- 2.1.3 Junctions are proposed at the following locations:
- a. New junction with the A2 to the south-east of Gravesend
 - b. Modified junction with the A13/A1089 in Thurrock
 - c. New junction with the M25 between junctions 29 and 30
- 2.1.4 To align with NPSNN policy and to help the Project meet the Scheme Objectives, it is proposed that road user charges would be levied. Vehicles would be charged for using the new tunnel.
- 2.1.5 The Project route would be three lanes in both directions, except for:
- a. link roads
 - b. stretches of the carriageway through junctions
 - c. the southbound carriageway from the M25 to the junction with the A13/A1089, which would be two lanes
- 2.1.6 In common with other A-roads, the A122 would operate with no hard shoulder but would feature a 1m hard strip on either side of the carriageway. It would also feature technology including stopped vehicle and incident detection, lane control, variable speed limits and electronic signage and signalling. Our A122 road design outside of the tunnel includes emergency areas spaced at intervals between 800 metres and 1.6km (less than one mile). The tunnel would include a range of enhanced systems and response measures instead of emergency areas.
- 2.1.7 The A122 would be classified as an 'all-purpose trunk road' with green signs. For the benefit of safety, walkers, cyclists, horse-riders and slow-moving vehicles would be prohibited from using it.
- 2.1.8 The Project would include adjustment to a number of side roads. There would also be changes to a number of public rights of way, used by walkers, cyclists and horse riders. Construction of the Project would also require the installation and diversion of a number of utilities, including gas pipelines, overhead power lines and underground electricity cables, as well as water supplies and telecommunications assets and associated infrastructure.

- 2.1.9 The Project has been developed to avoid or minimise significant effects on the environment. Some of the measures adopted include landscaping, noise mitigation, green bridges, floodplain compensation, new areas of ecological habitat and two new parks.

Plate 2.1 Lower Thames Crossing route



2.2 Context

- 2.2.1 Waste would arise from many locations within the Project footprint including enabling works, construction, demolition and excavation (CD&E) activities. The flow of waste and materials, both internally within the Project order limits, using a combination of the existing highway network and dedicated haul routes and externally on the surrounding highway network, are detailed in the Outline Materials Handling Plan (oMHP).
- 2.2.2 The detailed assessment of the potential effects from materials and waste management will be discussed in Environmental Statement Chapter 11:

Material Assets and Waste (REF TBC) and the associated technical appendices (REF TBC). These will be submitted to support the application for a Development Consent Order.

2.3 Scope

- 2.3.1 The purpose of this Outline Site Waste Management Plan (oSWMP) is to set out the overarching principles and procedures that would be applied for the management of waste during the construction phase of the Project.
- 2.3.2 The oSWMP also defines specific roles and responsibilities to ensure waste is managed effectively. The oSWMP covers all phases of work (enabling, demolition, highways and tunnelling) occurring within the Order Limits during the construction phase.
- 2.3.3 Prior to the commencement of construction, the Principal Contractor would prepare and submit for the approval of the Secretary of State, a Construction Site Waste Management Plan (CSWMP), under Requirement 4 of the draft Development Consent Order (REF TBC). The CSWMP would need to be prepared in accordance with this oSWMP, and would need to be updated as a live document throughout the construction phase.
- 2.3.4 This oSWMP has been developed to provide a consistent framework for the following:
- a. The management and recording of material resources used and waste arising from CD&E activities
 - b. Evidence that the Project meets regulatory requirements
 - c. Reduction of waste management costs
 - d. Recording of design and construction decisions that demonstrate good and best practice in material resource use and waste minimisation and management
- 2.3.5 The intention of this oSWMP is to reflect the Project's proposed design, the associated quantities of waste arisings that are anticipated to be generated and to enable better control over material resources and waste arisings throughout the construction phase of the Project. Volumes of waste described in this document present a forecast and will be updated by the contractors as part of the CSWMP.
- 2.3.6 This oSWMP:
- a. Estimates waste arisings during the CD&E activities and identifies actions to reduce waste arisings and associated cost
 - b. Provides an initial indication as to whether material resources and waste arisings have the potential to be reused, recycled, recovered or need disposal
 - c. Proposes end destinations for waste arisings

2.4 Regulatory Framework

2.4.1 A non-exhaustive list of key legislation regulating construction waste management on the Project is presented in Table 2.1.

Table 2.1 Key legislation regarding construction waste

Description of legislation
<p>Directive 2008/98/EC on Waste (Waste Framework Directive)</p> <p>The Waste Framework Directive (WFD) contains the European Parliament and the Council of the European Union's legal definition of waste, which is adopted by Member States. This definition is used to establish whether a material is classified as waste or not. This Directive is transposed into UK law through the Waste (England and Wales) Regulations 2011 (as amended), which remain in force.</p> <p>The legal definition of waste is '<i>any substance or object which the producer discards or intends or is required to discard</i>'. The legal definition of waste also covers substances or objects which fall outside of the commercial cycle or out of the chain of utility. In particular, most items that are sold or taken offsite for recycling are wastes, as they require treatment before they can be resold or reused.</p> <p>In practical terms, wastes include surplus earthworks materials and soil, scrap, unwanted surplus materials, packaging, recovered spills, office waste, and damaged, worn-out, contaminated or otherwise spoiled plant, equipment and materials.</p> <p>Article 2 of WFD states that '<i>uncontaminated soil and other naturally occurring material excavated in the course of construction activities where it is certain that the material will be used for the purposes of construction in its natural state on the site from which it was excavated</i>', are excluded from the scope of the WFD.</p> <p>The use of the waste hierarchy in waste management (prevention, preparation for reuse, recycling, other recovery and disposal) is mandated. In addition, it sets a target for increasing the recycling of non-hazardous construction and demolition waste to a minimum of 70% (measured by weight) by 2020 (Article 11).</p> <p>Annex III of Commission Decision of 18 November 2011, 'Establishing rules and calculation methods for verifying compliance with the targets set in Article 11(2) of Directive 2008/98/EC of the European Parliament and of the Council' (2011/753/EU), sets out the methodology implemented when calculating construction waste diversion from landfill.</p> <p>The Directive defines recovery as '<i>any operation the principal result of which is waste serving a useful purpose by replacing other materials which would otherwise have been used to fulfil a particular function</i>'. Disposal is defined as '<i>any operation which is not recovery, even where the operation has as a secondary consequence the reclamation of substances or energy</i>'.</p>
<p>Directive 1999/31/EC on the landfill of waste (Landfill Directive) and the Environmental Permitting (England and Wales) Regulations 2016</p> <p>The Landfill Directive establishes a framework for the management of waste and is implemented by the 2016 Regulations. The legislation outlines the management and monitoring required for each landfill class, including Waste Acceptance Criteria for incoming waste and a requirement for pre-treatment.</p> <p>A ban is also placed on the disposal of specific wastes, such as liquids and tyres, from landfill and the mixing of waste to meet waste acceptance criteria is prohibited.</p>
<p>Environmental Permitting (England and Wales) Regulations 2016 (as amended)</p> <p>These Regulations were created to standardise environmental permitting and compliance in England and Wales to protect human health and the environment. This includes provisions for the permitting of waste and recovery operations within the Order Limits by Contractors and at offsite third-party facilities receiving waste.</p>

Description of legislation
The Regulations also include a schedule of activities that are exempt from the requirements of obtaining a permit, although registration may still be required.
<p>Environmental Protection Act 1990 (Part II)</p> <p>This Act outlines the basic provisions for the management of all waste, which includes details on the definition of waste, and outlines the Duty of Care placed on those involved in managing wastes.</p> <p>Duty of Care requirements are set out in section 34 of the Environmental Protection Act 1990 and require parties who produce or handle (import, store, transport, treat or dispose of) waste to take all reasonable steps to ensure that the waste is managed properly. Anyone in possession of waste must take all reasonable steps to:</p> <ul style="list-style-type: none"> • Prevent unauthorised or harmful deposit, treatment or disposal of waste • Prevent a breach (failure) by any other person to meet the requirement to have an environmental permit, or a breach of a permit condition • Prevent the escape of waste • Ensure that waste is only transferred to an authorised person • Provide an accurate description of the waste when it is transferred to another person <p>The duty exists from the moment the waste is produced, until it is fully recovered or disposed of at an appropriately permitted facility. The Environmental Protection (Duty of Care) Regulations 1991 outline the statutory requirements for record completion and retention.</p>
<p>Hazardous Waste (England and Wales) Regulations 2005</p> <p>These Regulations transpose the Hazardous Waste Directive into English and Welsh law. The Regulations implement a duty to separate and prohibit the mixing of hazardous and non-hazardous waste. They also require that a Hazardous Waste Consignment Note is produced for each consignment of hazardous waste removed from site.</p>

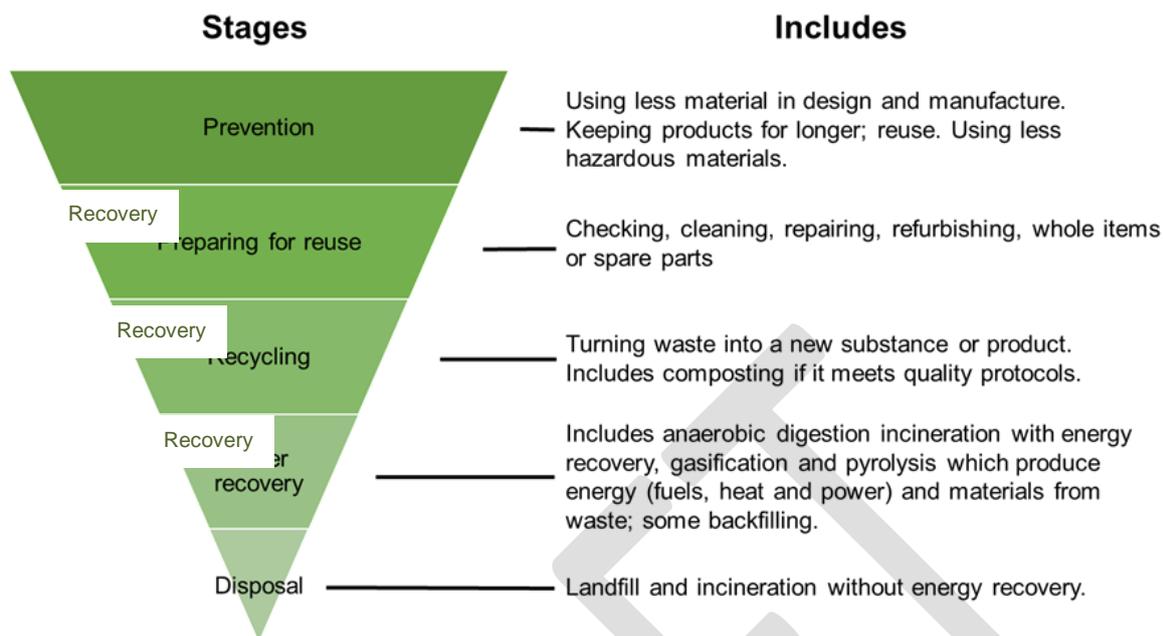
2.5 Outline Materials Handling Plan

- 2.5.1 The principles of waste and material transport both internally within the Project order limits, using a combination of the existing highway network and dedicated haul routes and externally on the surrounding highway network, is detailed in the oMHP.
- 2.5.2 The oMHP is a companion document to the oSWMP, providing the principles of waste movements associated with the Project. It provides further detail of waste generated from the Project's earthwork activities within the Order Limits.
- 2.5.3 In the context of waste, the oMHP covers environmental setting and existing infrastructure, construction logistics on large-scale projects, Materials movement and movement of excavated material transport options for material movements

2.6 Project commitments and targets

- 2.6.1 The Project is committed to implementing circular economy principles throughout design and construction, including the waste hierarchy, moving waste management practices as far up the hierarchy as practicable and minimising impacts on waste infrastructure receptors (Waste and Resources Action Programme (WRAP), 2020).

Plate 2.2 Waste hierarchy (Department for Environment, Food and Rural Affairs, 2011)



Prevention

2.6.2 Waste minimisation and prevention is at the top of the waste hierarchy and is concerned with avoiding the production of waste in the first place. Whilst complete avoidance of waste is impossible for a project of this scale, adopting certain waste minimisation practices would ensure that the overall quantity of materials not beneficially used within the Order Limits is kept to a minimum.

2.6.3 Opportunities with the greatest potential for improving resource efficiency and contributing to the circular economy in construction projects occur during the feasibility and early design stage. Circular economy principles have been implemented during design, such as:

- a. Designing out materials
- b. Identifying, securing and using materials onsite
- c. Designing for long life
- d. Designing for the future

2.6.4 A number of factors, including the aim of reducing waste, have influenced the Project throughout the design development process, from early route options assessment through to refinement of the Project design. An iterative process has facilitated design updates and improvements, informed by environmental assessment and input from the Project engineering teams, stakeholders and public consultation.

2.6.5 Waste prevention has been achieved in a variety of ways, for example:

- a. Maximising cut and fill to reduce the offsite management of excavated materials
- b. Altering the tunnel alignment and portal locations

- c. Reviewing the extent of the Order Limits to minimise the need to demolish buildings and structures
- d. Reusing demolition materials as recycled aggregate
- e. Retaining vegetation from site clearance for use in ecological mitigation works
- f. Reduction in footprint for temporary and permanent works
- g. Reduction in carriageway width
- h. Retention and reuse of all topsoil within the Order Limits

2.6.6 Some examples of waste reductions through the design process are presented in Table 2.2.

Table 2.2 Waste elimination in design

Item	Design change	Estimated reduction (m ³)
1	Changes to the auxiliary lanes at junction 29 on the M25	11,500
2	Reduction of the Project road from three lanes to two between the M25 and A13 (southbound)	15,000
3	Moving the South Portal approximately 350m south from the location presented at Statutory Consultation resulting in a reduced excavation for the road cutting	620,000
4	Retention and reuse within the Order Limits of excavated materials and treated tunnel boring machine slurry to fulfil the Project's requirements for fill and landscaping material	10,400,000
5	Trenchless methodology for some utility works instead of open trenching would result in less material handling Re-routing of the road alignment at Hornsby Lane/Chadwell St Mary to avoid the requirement to divert the existing the pylons Refinement of compound locations and layouts to reduce the requirements for vegetation clearance and vegetation waste generation	Not quantified

2.6.7 Additional measures have been proposed to continue to drive waste prevention and reduction throughout detailed design and construction phase. The Register of Environmental Actions and Commitments (REAC) includes a number of actions and commitments relating to waste management prevention during the construction phase. The REAC would be included within the Code of Construction Practice (CoCP) and would be secured by Requirement 4 of the draft Development Consent Order. Each entry in the REAC has an alpha-numerical reference code (eg. REAC Ref. MW0XX) to provide a cross reference to the secured commitment.

- 2.6.8 In terms of prevention, mitigation measures and targets would be implemented for the works, see Table 2.3.

Table 2.3 REAC for waste management – enhancing waste prevention

REAC Ref.	Commitment
MW001	<p>In line with the target set out in DMRB LA 110, 31% of aggregates used in construction would be recycled or secondary, for those applications where it is technically and economically feasible to substitute these alternative materials for primary aggregates. To facilitate compliance with this target, the Contractor would calculate the total aggregate required to achieve the detailed design, and the total where design specification dictates only primary aggregate is used. During construction, the Contractor would record the amount of primary and secondary/recycled aggregate by weight and calculate compliance with the target (offsetting the amount excluded by design specification).</p> <p>In line with the target set out in DMRB LA 110, 70% recycling and reuse on site of suitable, uncontaminated concrete from demolition activities to substitute use of primary material.</p> <p>Suitable uncontaminated concrete from demolition and construction activities would be processed to achieve non waste status in accordance with the Aggregates from Inert Waste Quality Protocol (WRAP, 2013)</p>
MW007	<p>Excavated material would be managed in line with the waste hierarchy with preference given to reuse where feasible and the design allows.</p> <p>Clean, naturally occurring soils would be reused on-site in line with Directive 2008/98/EC on Waste (Waste Framework Directive), Article 2.</p> <p>Contractors would implement all required environmental permits, exemptions and a Materials Management Plan (in accordance with the Definition of Waste: Development Industry Code of Practice (CL:AIRE, 2011) for the reuse of made ground and contaminated soils.</p> <p>Material that are not suitable for reuse or is excess to requirements would likely be managed as waste.</p>
MW008	<p>A ground investigation would be used to identify material that would be excavated on site that could be used as Class I-IV fill materials or construction aggregate to reduce the need to import equivalent materials in more detail.</p>

Recovery and Disposal

- 2.6.9 A project of this size cannot eliminate all waste; thus, having applied the principles of designing out waste set out above, recovery of waste on or offsite is the next preferable option.
- 2.6.10 The terms 'recovery' and 'disposal' are set out in Table 2.1.
- 2.6.11 As outlined in the waste hierarchy, recovery activities include 'preparing for reuse', 'recycling' and 'other recovery'. Example opportunities the Contractors could adopt to help achieve the waste recovery Project commitments in Table 2.5, are outlined in Table 2.4:

Table 2.4 Example waste recovery options

Management route	Example
Preparing for reuse	<ul style="list-style-type: none"> Retaining existing elements, such as street furniture, lighting columns and fencing, for reuse within the Order Limits Bringing excess materials, eg kerbs, drainage pipework or temporary piles from previous projects for use within the Order Limits Retaining and reusing offcuts such as metal and timber for reuse elsewhere within the Order Limits Ensuring that materials are ordered in line with programme requirements and stored to prevent damage, thus allowing them to be used and avoid becoming waste Retaining packaging materials and returning to the supplier for reuse Reuse of suitable demolition materials in habitat creation, e.g. hibernacula
Recycling	<ul style="list-style-type: none"> Reprocessing asphalt planings and utilising for tracks, compounds or in the permanent works Crushing and reusing concrete and inert materials for use in the permanent or temporary works Chipping vegetation for use as mulch and weed suppression in landscaping Identifying third-party recovery opportunities for excavated material such as a reclamation project. Identifying offsite opportunities for reuse of construction waste materials, e.g. in community projects
Other recovery	<ul style="list-style-type: none"> Waste sent for energy recovery (e.g. reuse as fuel) Biological recovery (e.g. composting and anaerobic digestion).

- 2.6.12 Disposal of waste is at the bottom of the waste hierarchy, as this is the least sustainable method of waste management.
- 2.6.13 Diversion from disposal and into recovery is required to minimise the impact on finite landfill capacity and divert potential waste into resource streams and thus deliver a circular economy.
- 2.6.14 In terms of recovery, mitigation measures and targets would be implemented for the works (Table 2.5). Again, these have been secured through the REAC included within the CoCP.
- 2.6.15 All commitments aim to ensure that waste would be handled in such a way as to enhance recovery rates achieved by the Project.
- 2.6.16 The commitments set out how waste would be managed both on and offsite, including requirements as to storage, segregation, labelling, sampling and classification.
- 2.6.17 Excavated materials are anticipated to be the largest sources of waste from the Project. A target has been set to ensure that these would be diverted from landfill disposal. In order to validate this proposal, an Excavated Materials Assessment (REF TBC) will be undertaken, which will verify that sufficient capacity is available in the study area to accept excavated materials for recovery activities.

Table 2.5 REAC for waste management – enhancing waste recovery

REAC Ref.	Commitment
MW005	<p>During construction it will be necessary to demolish various buildings, concrete structures and steel gantries. Pre-demolition surveys of these structures and buildings would be undertaken.</p> <p>Demolition materials would be identified and quantified including potential sources of recycled aggregate to be reused on site, as well as hazardous materials such as asbestos.</p>
MW010	<ol style="list-style-type: none"> a. Contractors would implement the following measures during construction in order to enhance recovery and recycling rates and minimise the quantities of waste: b. All waste arisings would be characterised and recorded. c. All wastes would be classified, with mirror entry code wastes sampled to determine classification, in line with the prevailing technical guidance. d. Waste management off-site would be completed under Duty of Care (Section 34 Environmental Protection Act). All waste would be transported using licensed carriers and taken only to appropriately permitted facilities. All waste movements would be accompanied by waste documentation such as Waste Transfer or Consignment Notes (dependent of waste class) which would be retained for the appropriate legal period. e. Satisfy the legal need under the Waste (England and Wales) Regulations 2011 (as amended) for pre-treatment of waste and confirm this in a written declaration on the associated waste documentation. f. Demonstrate and document that sufficient space has been allowed within the construction working areas for stockpiles for topsoil, contaminated material (for later off-site management), materials to be reused, excess clean material and imported materials for construction. This would enable the segregation of waste types, prevent the mixing of hazardous and non-hazardous wastes and enhance recovery rates by minimising degradation, damage and loss. g. Segregate hazardous and non-hazardous waste, separating waste at source by type, where reasonably practicable, providing separate skips for general waste, metal, dry recycling and timber as a minimum at each compound. Suitable provision would also be made for common hazardous wastes, e.g. used absorbents, aerosol cans, oily rags and waste electronics. h. Provide impermeable surfaces with sealed drainage for remediation, quarantine and hazardous waste storage areas to minimise cross contamination of other waste streams and surrounding ground. i. Label stockpiles and skips with contents, to prevent the mixing of hazardous and non-hazardous wastes. j. Comply with any specific waste storage and handling requirements required by legislation, e.g. for asbestos or waste electronics.

REAC Ref.	Commitment
	<ul style="list-style-type: none"> k. Vegetation waste should be reused on site wherever possible, e.g. for ecological mitigation (unless contaminated by invasive species). l. Where possible agree with material suppliers to reduce the amount of packaging on materials or to participate in a packaging take-back scheme. m. Implement a material delivery system to avoid materials being stockpiled, which increases the risk of their damage and disposal as waste. n. Monitor material quantity requirements to avoid over-ordering to reduce opportunity for oversupply and damage on site which would generate waste materials. o. Prioritise off-ground storage, e.g. on pallets, retention of materials in original packaging, protection from rain and collision by plant or vehicles. p. Ensure that the storage of lightweight or liquid/sludge waste materials will prevent dispersion by wind and precipitation. q. Seal stockpiles in place for over 30 days to maintain integrity of material. r. Seed topsoil stockpiles to reduce soil loss and maintain soil quality. s. Prohibit the burning of waste and unwanted materials on-site. t. In line with the requirements of DMRB LA 110, enhancement opportunities would be identified, reported and implemented during detailed design and construction to minimise the demand for material and the amount of waste sent for final disposal in landfill.
MW011	The Contractor would seek to achieve a target that 95% (by weight) of inert excavated materials destined for off-site waste management outside the Order Limits would be diverted from final disposal in landfill.
MW012	The Contractor would identify reuse sites that score positively against a sustainability scoring system agreed with Highways England.
MW013	The Contractor would use the methodology in the Waste Framework Directive (2008/98/EC) to demonstrate the recovery of non-hazardous construction waste, with a target of 90%. The Contractor would achieve a minimum recovery of 70% (by weight).
MW015	The Contractor would seek to achieve a target of 70% (by weight) of hazardous construction waste to be diverted from landfill. It is anticipated that this would be achieved by undertaking remediation or treatment within the Order Limits or off site at third party facilities. It is acknowledged that the nature of some hazardous construction waste may preclude this. Where a hazardous construction waste cannot be diverted from landfill, the justification and evidence will be provided by the Contractor and logged by the Contractor in the SWMP

2.7 Roles and responsibilities

- 2.7.1 Many parties would be involved in constructing the Project, including Highways England, Designers, Principal Contractors and sub-contractors. Each has their own role to play in ensuring effective waste management.
- 2.7.2 Given the Project will be divided into different contracts, multiple Principal Contractors and Designers are anticipated, however all would be subject to the same responsibilities outlined below.
- 2.7.3 These responsibilities have been secured as Project commitments in the REAC and the appropriate reference is included (e.g. MW0XX).
- 2.7.4 The key roles and associated responsibilities for delivery of the CSWMP are summarised below. These roles and responsibilities are based on those required by the now-revoked Site Waste Management Plan Regulations 2008. However, it is considered appropriate to follow the revoked SWMP Regulations 2008 as this provides a suitable framework for setting out a SWMP.

Highways England

- 2.7.5 Highways England is responsible for operating, maintaining and improving England's motorways and major A roads. Its responsibilities would include:
- Appointing the Principal Contractors and Designers
 - Monitoring the implementation of the CSWMP and Project commitments
 - Providing necessary direction to Contractors, e.g. setting contractual obligations
 - Monitoring the CSWMP as necessary in liaison with the Contractors, ensuring it is kept up to date
 - Sharing responsibility for ensuring that all waste from the site is dealt with in accordance with the waste Duty of Care in section 34 of the Environmental Protection Act 1990 and the Waste (England and Wales) Regulations 2011

Designer

- 2.7.6 The Designer would be appointed with the Principal Contractor to develop the preliminary design which will be submitted in the application for a Development Consent Order, into the detailed design to be executed in construction. Their responsibilities would include:
- Supporting the Contractors to identify, prioritise and implement ways of meeting the Project targets for waste
 - Identifying further opportunities to reduce total waste and improving material resource management
 - Identifying opportunities to increase reused and recycled content (where there is no impact on cost or performance)
 - Supporting the development/implementation of the CSWMP from an early design stage, including the provision of waste forecasts and pursuing further waste reduction through design

Principal Contractor

- 2.7.7 The Principal Contractor would be in control of the construction phase of a project involving more than one Contractor.
- 2.7.8 They would use the oSWMP and detailed design to write the CSWMP (or equivalent) to set out procedures for the characterisation, management and monitoring of waste arisings (MW009).
- 2.7.9 The CWSMP would contain:
- a. Initial forecast of construction waste listed by waste type, waste code, source and anticipated weight from detailed design.
 - b. Calculation of construction waste listed by waste type, waste code and source.
 - c. All wastes entered would have a final destination entered and the offsite destination, i.e. reuse, recycling, recovery or disposal.
 - d. Data in the document would be used to calculate the reuse of site-won materials.
 - e. Data in the document would be used to calculate recycling and reuse of demolition materials as recycled aggregate to demonstrate compliance with the Project target (REAC Ref. MW001).
 - f. Data in the document would be used to calculate offsite reuse of inert excavated materials to demonstrate compliance with the Project target (REAC Ref. MW011).
 - g. Data in the document would be used to calculate overall construction waste diversion from landfill to demonstrate compliance with the Project target (REAC Ref. MW013).
 - h. The document would be used to record relevant Duty of Care documentation (waste carrier registration, receiving site environmental permit number, waste transfer documentation reference) associated with the waste movement.
- 2.7.10 Where a Materials Management Plan (as defined by CL:AIRE (2011)) is required (see REAC Ref. MW007), the CSWMP would be compatible with the materials tracking element to enable the full traceability of all materials excavated during construction.
- 2.7.11 The CSWMP used to track the management of waste would be stored in an accessible location on site.
- 2.7.12 A Materials and Waste Manager would be appointed (MW006) to ensure:
- a. Procedures within the CSWMP and commitments outlined in the REAC would be followed during both the detailed design and construction
 - b. The waste hierarchy would be implemented and further opportunities to reduce waste generation or improve recovery/recycling rates are identified
 - c. Compliance with waste mitigation requirements and ensuring the CSWMP is written and updated
- 2.7.13 The Principal Contractor would provide adequate environmental training, including content on waste management and the CSWMP.

- 2.7.14 Where waste targets set out in the CSWMP are unlikely to be met, the Principal Contractor would notify Highways England in advance and provide justification.

Contractors/Subcontractors

- 2.7.15 Contractors and Subcontractors are companies or persons who would carry out, manage or control works at the direction of the Principal Contractor. Their responsibilities would include:
- a. Carrying out the relevant waste management tasks detailed in the CSWMP
 - b. Assisting with required inputs, providing forecasts of waste produced through their activities when requested
 - c. Measuring and reporting progress for waste and reused and recycled waste in tonnes and/or cubic metres
 - d. Reporting performance for construction and excavation waste streams separately, measured in tonnes and/or cubic metres
 - e. Supporting the development/implementation of the CSWMP and working in full compliance with the methods detailed within the CSWMP, in particular complying with all actions to reduce and reuse waste and increase levels of recovery
 - f. Participating in site briefings/toolbox talks for operatives on materials handling and waste disposal
 - g. Informing the Principal Contractor (in advance) where waste targets set out in the CSWMP are unlikely to be met, and providing justification
 - h. Identifying additional ways to reduce and reuse waste and/or increase recovery and informing the Principal Contractor

2.8 Waste management contractors

- 2.8.1 The Project would be located in the south-east of England in an area with a high density of registered waste carriers and appropriately licensed waste handling facilities.
- 2.8.2 Waste management contractors would provide evidence of registration/permitting prior to waste leaving the Project, and the relevant details entered on the accompanying waste documentation, eg waste transfer note.
- 2.8.3 Credentials of waste management contractors can be verified using the public registers managed by Defra (Defra, 2021).
- 2.8.4 Disposal and recovery facilities within the study area would be presented in the Environmental Statement Appendix 11.3 (REF TBC).

2.9 Waste forecast

- 2.9.1 In order to assist the management and segregation of waste and the completion of the CSWMP, estimations have been made of the types and quantities that will be generated during the construction phase of the Project.
- 2.9.2 The following information was collated:

- a. The types and quantities of waste arising from the Project (demolition, excavation arisings and remediation)
 - b. The amount of waste (by weight) that would be recovered and diverted from landfill either within the Order Limits or offsite
 - c. The type and quantity of hazardous waste
- 2.9.3 Calculations exclude excavated materials sourced and reused within the Order Limits as these are classed as non-waste, e.g. under Article 2 of WaFD or using a Materials Management Plan in line with CL:AIRE (2011).
- 2.9.4 The estimated recovery rates are based on the “good practice quick win” recovery rates set out in the Achieving Good Practice Waste Minimisation and Management report published by WRAP (undated). The overall recovery rate is calculated by tonnage.
- 2.9.5 The recovery potential of each waste stream is stated and indicates where Contractors are likely to increase recovery of this waste stream either within the Order Limits or offsite.
- 2.9.6 All the materials identified for use in construction were designated for use in either permanent or temporary works. All materials designated for use in the temporary works were assumed to be removed from the Order Limits as waste following the completion of construction to provide a worst-case estimate.
- 2.9.7 As outlined in Sections 1.6 and 1.7 of this oSWMP, it is expected that Designers, Principal Contractors and Contractors would identify waste management options to enhance the recovery of waste and further improve upon the data presented.
- 2.9.8 In addition to directly generated wastes, e.g. excavated soils and welfare bins, a wastage rate was also applied to all key materials used in construction (in both permanent and temporary works). The wastage factors defined in the Net Waste Tool (WRAP, 2008) were applied to account for damage and defects.
- 2.9.9 Table provides a breakdown of the waste arisings from surplus excavated material. These are presented based on the contract areas which comprise:
- a. Kent Roads
 - b. Tunnels and Approaches (South and North)
 - c. Roads North
- 2.9.10 Waste generated from enabling works and demolition activities may form part of these contracts.
- 2.9.11 Indicative waste types and quantities from non-earthwork-related activities are summarised in Table 2.7. The waste data presented in Table 2.7 has been separated into construction activity providing context regarding the stage of construction from which the waste may originate. Some entries have been marked with ‘TBC’ and will be updated for the oSWMP submitted in support of the Development Consent Order application.
- 2.9.12 It is intended that the oSWMP to be submitted with the DCO Application will divide the waste quantities detailed in Table 2.7 into proposed contract areas to facilitate use in individual Principal Contractors’ CSWMPs.

- 2.9.13 Annexes A.1 to A.5 provide a template for waste forecasting to be adopted by the Contractors as part of the development of the CSWMP and as a result, the entries in these tables have been marked TBC.
- 2.9.14 The content of Table 2.6 and Table 2.7 will be updated to reflect the waste quantities forecast for the Project design submitted as part of the Development Consent Order application.

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Table 2.6 Indicative types, quantities and anticipated management route of surplus excavated material

Location	Waste generated	Estimated m3	Anticipated management
Section A - Kent Roads			
South of the River Thames - Material is anticipated to be chalk (as dug), with lesser contributions of made ground and Head deposits.	Contaminated excavated material *potentially hazardous	6,600	30% sent for offsite disposal [MW015]
	Contaminated excavated material *potentially hazardous	15,400	70% recovered/recycled [MW015]
Section B			
South of River Thames –Tunnels & Approaches South of the River Thames - Material is anticipated to be chalk (as dug) with lesser contributions of made ground, Alluvium, River Terrace Deposits and Head deposits.	Contaminated excavated material *potentially hazardous	600	30% sent for offsite disposal [MW015]
	Contaminated excavated material *potentially hazardous	1,400	70% recovered/recycled [MW015]
North of River Thames – Tunnels & Approaches North of the River Thames Material is anticipated to be chalk slurry (from tunnel boring machine (TBM) with made ground (landfill), pulverised fuel ash, peat and Alluvium from the launch ramp and North Portal area.	Inert excavated material	520,000	Transportation to Ingrebourne Valley Limited receiver site which is located within the Order Limits

Location	Waste generated	Estimated m3	Anticipated management
	Contaminated excavated material *potentially hazardous	7,500	30% sent for offsite disposal [MW015]
	Contaminated excavated material *potentially hazardous	17,500	70% recovered/recycled [MW015]
Section C – Roads North			
North of the River Thames Material is anticipated to be made ground, Alluvium, River Terrace Deposits and clay	Inert excavated material	446,500	95% Diversion from landfill in line with commitment [MW011]
	Inert excavated material	23,500	5% landfill disposal
	Contaminated excavated material *potentially hazardous	4,500	30% sent for offsite disposal [MW015]
	Contaminated excavated material *potentially hazardous	10,500	70% recovered/recycled [MW015]
Section D – Roads North			
North of the River Thames Material is anticipated to be made ground, Alluvium, River Terrace Deposits and Clay	Inert excavated material	753,350	95% Diversion from landfill in line with commitment [MW011]
	Inert excavated material	39,650	5% landfill disposal
	Contaminated excavated material *potentially hazardous	1,800	30% sent for offsite disposal [MW015]
	Contaminated excavated material *potentially hazardous	4,200	70% recovered/recycled [MW015]

Location	Waste generated	Estimated m3	Anticipated management
Summary			
Total volume for offsite management (m3)	Inert excavated material (management outside of Order Limit)	1,265,000	
	Inert excavated material (management within the Order Limits)	520,000	
	Contaminated excavated material *potentially hazardous	70,000	

Table 2.7 Indicative waste types (excluding surplus excavated materials), quantities and anticipated management route

Activity	Waste generated	Estimated tonnage	Estimated m ³	Recovery potential	Anticipated management
Site clearance/ utility connections/ enabling works	Aluminium (power cable and transmission towers – removed and wastage)	10,150	3,760	High	100% recycling offsite
	Steel (gas main and power transmission towers – removed and wastage)	830	110	High	100% recycling offsite
	Concrete (pre-cast pipes, slabs, foundations, sewer) – wastage and temporary works	7,300	3,040	High	95% recycling offsite
	Concrete (pre-cast pipes, slabs, foundations, sewer) – wastage and temporary works	390	160	High	5% disposal offsite
	Bituminous road surfacing *potentially hazardous (assumes 25% of total contains coal tar)	18,940	10,530	Medium	95% recycling offsite
	Bituminous road surfacing *potentially hazardous (assumes 25% of total contains coal tar)	1,000	560	Medium	5% disposal offsite
	Asphalt – wastage and temporary works	79,340	44,080	High	95% recycling offsite
	Asphalt – wastage and temporary works	4,180	2,320	High	5% disposal offsite
	Excess vegetation from site clearance	17,350	19,890	High	100% composting offsite

Activity	Waste generated	Estimated tonnage	Estimated m ³	Recovery potential	Anticipated management
	Vegetation from site clearance – reused within the Order Limits	26,020	29,840	High	100% reuse (mulching, bio piles, habitat creation)
	Iron (manholes) – wastage	TBC	TBC	High	100% recycling offsite
	Plastic (utility pipework) – wastage and temporary works	TBC	TBC	Low	50% recycling offsite
	Plastic (utility pipework) – wastage and temporary works	TBC	TBC	Low	50% disposal offsite
Demolition (properties and structures)	Concrete from demolition reused as recycled aggregate	7,740	3,230	High	70% of total tonnes generated reused as secondary aggregate – retained
	Concrete from demolition – sent offsite	3,150	1,320	High	Of the 30% of total concrete tonnes generated sent offsite, 95% recycling offsite
	Concrete from demolition – sent offsite	TBC	TBC	High	Of the 30% of total concrete tonnes generated sent offsite, 5% disposal offsite
	Steel	2,090	270	High	100% recycling offsite
	Other inert (e.g. brick, glass)	4,110	1,720	High	95% recycling offsite
	Other inert (e.g. brick, glass)	TBC	TBC	High	5% disposal offsite
	Insulation	TBC	TBC	Low	50% recycling offsite
	Insulation	TBC	TBC	Low	50% disposal offsite
	Mixed metal	2,190	240	High	100% recycling offsite

Activity	Waste generated	Estimated tonnage	Estimated m ³	Recovery potential	Anticipated management
	Plastic	TBC	TBC	Low	80% recycling offsite
	Plastic	TBC	TBC	Low	20% disposal offsite
	Timber	TBC	TBC	High	90% recycling offsite
	Timber	TBC	TBC	High	10% disposal offsite
	Plasterboard	TBC	TBC	Low	90% recycling offsite
	Plasterboard	TBC	TBC	Low	10% disposal offsite
	Hazardous waste (e.g. asbestos)	Unknown	Unknown	Low	70% diversion from landfill
Construction (earthworks, compounds, haul roads, tunnel and highways)	Concrete (temporary and permanent works, including pre-cast and poured)	800,710	333,630	High	95% recycling offsite
	Concrete (temporary and permanent works, including pre-cast and poured)	42,150	17,560	High	5% disposal offsite
	Steel	98,260	12,440	High	100% recycling offsite
	Rubber	610	410	Low	100% disposal
	Plastic	19,840	22,040	Low	80% recycling offsite
	Plastic	4,960	5,510	Low	20% disposal offsite
	Aggregate	610,370	339,100	High	95% recycling offsite
	Aggregate	32,130	17,850	High	5% disposal offsite
	Cement	5,750	4,110	Medium	75% recycling offsite
	Cement	1,920	1,370	Medium	25% disposal offsite
	Bentonite	77,060	154,120	Medium	75% recycling offsite

Activity	Waste generated	Estimated tonnage	Estimated m ³	Recovery potential	Anticipated management
	Bentonite	25,690	51,380	Medium	25% disposal offsite
	Iron	240	30	High	100% recycling offsite
	Asphalt	64,790	36,000	High	95% recycling offsite
	Asphalt	3,410	1,900	High	5% disposal offsite
	Timber	24,350	34,780	High	90% recycling offsite
	Timber	2,710	3,870	High	10% disposal offsite
	General waste skips	13,500	13,500	Medium	50% recovery offsite
	General waste skips	13,500	13,500	Medium	50% disposal offsite
	Cardboard (packaging)	11,480	25,500	High	85% recycling offsite
	Cardboard (packaging)	2,030	4,500	High	15% disposal offsite
	Tunnel boring machine (TBM) and ancillaries x2	6,720	860	Low/Medium	49% recycling offsite
	TBM and ancillaries x2	7,000	2,340	Low/Medium	51% disposal offsite

Potential European Waste Catalogue (EWC) codes have been provided. However, the waste producer will be legally responsible in providing an appropriate description of any waste produced.

2.10 Monitoring

- 2.10.1 As outlined in Section 1.6 of this document, all Contractors would assist the Principal Contractor in collating waste data and Duty of Care records.
- 2.10.2 The Principal Contractor would utilise this information in addition to site audits to monitor ongoing compliance against the legal requirements laid out in Table 2.1 and the Project targets and commitments laid out in Table 2.3 and Table 2.5.
- 2.10.3 The Principal Contractor would submit quarterly monitoring waste reports to Highways England, which would present the following information as a minimum:
- Confirmation of compliance with waste legislation
 - Summary of waste management performance against targets, consents, environmental permits and exemptions registered for construction activities within the Order Limits in the monitoring period
 - A summary of waste sent offsite for disposal and recovery and compliance against the Project targets (see Table 2.8)
 - Where targets are projected to be missed, the Contractors will be required to provide a plan setting out how they can rectify the situation and bring it back to compliance
 - A copy of the latest Contractor audit would be attached, verifying compliance with REAC items MW001 to MW015

Table 2.8 Project targets

REAC Ref.	Target	Project % Targets
MW001	Total uncontaminated concrete from demolition	70% recycling and reuse on site of suitable, uncontaminated concrete from demolition activities to substitute use of primary material
	Total crushed and reused within Order Limits	
	Total sent off site for recovery during demolition phase	
	Total sent off site for disposal during demolition phase	
MW013	Total non-hazardous waste generated	Achieve a minimum recovery of 70% (by weight) of non-hazardous construction waste
	Total non-hazardous waste recovered on site* (*excluding site-sourced, naturally occurring excavated ground materials)	
	Total non-hazardous waste sent off site for recovery	
	Total non-hazardous waste sent off site for disposal	
MW011	Total excavated inert ground materials leaving Order Limits	Achieve a target that 95% (by weight) of inert excavated materials

REAC Ref.	Target	Project % Targets
	Amount of excavated inert ground materials leaving Order Limits for recovery	destined for off-site waste management outside the Order Limits would be diverted from final disposal in landfill
	Amount of excavated inert ground materials leaving Order Limits for disposal	
MW015	Total hazardous waste generated	Achieve a target of 70% (by weight) of hazardous construction waste to be diverted from landfill
	Total hazardous waste recovered on site (e.g. remediation)	
	Total hazardous waste sent off site for recovery	
	Total hazardous waste sent off site for disposal	

- 2.10.4 At the close of the construction phase, a final report would be provided and include an Action Plan to address the lessons that have been learned from the Project that could be implemented for future similar projects.
- 2.10.5 Highways England would monitor the Project performance and the implementation of the CSWMP at regular intervals.

3 Conclusion

- 3.1.1 This Outline Site Waste Management Plan (oSWMP) sets out the overarching principles and procedures that would be applied for the management of waste during the construction of the Project. It also defines specific roles and responsibilities to ensure waste is managed effectively.
- 3.1.2 Prior to the commencement of construction, the Principal Contractor would prepare and submit for the approval of the Secretary of State, a Construction Site Waste Management Plan (CSWMP), under Requirement 4 of the draft Development Consent Order (REF TBC). The CSWMP would need to be prepared in accordance with this oSWMP and would need to be updated as a live document throughout the construction phase.

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Annex A CSWMP data Templates

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Annex A.1 Enabling Works Template

Annexes A.1 to A.5 provide a template for waste forecasting to be adopted by the Contractors as part of the development of the CSWMP and as a result, the entries in these tables have been marked TBC.

Activity	Waste generated	Possible EWC code	Estimated tonnage	Estimated m ³	Anticipated management
Site clearance/utility connections/enabling works	Exported utility trenching as-dug offsite waste *potentially hazardous	170503*	TBC	TBC	TBC
	Exported utility trenching as-dug offsite *potentially hazardous	170503*	TBC	TBC	TBC
	Exported utility trenching as-dug offsite (non-hazardous)	170504	TBC	TBC	TBC
	Aluminium (power cable and transmission towers) – removed and wastage	170402	TBC	TBC	TBC
	Steel (gas main and power transmission towers) – removed and wastage	170405	TBC	TBC	TBC
	Concrete (pre-cast pipes, slabs, foundations, sewer) – wastage and temporary works	170101	TBC	TBC	TBC
	Concrete (pre-cast pipes, slabs, foundations, sewer) – wastage and temporary works	170101	TBC	TBC	TBC
	Bituminous road surfacing *potentially hazardous (assumes 25% of total contains coal tar)	170301*	TBC	TBC	TBC
	Bituminous road surfacing *potentially hazardous (assumes 25% of total contains coal tar)	170301*	TBC	TBC	TBC

Activity	Waste generated	Possible EWC code	Estimated tonnage	Estimated m ³	Anticipated management
	Asphalt – wastage and temporary works	170302	TBC	TBC	TBC
	Asphalt – wastage and temporary works	170302	TBC	TBC	TBC
	Excess vegetation from site clearance	200201	TBC	TBC	TBC
	Vegetation from site clearance – reused within the Order Limits	200201	TBC	TBC	TBC
	Iron (manholes) – wastage	170405	TBC	TBC	TBC
	Plastic (utility pipework) – wastage and temporary works	170203	TBC	TBC	TBC
	Plastic (utility pipework) – wastage and temporary works	170203	TBC	TBC	TBC

Annex A.2 Demolition Works Template

Activity	Waste generated	Possible EWC code	Estimated tonnage	Estimated m ³	Anticipated management
Demolition (properties and structures)	Concrete from demolition reused as recycled aggregate	170101	TBC	TBC	TBC
	Concrete from demolition – sent offsite	170101	TBC	TBC	TBC
	Concrete from demolition – sent offsite	170101	TBC	TBC	TBC
	Steel	170405	TBC	TBC	TBC
	Other inert (e.g. brick, glass)	170107	TBC	TBC	TBC
	Other inert	170107	TBC	TBC	TBC
	Insulation	170604	TBC	TBC	TBC
	Insulation	170604	TBC	TBC	TBC
	Mixed metal	170407	TBC	TBC	TBC
	Plastic	170203	TBC	TBC	TBC
	Plastic	170203	TBC	TBC	TBC
	Timber	170201	TBC	TBC	TBC
	Timber	170201	TBC	TBC	TBC
	Plasterboard	170801* 170802	TBC	TBC	TBC
	Plasterboard	170801* 170802	TBC	TBC	TBC
Hazardous waste (e.g. asbestos)	170603* 170605*	TBC	TBC	TBC	

Annex A.3 Construction: Highways North Template

Activity	Waste generated	Possible EWC code	Estimated tonnage	Estimated m ³	Anticipated management
Construction (earthworks, compounds, haul roads and highways)	Concrete	170101	TBC	TBC	TBC
	Steel	170405	TBC	TBC	TBC
	Rubber	200301	TBC	TBC	TBC
	Plastic	170203	TBC	TBC	TBC
	Aggregate	170504	TBC	TBC	TBC
	Cement	170101	TBC	TBC	TBC
	Bentonite	200301	TBC	TBC	TBC
	Bentonite	200301	TBC	TBC	TBC
	Iron	170405	TBC	TBC	TBC
	Asphalt	170302	TBC	TBC	TBC
	Timber	170201	TBC	TBC	TBC
	Contaminated excavated material *potentially hazardous	170503*	TBC	TBC	TBC
	Non-hazardous excavated material	170504	TBC	TBC	TBC
	Inert excavated material	170504	TBC	TBC	TBC
	Inert excavated material – retained in Order Limits	170504	TBC	TBC	TBC
	General waste skips	200301	TBC	TBC	TBC
	Cardboard (packaging)	200101	TBC	TBC	TBC
Dry mixed recycling	200102 200108 200139 200140	TBC	TBC	TBC	

Annex A.4 Construction: Tunnels Template

Activity	Waste generated	Possible EWC code	Estimated tonnage	Estimated m ³	Anticipated management
Construction (earthworks, compounds, haul roads and tunnels)	Concrete	170101	TBC	TBC	TBC
	Steel	170405	TBC	TBC	TBC
	Rubber	200301	TBC	TBC	TBC
	Plastic	170203	TBC	TBC	TBC
	Aggregate	170504	TBC	TBC	TBC
	Cement	170101	TBC	TBC	TBC
	Bentonite	200301	TBC	TBC	TBC
	Bentonite	200301	TBC	TBC	TBC
	Iron	170405	TBC	TBC	TBC
	Asphalt	170302	TBC	TBC	TBC
	Timber	170201	TBC	TBC	TBC
	Contaminated excavated material *potentially hazardous	170503*	TBC	TBC	TBC
	Non-hazardous excavated material	170504	TBC	TBC	TBC
	Inert excavated material	170504	TBC	TBC	TBC
	Inert excavated material – retained in Order Limits	170504	TBC	TBC	TBC
	General waste skips	200301	TBC	TBC	TBC
	Cardboard (packaging)	200101	TBC	TBC	TBC
Dry mixed recycling	200102 200108 200139 200140	TBC	TBC	TBC	

Annex A.5 Construction: Highways South Template

Activity	Waste generated	Possible EWC code	Estimated tonnage	Estimated m ³	Anticipated management
Construction (earthworks, compounds, haul roads and highways)	Concrete	170101	TBC	TBC	TBC
	Steel	170405	TBC	TBC	TBC
	Rubber	200301	TBC	TBC	TBC
	Plastic	170203	TBC	TBC	TBC
	Aggregate	170504	TBC	TBC	TBC
	Cement	170101	TBC	TBC	TBC
	Bentonite	200301	TBC	TBC	TBC
	Bentonite	200301	TBC	TBC	TBC
	Iron	170405	TBC	TBC	TBC
	Asphalt	170302	TBC	TBC	TBC
	Timber	170201	TBC	TBC	TBC
	Contaminated excavated material *potentially hazardous	170503*	TBC	TBC	TBC
	Non-hazardous excavated material	170504	TBC	TBC	TBC
	Inert excavated material	170504	TBC	TBC	TBC
	Inert excavated material – retained in Order Limits	170504	TBC	TBC	TBC
	General waste skips	200301	TBC	TBC	TBC
	Cardboard (packaging)	200101	TBC	TBC	TBC
Dry mixed recycling	200102 200108 200139 200140	TBC	TBC	TBC	

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Lower Thames Crossing

Outline Traffic Management Plan for Construction

DATE: June 2021

VERSION: 0.2

Lower Thames Crossing

Outline Traffic Management Plan for Construction

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Covering Note

This document is a draft of one of a series of Control Documents that will form part of our planned DCO application. Following this consultation we will carefully consider your feedback as we finalise the documents for our planned submission of the DCO application for the Lower Thames Crossing later this year.

The Outline Traffic Management Plan for Construction (oTMPfC) outlines the approach to carrying out temporary traffic management for the safe construction of the Project. It will also explain management measures available to our Contractor to reduce the impact on the local community (including journey time reliability, access, and safety).

The oTMPfC has been produced following our work with the relevant local authorities. This engagement will continue with those authorities, as well as businesses, statutory bodies and emergency services.

The construction traffic modelling, and subsequently this document, will be updated ahead of submitting the application to reflect more detailed construction data (including the measures outlined below). Technical engagement will continue with highways authorities with the aim of securing SoCG to be included in our DCO application.

As this is a draft control document, there will be references to the upcoming Development Consent Order (DCO). Any documents referenced that will form the DCO will be mentioned with a (REF TBC).

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1 Executive summary

1.1 Background

- 1.1.1 This outline Traffic Management Plan for Construction (oTMPfC) has been produced to provide outline concepts and principles that will be applied for the design and management of construction traffic management and transport logistics for the Lower Thames Crossing Project. This outline document, which has been the subject of engagement with highway authorities, provides an initial framework for how the traffic management in connection with the Project will be controlled (if consent is granted). It will be submitted with the DCO application for the Lower Thames Crossing, subject to changes as a result of feedback received as part of this community impact consultation.
- 1.1.2 As required by Requirement 10 of Part 1 of Schedule 2 of the Development Consent Order (DCO), the Contractors will be required to produce Traffic Management Plans for construction before commencing works. This will be presented to Highways England and will need to be submitted to and approved by the Secretary of State (SoS) before any part of the authorised development can commence.
- 1.1.3 The Traffic Management Plans for construction (which will be approved by the Secretary of State if consent is granted for the Project) will include:
- a. Strategic road network (SRN) traffic management including lane closures, speed control and temporary road closures and diversions
 - b. Local road network (LRN), including temporary contraflows (typically a short section of road is closed on one lane and traffic lights are used to allow bi-directional travel along the remaining open lane), road closures, diversions both on-line and off-line, and weekend closures
 - c. Traffic management within the worksite, such as traffic routes and workforce pedestrian management, strategic and local road networks due to the different highway authorities

2 Introduction

2.1 Purpose and objectives

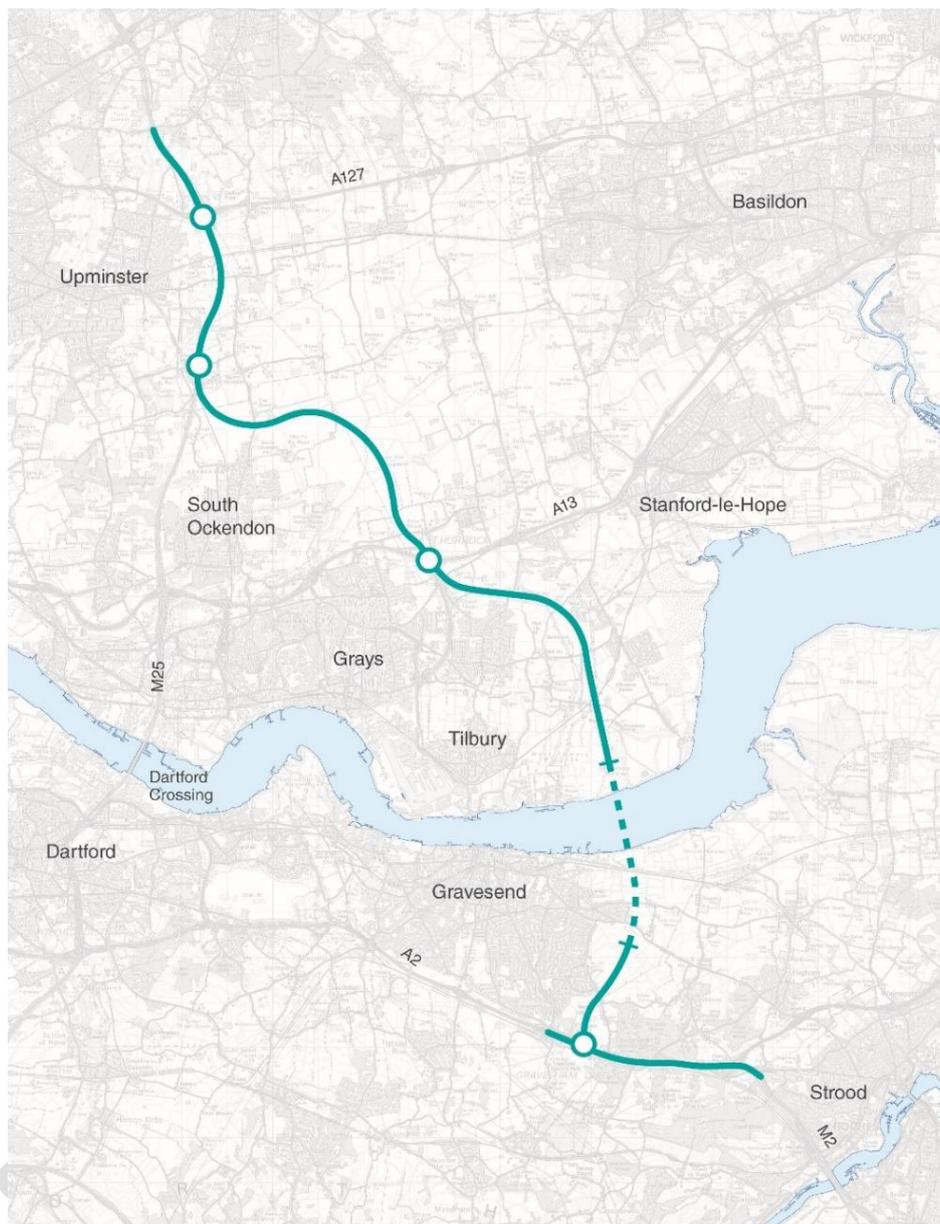
- 2.1.1 The purpose of this outline Traffic Management Plan for Construction (oTMPfC) is to provide an overview of the approach that will be followed when undertaking temporary traffic management for the safe construction of the Lower Thames Crossing Project (the Project).
- 2.1.2 This document will be used to inform the Traffic Management Plan for Construction (TMP), a document which Highways England will have to submit to the Secretary of State for approval before commencing the relevant part of the Project if the Development Consent Order (DCO) (REF TBC) is granted. This oTMPfC has been produced following engagement with the relevant highway authorities, businesses and emergency services.
- 2.1.3 The TMP, which must substantially accord with this oTMPfC, is legally secured under Requirement 10 in Schedule 2 to the DCO. The TMP which is approved by the Secretary of State must be implemented by Highways England and its Contractors.
- 2.1.4 The oTMPfC will also outline measures available to the Contractor to reduce the impacts on the community (including journey time reliability, access, severance, and safety).

2.2 Summary description of the Project

- 2.2.1 The A122 Lower Thames Crossing (the Project) would provide a connection between the A2 and M2 in Kent, east of Gravesend, crossing under the River Thames through a tunnel, before joining the M25 south of junction 29. The Project route is presented in Plate 2.1.
- 2.2.2 The A122 road would be approximately 23km long, 4.25km of which would be in tunnel. On the south side of the River Thames, the Project route would link the tunnel to the A2 and M2. On the north side, it would link to the A13 and junction 29 of the M25. The tunnel entrances would be located to the east of the village of Chalk on the south of the River Thames and to the west of East Tilbury on the north side.
- 2.2.3 Junctions are proposed at the following locations:
- a. New junction with the A2 to the south-east of Gravesend
 - b. Modified junction with the A13/A1089 in Thurrock
 - c. New junction with the M25 between junctions 29 and 30
- 2.2.4 To align with NPSNN policy and to help the Project meet the Scheme Objectives, it is proposed that road user charges would be levied. Vehicles would be charged for using the new tunnel.

- 2.2.5 The Project route would be three lanes in both directions, except for:
- a. link roads
 - b. stretches of the carriageway through junctions
 - c. the southbound carriageway from the M25 to the junction with the A13/A1089, which would be two lanes
- 2.2.6 In common with other A-roads, the A122 would operate with no hard shoulder but would feature a 1m hard strip on either side of the carriageway. It would also feature technology including stopped vehicle and incident detection, lane control, variable speed limits and electronic signage and signalling. Our A122 road design outside of the tunnel includes emergency areas spaced at intervals between 800 metres and 1.6km (less than one mile). The tunnel would include a range of enhanced systems and response measures instead of emergency areas.
- 2.2.7 The A122 would be classified as an 'all-purpose trunk road' with green signs. For the benefit of safety, walkers, cyclists, horse-riders and slow-moving vehicles would be prohibited from using it.
- 2.2.8 The Project would include adjustment to a number of side roads. There would also be changes to a number of public rights of way, used by walkers, cyclists and horse riders. Construction of the Project would also require the installation and diversion of a number of utilities, including gas pipelines, overhead power lines and underground electricity cables, as well as water supplies and telecommunications assets and associated infrastructure.
- 2.2.9 The Project has been developed to avoid or minimise significant effects on the environment. Some of the measures adopted include landscaping, noise mitigation, green bridges, floodplain compensation, new areas of ecological habitat and two new parks.

Plate 2.1 Lower Thames Crossing route



Related Project documents

- 2.2.10 Control documents that should be read alongside this oTMPfC:
- The Code of Construction Practice (CoCP) and the Register of Environmental Commitments (REAC) which detail specific environmental management commitments.
 - Outline Site Waste Management Plan (oSWMP)
 - Outline Materials Handling Plan (oMHP)
 - Framework Construction Travel Plan (FCTP)

2.3 Interaction with the Development Consent Order

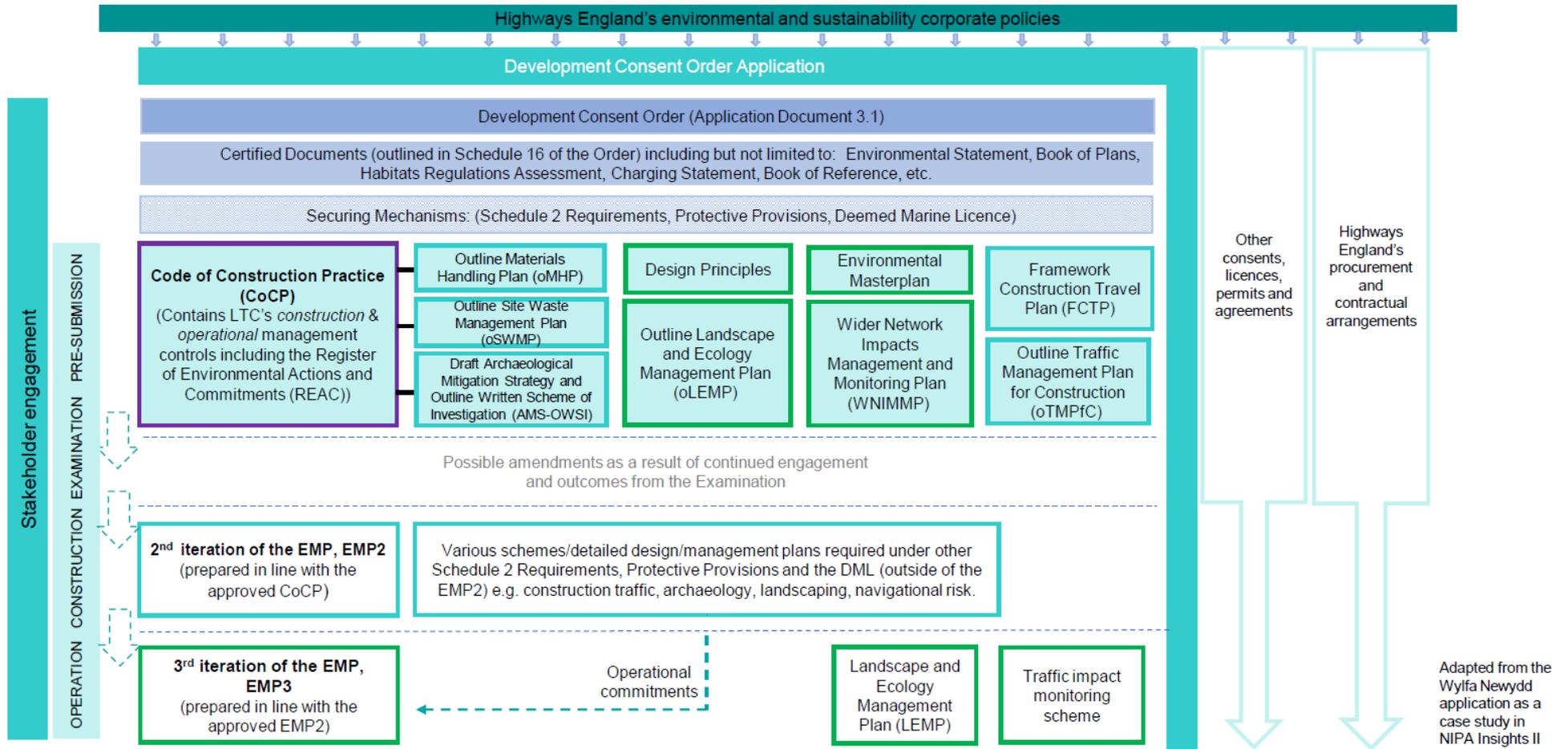
- 2.3.1 This oTMPfC is the document which the TMP must substantially accord with under the draft Development Consent Order (DCO) (REF TBC). In particular, Requirement 10 requires plans for the management of traffic (i.e. the TMP) to be submitted and approved by the Secretary of State prior to commencing construction. A TMP may relate to part of the Project so, for example, there may be separate TMPs for different stages or areas of the Project. Plate 2.2 provides an extract from the Project Control Plan, which illustrates the securing mechanisms.

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Plate 2.2 Extract from the Project Control Plan

Control Plan

- Certified docs prepared for submission
- Document controls construction impacts
- Document controls operational impacts
- Document controls construction and operational impacts



Adapted from the Wylfa Newydd application as a case study in NIPA Insights II

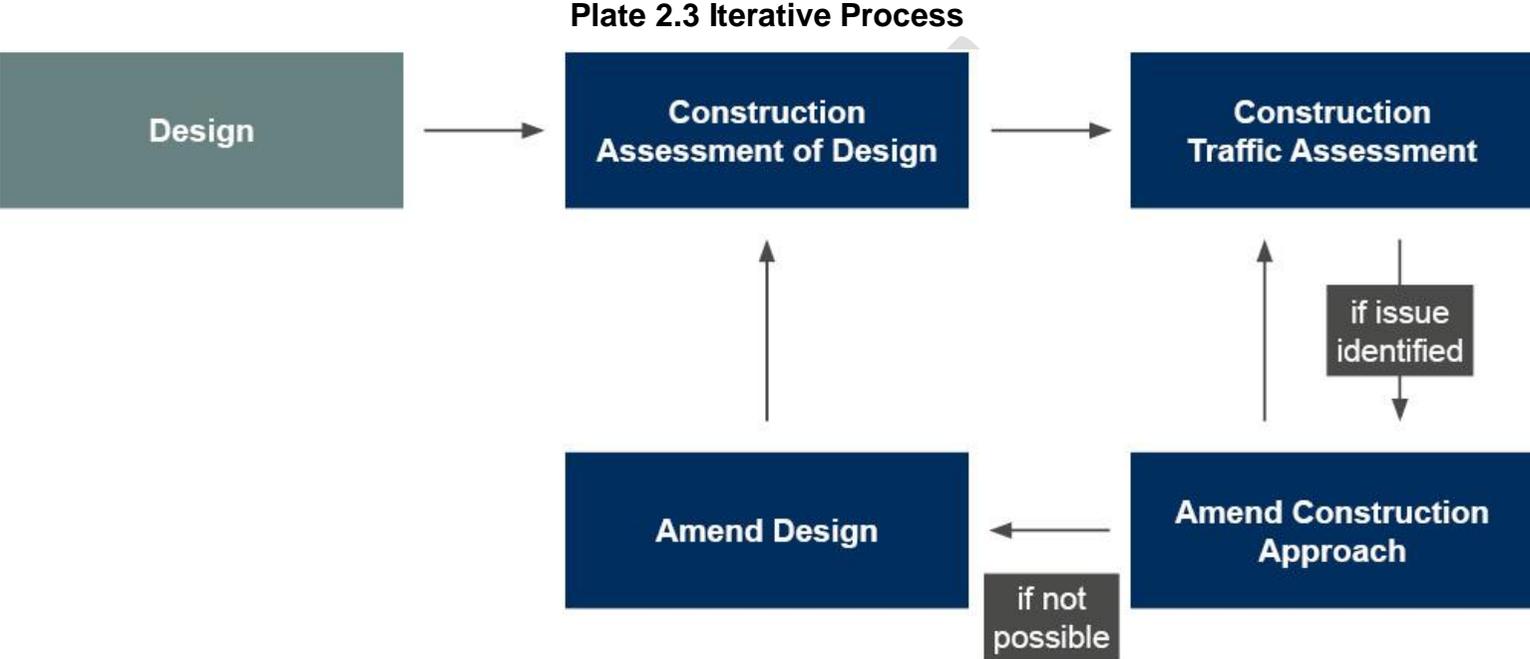
- 2.3.2 The TMP which is approved by the Secretary of State must be implemented by Highways England, its Contractors and agents.
- 2.3.3 The Contractor must consult with the relevant authorities in Table 2.1 and in accordance with this oTMPfC, and must give due consideration to any representations made in response to that consultation regarding the TMP for construction.
- 2.3.4 The Contractor must include copies of any representations made and a written account of how any such representations have been taken into account, with the TMP submitted to the Secretary of State for approval.

Table 2.1 TMP consultees

	Local planning authority	Local highway authority	Other
Essex County Council		X	
Brentwood Borough Council	X		
Transport for London		X	
London Borough of Havering	X	X	
Thurrock Council	X	X	
Kent County Council		X	
Gravesham Borough Council	X		
Medway Council	X	X	
Royal Mail			X
Port of Tilbury			X
London Gateway			X
Purfleet Terminal			X

2.4 Challenges and considerations

- 2.4.1 The Project is complex, with many different elements. A significant number of construction vehicle movements and associated traffic management measures would be required throughout the construction period. While many of the Project elements can be constructed offline, away from the public, there are also main works and utility works which would interface with public areas and the public road network.
- 2.4.2 During the design development phase, issues were identified, assessed and resolved on an iterative basis as indicated in Plate 2.3. That plate also illustrates the cycle of work required to optimise the design and minimise the construction traffic impacts.



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- 2.4.3 Early engagement with relevant stakeholders, including local authorities and emergency services, will continue through the design development phase. Much of the feedback and discussion has led to refinements being included in the current proposals and design. As a direct result of engagement thus far, several significant design changes and construction approaches have been made which would materially reduce the envisaged construction impacts.
- 2.4.4 It should be noted that while early collaboration has notably helped refine the design and construction proposals to date, this engagement and refinement will be an ongoing workstream; we are consulting on the contents of this document which will be updated for the resubmitted application.
- 2.4.5 Through early engagement with key stakeholders we have identified themes and localities that we have taken into consideration when developing the oTMPfC. Engagement with other key stakeholders including local businesses, landowners, public services and members of the public, will continue to take place. Table 2.2 highlights some of the key themes identified through engagement.

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Table 2.2 Key themes from technical engagement

Location	Issue	Outcome
All local road networks	Concerns were raised regarding the local authorities' ability to contribute to the development of three TMPs. Additionally how would the Project be able to coordinate its traffic management and how the local authorities would be party to that coordination.	The Project will appoint a Traffic Manager whose role it will be to coordinate management and act as an interface with the local authorities. In addition, following the successful determination of the DCO, Highways England will establish a Traffic Management Forum chaired by the Traffic Manager. Members of the forum will be from the main Contractors and associated utility companies, as well as representatives of local communities and businesses, emergency services and local authorities.
Gravesend town centre and country lanes	Not allowing HGV movements	The Project will apply construction HGV bans on Brewers Road, Thong Lane, and The Street
A226	Minimise construction traffic impacts	The Project will introduce a right-turn-only movement for construction HGVs when exiting CA3 compound.
Local road network	Consider mitigation measures Rat-running	The Project will introduce a construction HGV ban on Lower Higham Road and provide a primary access to CA3a from the A226 Gravesend Road. The Project will introduce additional temporary overnight closure on local roads to minimise rat-running associated with overnight closures of the A2.

Location	Issue	Outcome
A1013 & local roads	<p>Minimise long-term closures</p> <p>Avoid Orsett village for access routes</p>	<p>Design changes to the Rectory Road / A1013 and A1089 / A1013 interfaces to remove the need for long-term closures.</p> <p>The Project will introduce construction HGV bans on Rectory Road, School Lane, High Road and Prince Charles Avenue in Orsett.</p>
Accessing routeing from Port of Tilbury	Minimise impact on West Tilbury	Secondary access route for compounds CA5 & CA5a will avoid Gunn Hill and Rectory Road in West Tilbury.
A13 North Stifford Interchange	Impacts on traffic movements because of Veolia track usage	Depending on the outcome of the latest construction traffic forecasts, requirement of mitigation measures will be considered.
A127 / Warley Street	Project needs to consider traffic movement impacts, junction already identified for improvements	Depending on the outcome of the latest construction traffic forecasts, requirement of mitigation measures will be considered.
Ockendon Road and St Marys Lane	<p>Impacts on long-term closures due to existing HGV and bus movements.</p> <p>Suitability of alternative routes due to weight restrictions</p>	The Project will liaise with impacted businesses and premises (e.g. South Essex Crematorium, and The Coopers' Company and Coborn School).

- 2.4.6 It is acknowledged that the impacts on communities from measures required to ensure the safe delivery of the Project should be to be kept to a minimum as much as is reasonably practicable.
- 2.4.7 The specific restrictions required to mitigate or otherwise minimise the impacts would be developed in discussions undertaken with the relevant authorities, and would be set out in the TMP. Table 2.3 below has been produced to set out the overarching considerations which would be considered.
- 2.4.8 In particular, Table 2.3 identifies different classes of stakeholders that must be considered when designing the traffic management measures and transportation plans, and suggests how the TMP would take their concerns into consideration.

- 2.4.9 The Contractor will provide a monitoring system, the purpose of which is to capture real-time data that provides confirmation that traffic and vehicle control measures are effective and vehicle arrival and departure times from compounds are controlled. The outputs of this will be a Monitoring Report which will be provided to the Traffic Management Forum (TMF). This reports based on traffic monitoring measures, such as ANPR, traffic flow monitors and possibly web based camera systems. Actual monitoring to be implemented will be selected as part of the TMP on a case by case basis by road / section.
- 2.4.10 The Contractor will support interventions and/or changes to traffic management measures required to ensure that disruption is kept to a minimum, at the time of planning, and will identify where continuous improvements need to be implemented.
- 2.4.11 Where requests for traffic measures to be modified arise during feedback from the Traffic Management Forum, Highways England would give due consideration to any such request. The Contractors would consider revising the approved TMP where Highways England considers it is necessary.

Table 2.3 Stakeholder considerations

Who is affected by the Project?	What are their requirements?	How would the TMP take these into account?
Van drivers, car drivers and motorcyclists	<ul style="list-style-type: none"> • Journey time reliability • Safety during journey through traffic management • Advance warning • Breakdown recovery 	<ul style="list-style-type: none"> • Reduce the number of traffic management changes • Reduce narrow lane arrangement • Reduce closures and use of diversion routes • Enforce speed reduction through cameras • Pre-warning signage in line with best practice guidance • Provision of portable variable message signs to display informative messages • Provide (and clearly sign) free vehicle recovery where applicable
Disabled car drivers	<ul style="list-style-type: none"> • Breakdown recovery • Advance communication 	<ul style="list-style-type: none"> • Provide (and clearly sign) free vehicle recovery where applicable • Method of recovery is suitable for people with reduced mobility • Ensure means of communication is accessible

Who is affected by the Project?	What are their requirements?	How would the TMP take these into account?
Heavy Goods Vehicles (HGV) drivers	<ul style="list-style-type: none"> • Journey time reliability • Advance warning of closures and/or diversions • Appropriate diversion routes • Maximised lane widths where possible • Breakdown recovery 	<ul style="list-style-type: none"> • Sufficient notification of closures • Diversion routes which avoid narrow roads and low bridges • Narrow lane arrangements to maximise slow lane width for HGVs. • Provide (and clearly sign) free vehicle recovery where applicable
Walkers, cyclists and horse riders	<ul style="list-style-type: none"> • Access to pedestrian routes • Access to cycling routes • Access to equestrian routes • Appropriate and safe surfaces for all users • Clearly signed and segregated diversion and access routes 	<ul style="list-style-type: none"> • Seek views of highway authorities when designing diversion routes • Ensure temporarily diverted routes are designed with users in mind and that consideration is given to visual, hearing and physically impaired users • Ensure diverted and existing routes are clearly signed and segregated from construction sites. • Provide temporary signalised crossings to ensure safe crossing points where required
Public transport users and operators	<ul style="list-style-type: none"> • Modes of public transport including rail and bus services and operations 	<ul style="list-style-type: none"> • Maintain existing routes (as far as reasonably practicable) • Provide temporary diversions, temporary bus stops when and where required • Seek view of authorities when designing diversion routes and temporary bus stops • Reduce impact to the rail network and schedule • Engage with rail companies on proposed works and programme to reduce impacts
Highways England	<ul style="list-style-type: none"> • Safety during works • Reduced road closures 	<ul style="list-style-type: none"> • Ensure safety standards are met throughout • Develop efficient programme of works to reduce disruptive traffic management

Who is affected by the Project?	What are their requirements?	How would the TMP take these into account?
	<ul style="list-style-type: none"> • Reduced narrow-lane traffic management arrangement • Reduced delays • Prevention of damage to roads 	<ul style="list-style-type: none"> • Propose <i>in situ</i> road assessment (which would be carried out by the principal Contractor) to determine road condition and plan of action during works • Collaborate with Highways England to optimise use of traffic management information about planned closures • Provide diversion routes to Highways England Customer Contact Centre to enable accurate information to be supplied to customers • Consult with Highways England National Traffic Operation Centre regarding infrastructure and technology assets and the potential impact on journey time data, enabling pre-event and 'on the night' messages to road users via Variable Message System
<p>Exhibition centres, church halls, community centres, sports clubs, places of worship, cemeteries and crematoriums</p>	<ul style="list-style-type: none"> • Public and staff access • Access for deliveries • Waste collection • Emergency service access • Postal deliveries 	<ul style="list-style-type: none"> • Access and egress to be maintained throughout the construction period with the exception of night-time and weekend closures when required for specific planned works • Advance warning and particular sensitivity around significant events, particularly evenings and weekends • Consultation prior to proposed night closures of the LRN and SRN.
<p>Major superstores</p>	<ul style="list-style-type: none"> • Public and staff access • Access for deliveries • Waste collection • Emergency service access • Postal deliveries 	<ul style="list-style-type: none"> • Access and egress to be maintained throughout the construction period with the exception of night-time and weekend closures when required for specific planned works • Advance warning and particular sensitivity around significant events, particularly evenings and weekends

Who is affected by the Project?	What are their requirements?	How would the TMP take these into account?
		<p>Consultation prior to proposed night closures of the LRN and SRN</p> <ul style="list-style-type: none"> • Include temporary advance warning signs on approaches at appropriate locations to inform road users to use appropriate diversions put in place
Logistics centres (e.g. ports)	<ul style="list-style-type: none"> • Closures/diversions that may impact on journey-time reliability to and from the facility • Appropriate diversion routes for distribution centre traffic 	<ul style="list-style-type: none"> • Access and egress to be maintained throughout the construction period with the exception of night-time and weekend closures when required for specific planned works • Advance warning, with particular sensitivity around peak times • Diversion routes that can accommodate stacking and/or tacho breaks • Consultation prior to proposed night closures of the SRN
Local businesses and residents	<ul style="list-style-type: none"> • Public and staff access • Access for deliveries • Waste collection • Emergency service access • Postal deliveries (including Royal Mail collection) • Appropriate diversion routes 	<ul style="list-style-type: none"> • Ensure access is maintained throughout works • Regular communication to inform changes and scheme progress • Include temporary advance warning signs on approaches at appropriate locations to inform road users to use appropriate diversions put in place
Relevant authorities and local stakeholders	<ul style="list-style-type: none"> • Closures/diversions that may impact on journey-time reliability to and from the facility • Public and staff access • Emergency service access • Appropriate diversion routes • Safety during works 	<ul style="list-style-type: none"> • Engage with the local authorities on Traffic Management. • Include temporary advance warning signs on approaches at appropriate locations to inform road users to use appropriate diversions put in place. • Ensure existing routes are maintained where possible.

Who is affected by the Project?	What are their requirements?	How would the TMP take these into account?
	<ul style="list-style-type: none"> • Reduced road closures • Reduced delays • Prevention of damage to roads 	<ul style="list-style-type: none"> • Ensure safe crossing is provided where temporary pedestrian crossings are placed. • Ensure diversion routes and existing routes are segregated from construction sites. • Make sure access is maintained throughout works. • Regular communication which may include web-based applications and letter drops, describing changes and scheme progress.
Distribution centres	<ul style="list-style-type: none"> • Closures/diversion that may impact on journey time reliability to and from the facility • Appropriate diversion routes for distribution centre traffic 	<ul style="list-style-type: none"> • Access and egress to be maintained throughout the construction period with the exception of night-time and weekend closures when required for specific planned works • Advance warning, with particular sensitivity around peak times • Diversion routes that can accommodate stacking and/or tacho breaks • Consultation prior to proposed night closures of the SRN
Emergency services	<ul style="list-style-type: none"> • Access through haul road during emergencies • Suitable diversion routes • Advance warning of closures and/or diversions 	<ul style="list-style-type: none"> • Process and procedure for allowing emergency services through the works/haul road • Diversion routes avoid narrow roads and low bridges • Sufficient notification of closures • Early engagement with Emergency Services to ensure clarity
Nearby events	<ul style="list-style-type: none"> • Minimum disruption due to works, to and from the venue 	<ul style="list-style-type: none"> • Closures/diversions to avoid such events and/or simultaneous activities as far as possible

Who is affected by the Project?	What are their requirements?	How would the TMP take these into account?
Healthcare facilities, local surgeries and hospitals	<ul style="list-style-type: none"> • Access/egress for staff and patients • Emergency service access • Postal deliveries • Waste collection 	<ul style="list-style-type: none"> • Access and egress to be maintained throughout the construction period with the exception of night-time and weekend closures when required for specific planned works • Communications to update the facility regarding any closures and diversion routes
Local schools	<ul style="list-style-type: none"> • Access/egress for staff and students • Unhindered walking routes • Emergency service access • Waste collection 	<ul style="list-style-type: none"> • Access and egress to be maintained throughout the construction period with the exception of night-time and weekend closures when required for specific planned works • Advance warning with particular sensitivity around significant events, particularly evenings and weekends that are likely to affect late evening and weekend school • HGV movements will not be allowed to pass school entrances during drop off/pick up
Local care homes	<ul style="list-style-type: none"> • Access/egress for staff and patients • Unhindered walking routes • Emergency service access • Waste collection 	<ul style="list-style-type: none"> • Ensure safe crossing and pedestrian lights are provided • Access and egress to be maintained throughout the construction period with the exception of night-time and weekend closures when required for specific planned works

3 General principles

3.1 Collaborative working and permit schemes

- 3.1.1 Key to the successful delivery of the Project is the need to establish a collaborative working environment where Highways England along with its suppliers and stakeholders can discuss construction programmes to ensure works are planned and undertaken safely.

Plate 3.1 Overview of collaborative working environment



- 3.1.2 The Project will coordinate road space requirements across three primary areas:

- a. Roads in Kent
- b. Tunnels
- c. Roads north of the Thames

- 3.1.3 Each primary area will request road space through the following relevant highway authority booking or permitting systems (see also 3.1.4, Modification to application of permit schemes) to:

- a. Highways England – Network Occupancy Management System (NOMS)
- b. Local highway authorities – Permits for Road & Street Works – Street Manager:
 - i. Kent County Council
 - ii. Thurrock Council

- iii. Essex County Council
- iv. London Borough of Havering
- v. Transport for London

Timescales for road booking

- a. Highways England
 - i. Provisional booking – 24 months
 - ii. Firm booking – six months
- b. Local highway authority
 - i. Provisional advanced booking – three months minimum
 - ii. Permit application – 10 days

Modification to application of permit schemes

- 3.1.4 As is common with Nationally Significant Infrastructure Projects, the Project DCO will propose to disapply provisions of the New Roads and Street Works Act 1991 (NRSWA). The intent is to ensure that the street authority cannot impose moratoria on works, or give direction on location, timing or the nature of reinstatement, which would impact the project delivery.
- 3.1.5 This is considered appropriate given the scale of works proposed under the DCO, the specific authorisation given for those works by the Order (if granted) and the provisions in the DCO (including the requirements, and the need for a TMP) which would regulate, and provide appropriate safeguards in connection with, the carrying out of the Order works.
- 3.1.6 The Project intends to utilise the existing road booking system operated by the respective local highway authority, to aid management and integration of other schemes. In addition the appointment of a Traffic Manager (see paragraph 3.3.10) and the establishment of a Traffic Management Forum (see paragraph 3.3.11) will enable timely discussions to be held regarding the detailed location, extent and type of traffic management to be used prior to SoS approval of the TMP.

3.2 Local operating parameters during construction

- 3.2.1 Highway authorities would continue to carry their statutory obligations with regard to managing their networks.
- 3.2.2 Where the Project has an interface with either the strategic or local road network, the Contractor delivering the works would seek to reach agreement with the relevant highway authority, on the extent of the operational boundaries by way of a Detailed Local Operating Agreement (DLOA) or a Local Operating Agreement (LOA). The agreements set out the roles and responsibilities for the following themes:
 - a. Communications and customer care
 - b. Operational areas

- c. Asset handover
- d. Routine maintenance and repair
- e. Winter maintenance and extreme weather
- f. Incidents
- g. Traffic management

3.2.3 In the event that no agreement can be reached, the Contractor delivering the works will set out the arrangements covering these themes in its Traffic Management Plan (where relevant to the construction of the Project) for the approval of the Secretary of State.

3.2.4 The management of PRowS, with respect to their short-term closure and/or diversion, will be done following engagement with the relevant local authority in accordance with the terms of the DCO. Depending on footfall/likely usage, and length and suitability of an alternative route, it will be determined whether a temporary diversion is required and what route it will follow. The DCO will include a requirement that for temporary closures, restrictions, and alterations of streets, there must be reasonable access for pedestrians going to or from premises abutting a street, or private means of access if there would otherwise be no such access.

3.3 Communication and community engagement

3.3.1 The communication relating to the TMP should be seen in the context of the communications plans set out in the Code of Construction Practice (CoCP). In particular, Section 5 of the CoCP details how the Project and Contractors will engage and communicate with the stakeholders and communities impacted by the works.

3.3.2 Section 5.1.1 of the CoCP establishes that Highways England will develop a Communications and Engagement Strategy (CES) that outlines the objectives and processes for engagement and communications with stakeholders.

3.3.3 Furthermore Section 5.1.1 of the CoCP requires each Contractor to develop a Communications and Engagement Plan (CEP) in support of the CES, to ensure stakeholders are informed of the works activities and to maintain good relationships with others.

3.3.4 The CEPs will be submitted for acceptance by Highway England, following consultation with the local planning authorities and before the development commences.

3.3.5 The Contractor will engage with the local community, particularly focusing on those who may be impacted by the construction, including local residents, businesses and landowners.

3.3.6 The CEPs will provide a programme of community engagement such as, but not limited to, community drop-in sessions, one-on-one meetings, newsletters and leaflet drops (explaining forthcoming works).

- 3.3.7 Before works commence, the Project will establish Community Liaison Groups (CLGs). The frequency of meetings will be developed with the participants in advance of construction commencing. Attendance will be publicised using traditional and digital media.
- 3.3.8 At least two weeks before works are carried out, Contractors will distribute information sheets detailing expected disruptions and measures being taken to avoid or minimise adverse impacts of the works.
- 3.3.9 The Highways England Customer Contact Centre will be used to deal with enquires and complaints from the public. This consists of a phone line, email and website facility. The information line is staffed by Highways England 24 hours a day, seven days a week. The response time for enquiries is 10 working days. The contact number, email and website addresses for the Customer Contact Centre will be displayed on signs adjacent to the construction areas that are clearly visible to pedestrians and the travelling public.

Highways England's responsibilities

- 3.3.10 Highways England would appoint a Traffic Manager whose role would be to:
- a. Ensure that any traffic management required by the Project is planned, delivered, and managed collaboratively, and that the commitments of the TMP are adhered to, with a specific focus on:
 - i. Planning and delivery
 - ii. Network occupancy
 - iii. Delivering safely
 - iv. Operations
 - b. Ensure that standards and best practices are applied in the planning and delivery of Traffic Management
 - c. Establish and chair the Traffic Management Forums ensuring that all affected stakeholders are invited to attend
 - d. Attend other third-party established traffic management meetings where there is an interface with the Project (e.g. Kent Corridor Coordination Group)
 - e. Review feedback from local highway authorities in terms of planned traffic management as well as the performance of key traffic management phases
 - f. Receive data from the main works Contractors as to the performance of traffic management in terms of the impact on the strategic road network and local authority roads
 - g. Represent the Traffic Management Forum (see paragraph 3.3.11 below) at the Joint Operations Forum (JOF) which is a forum, at executive level,

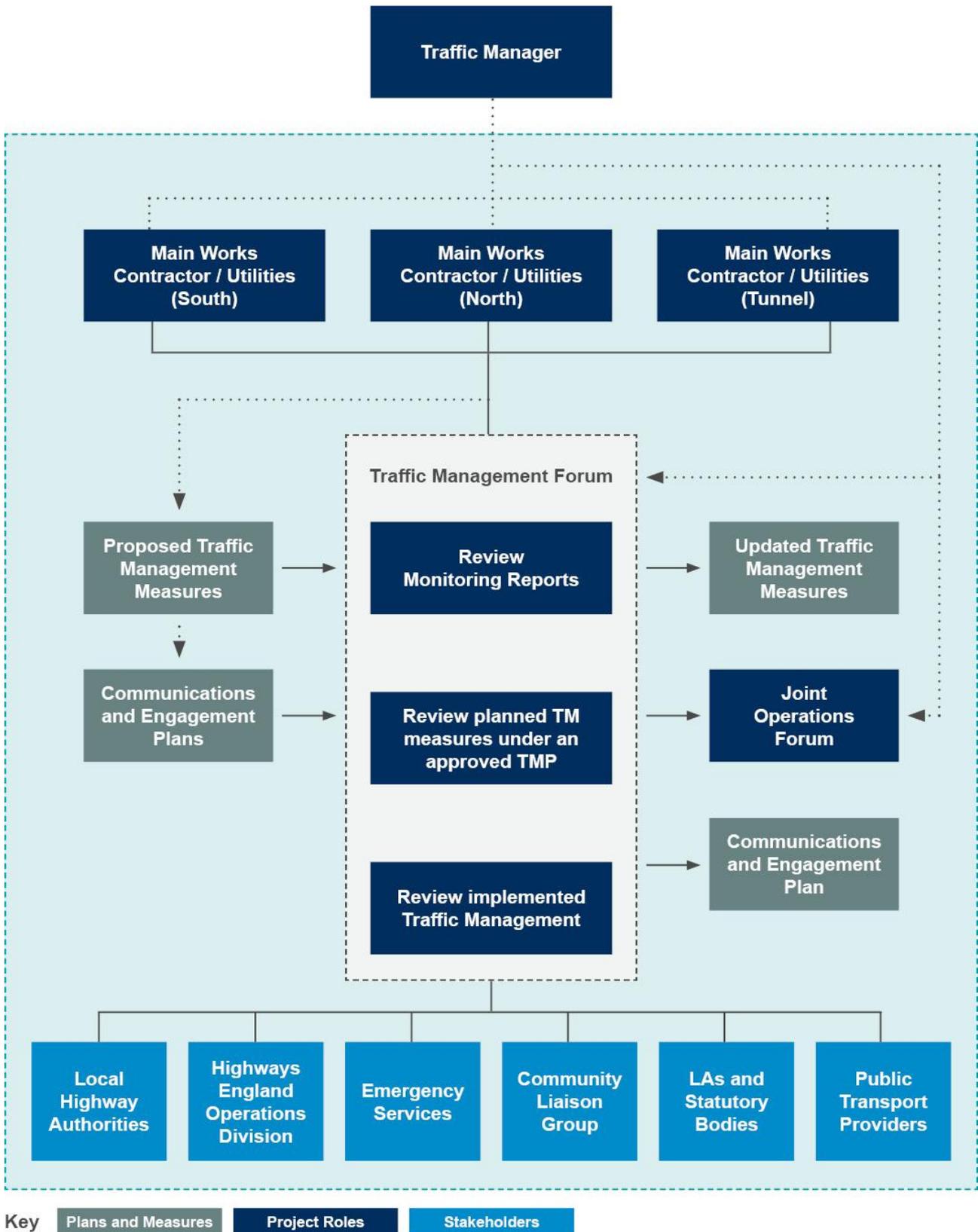
made up of Highways England and its Contractors. The Traffic Manager will report to the JOF on traffic management performance and to escalate issues of concern raised by stakeholders. More information on the JOF is available in the Code of Construction Practice

- h. Review the performance of incident management that occurs within the designated “Works Zone” as set out in a TMP and any relevant DLOAs
- i. Act as the interface with the Community Liaison Group.
- j. Generally, oversee the performance of the wider Project construction network in terms of the coordination, planning and delivery of traffic management on the SRN and LRN

Traffic Management Forum

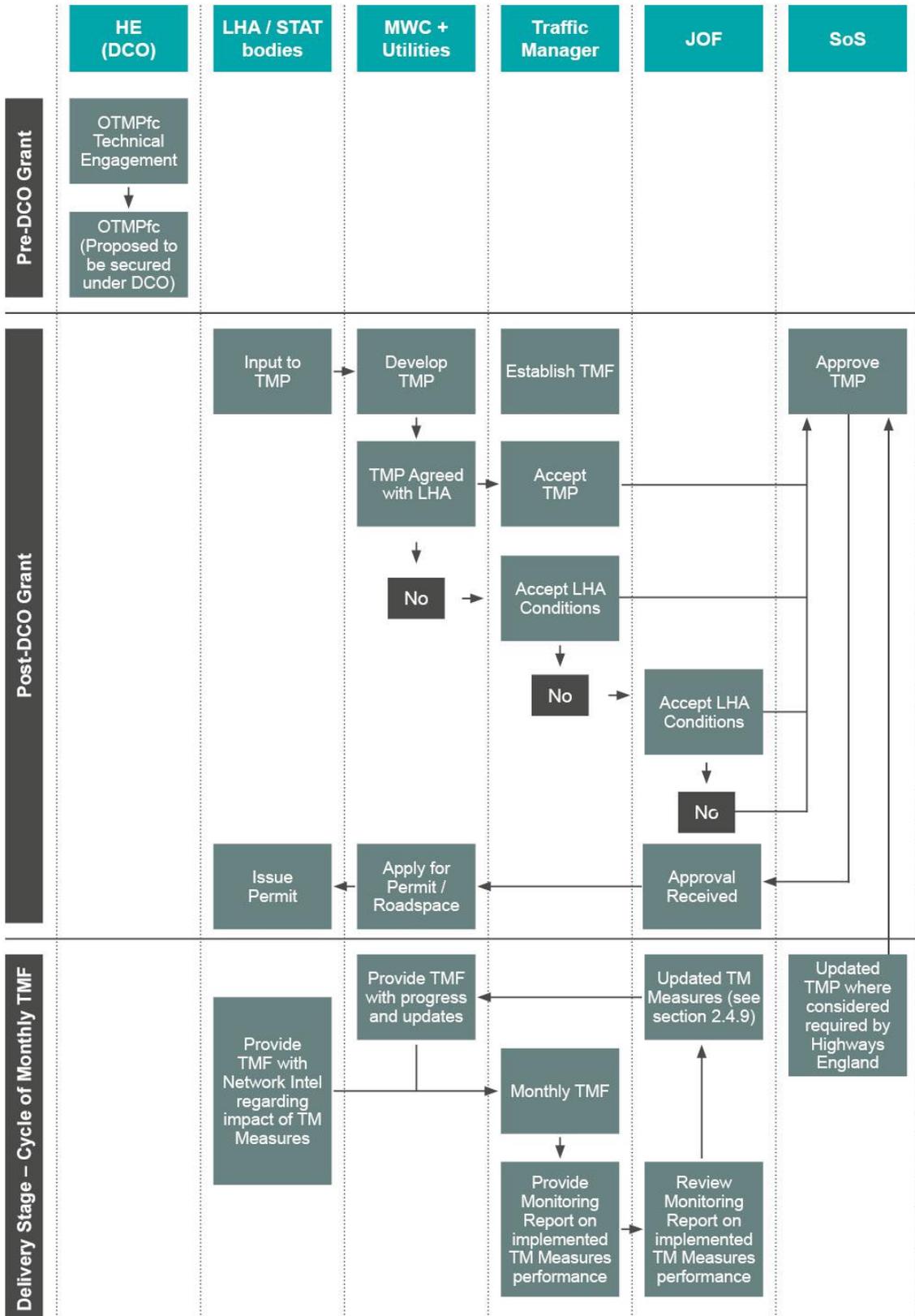
- 3.3.11 The Traffic Management Forum would consist of the main works Contractors, utility companies, local authorities, statutory bodies as named in Table 2.1, local highway authorities, public transport operators, emergency services, Highways England maintenance providers and any other affected stakeholders depending on the planned construction phases (see Plate 3.2 for proposed structure).
- 3.3.12 Two TMFs would be established (roads in Kent and roads north of the Thames) both chaired by the Traffic Manager and would have attendees from the roads and tunnels contractors in each respective area.
- 3.3.13 The TMF would be established following the granting of the DCO and would be held monthly.
- 3.3.14 The TMF would review planned traffic management arrangements and receive comments as to their appropriateness.
- 3.3.15 The TMF would review the performance of implemented traffic management with a focus on:
 - a. Direct impacts to the travelling public (including WCH)
 - b. Indirect impacts on the wider network as a result of the implemented traffic management
 - c. Impacts on local businesses and communities
 - d. Reviewing specific traffic management operations such as weekend closures for demolition

Plate 3.2 Traffic Management Forum



3.3.16 The implementation of traffic management measures on the LRN and SRN would require engagement in the Traffic Management Forum and would be subject to discussion with the relevant local highway authority. Plate 3.3 shows the possible traffic management planning/escalation process.

Plate 3.3 Traffic management planning



3.4 Working hours

- 3.4.1 The Code of Construction Practice (CoCP) details the working hours that have been assessed as part of the ongoing environmental assessments.
- 3.4.2 Abnormal traffic movements may occur outside standard working hours. These movements will be discussed with the relevant authority as required and carried out in a way such that will reduce the impact on the local area. Abnormal load routes between the SRN and delivery destination would be assessed prior to use to ensure their suitability. In some cases, temporary modification of the existing road or road assets may be required to accommodate the abnormal load. These temporary modification works would be discussed with the relevant authority as required.

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4 Proposed measures

4.1 Safety measures

- 4.1.1 The traffic management will be designed in accordance with the requirements of the Department for Transport Traffic Signs Manual and Highways England's 'Roadworks – A Customer View' which outlines the customer principles that Highways England expects to be applied to roadworks.
- 4.1.2 To protect the health, safety and security of road users and the workforce, traffic management would need to ensure that safety measures have been thoroughly considered.
- 4.1.3 Traffic management will be designed and implemented to be effective in all lighting conditions, weather conditions and under all envisaged circumstances. The Contractors would demonstrate that their traffic management proposals had been developed to consider alternative options, minimal traffic management measures, safety and space assessments to reduce delays, disruptions and diversions to traffic. Further details of proposed measures are contained below.
- 4.1.4 In the event a road has to be closed for construction purposes which require traffic to be diverted, meetings would be held with the appropriate highway authority as part of the Traffic Management Forum to ensure minimal disruption to road users and communities affected by the diversion.
- 4.1.5 For the purposes of protecting the workforce and the public while maintaining traffic, the TMP will secure appropriate traffic management measures, including narrow lanes, lane closures, closures with diversions, etc. These measures would introduce safe working zones (through use of cones and/or safety barriers as appropriate) adjacent to the carriageway as required by Chapter 8 of the Traffic Signs Manual.
- 4.1.6 A risk-based approach would be taken when choosing and implementing traffic management measures. This would be dependent on several factors including but not limited to traffic counts, types of traffic, WCH interface, nearby points of interests (e.g. schools) and will include engagement with relevant authorities.
- 4.1.7 Where traffic signals or similar are required to facilitate construction movements such as access to compounds and construction vehicle crossing points, they will be locally controlled to ensure that the LRN has priority in terms of traffic movements additionally when not required operationally the traffic signals will be turned off.
- 4.1.8 Traffic signal-controlled pedestrian crossing points or similar would be provided where appropriate (i.e. based on road usage, safety considerations, pedestrian usage etc.).

4.2 Access routes

- 4.2.1 Establishing access routes to the works has been an iterative process, involving stakeholders and changes to design. The key principle during development was to avoid or reduce as far as reasonably practicable the use of the LRN for construction traffic.

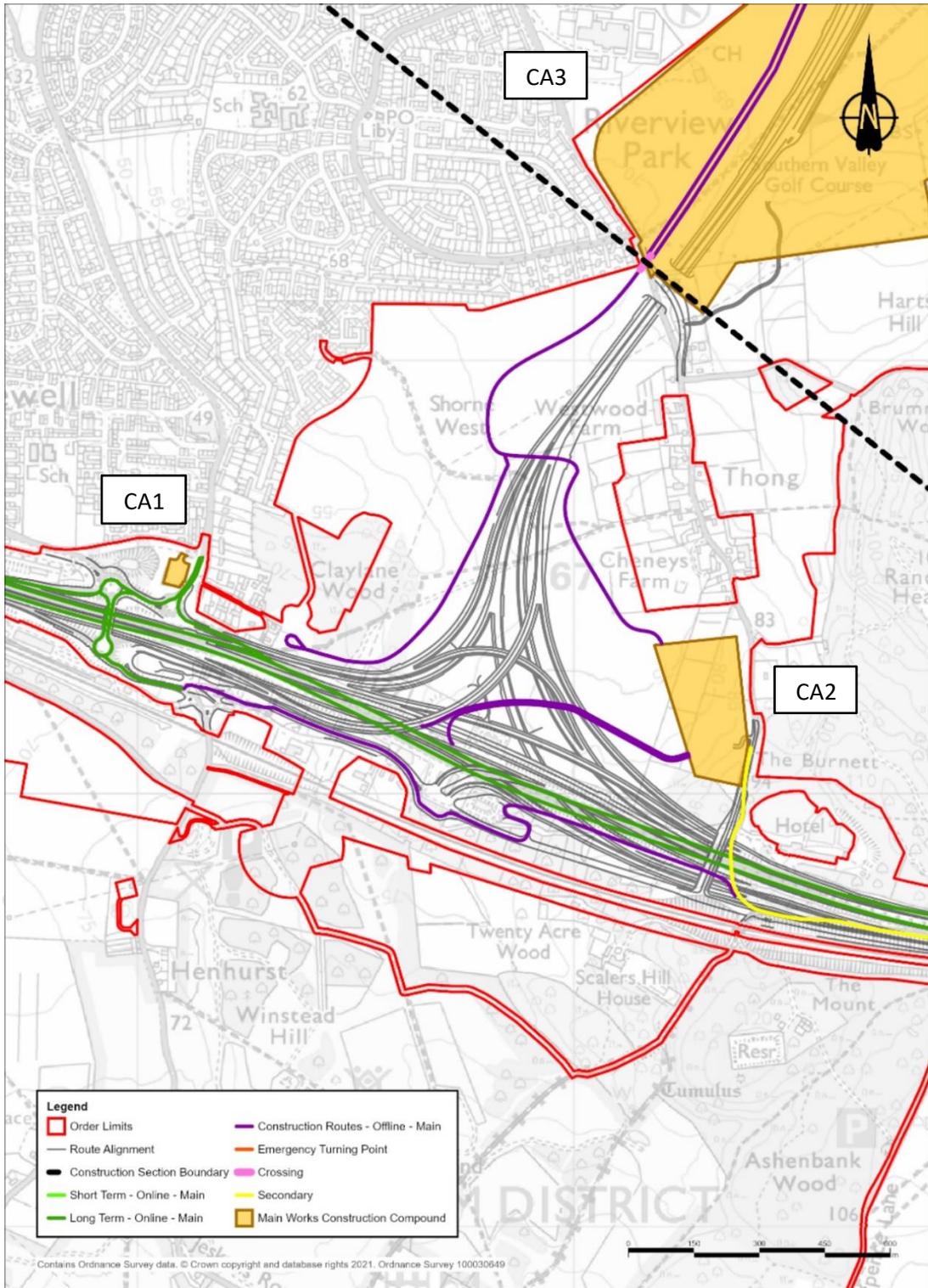
- 4.2.2 The main works routes have been revised and refined on the basis of reasons including the following:
- a. Numerous site visits have allowed the determination of suitable roads for short-term or long-term use and the safety implications of using such routes.
 - b. Stakeholder meetings and public consultations have highlighted issues which have been fed back into the Project development.
 - c. Discussions with internal and external stakeholders have highlighted sensitive areas and roads.
 - d. Traffic assessments, using the Project's transport model, have helped predict the impact of the Project's construction on the road network.
- 4.2.3 The use of the LRN has been reduced by the following proposals:
- a. Early construction of temporary offline haul routes directly off the SRN where possible
 - b. Maximum use of internal haul routes to gain access to worksites
 - c. Engagement with local businesses to establish access via private roads
- 4.2.4 Haul routes have been proposed within the Order Limits to connect the SRN directly to the work sites where possible. While these are constructed early in the programme, traffic would need to utilise the local road network.
- 4.2.5 Plate 4.1 to Plate 4.4 show indicative HGV routes which would facilitate main works. Note these figures are indicative and a snapshot in time during the works. Plate 4.1 below shows main works compounds:
- a. CA1 – near Gravesend East junction
 - b. CA2 – near the A2 and Thong Lane
 - c. CA3 – north of the dashed line (part of CA3)
- 4.2.6
- 4.2.7 There are various types of access routes associated with main works activities. These are:
- a. 'Short-term – Online - Main' routes shown would be used for initial access, primarily for site setup works. Once the appropriate offline accesses are created, the short-term routes would not be used for HGV construction traffic other than for very specific works (e.g. any remaining utility works). The temporary offline access routes are programmed to be constructed early in the programme to minimise the use of the local road access where possible. It is envisaged offline access routes would be available within several months, but all are scheduled to be completed no later than two years after start of construction.

- b. 'Long-term – Online – Main' routes are primarily part of the SRN and would be used by HGV construction traffic throughout the construction period.
- c. 'Construction Routes - Offline - Main', also known as haul routes, are offline routes constructed temporarily to facilitate the construction works and in most cases allow access to the worksite directly from the SRN thereby reducing the need to use the LRN. Note, the offline access routes shown are indicative and represent a snapshot in time; they would evolve in line with the surrounding construction works.
- d. 'Secondary' routes would be used by HGV construction traffic throughout construction, but would be used far less frequently than the other routes.
- e. 'Emergency' routes would be used in the case of an emergency. They would not be used in any other instance by HGV construction traffic (i.e. including during wider network issues). It is therefore possible the route would not be used at all during the construction period.
- f. 'Crossing' locations shown are indicative locations where the haul route bisects the local road network, thereby creating a need for a construction crossing point. Crossing points would be in place with traffic signals or similar for a period of time during the works to allow construction traffic to cross the local road network. Once new local road overbridges are completed (proposed as part of the permanent works) and an access under the bridge is created, these crossing point traffic management measures would no longer be required and would therefore be removed.
- g. 'Main Works Construction Compound' illustrates the proposed temporary construction compound area which would generally encompass hardstanding for construction offices, welfare facilities, plant and material storage among others, to facilitate construction. In most compounds, the area would also contain provision for holding construction traffic (thereby reducing risk of queuing on the road network) as well as earthworks stockpile.

4.2.8 Plate 4.1 below shows main works compounds:

- h. CA1 – near Gravesend East junction
- i. CA2 – near the A2 and Thong Lane
- j. CA3 – north of the dashed line (part of CA3)

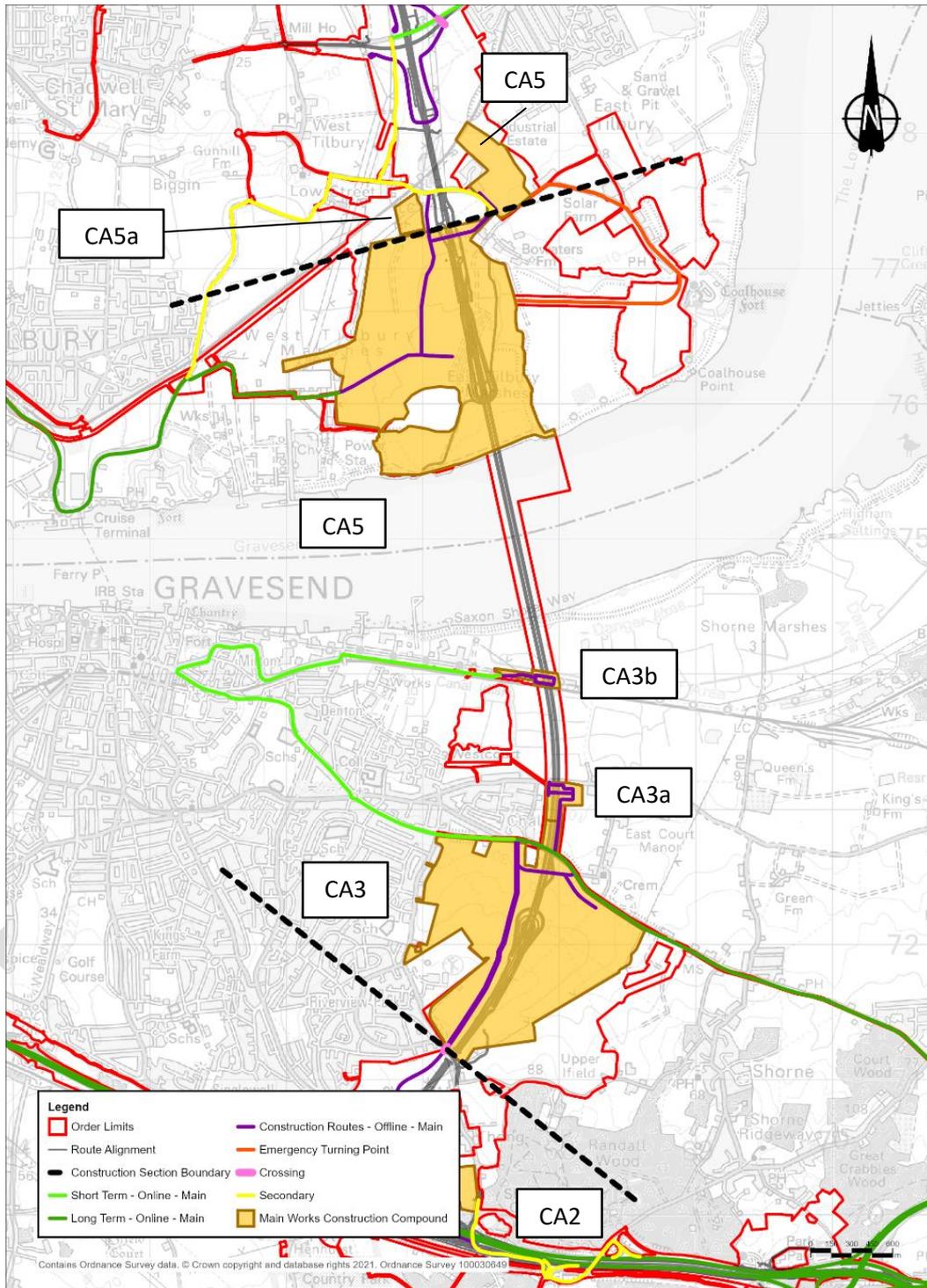
Plate 4.1 Compounds and HGV construction traffic routes (A2 to Thong Lane over LTC)



- 4.2.9 Plate 4.2 below shows main works compounds:
- a. CA3 – around proposed southern tunnel portal
 - b. CA5 – around proposed northern tunnel portal (including the section between the dashes line and tilbury loop line, east of the Project alignment)
 - c. CA5a – between dashed line and tilbury loop line (west of the Project alignment)

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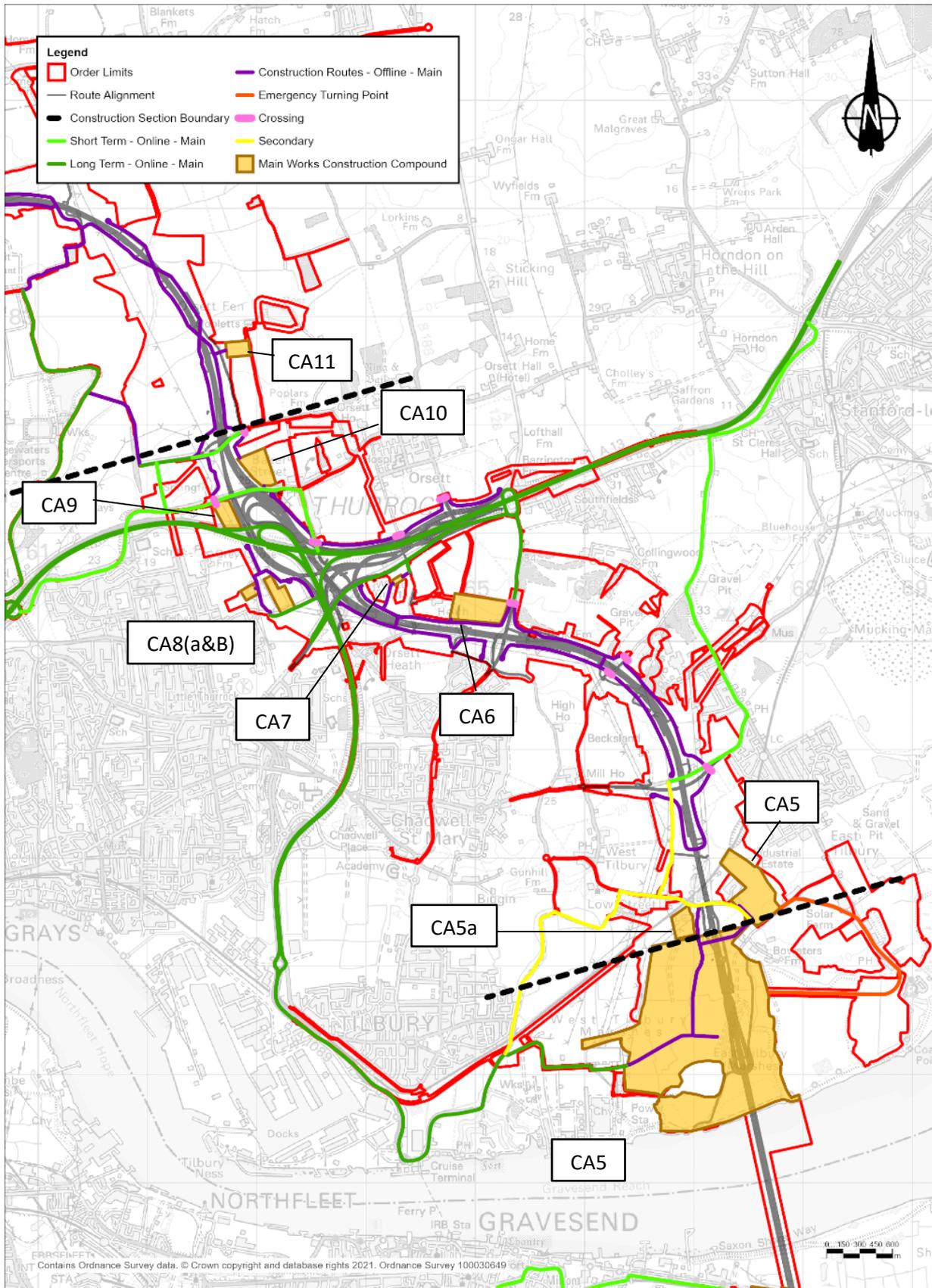
Plate 4.2 Compounds and HGV construction traffic routes (South Portal to North Portal)



- 4.2.10 Plate 4.3 below shows main works compounds:
- a. CA5 – around proposed northern tunnel portal (including the section between the dashes line and tilbury loop line, east of the Project alignment)
 - b. CA5a – between dashed line and tilbury loop line (west of the Project alignment)
 - c. CA6 – south of the A13 and east of the A1089 near Brentwood Road
 - d. CA7 – south of the A13 and east of the A1089 near the A1013
 - e. CA8(a&b) - south of the A13 and west of the A1089
 - f. CA9 – north of the A13 and west of the Project alignment
 - g. CA10 – north of the A13 and east of the Project alignment
 - h. CA11 – north of the A13, east of the Project alignment near Fen Lane

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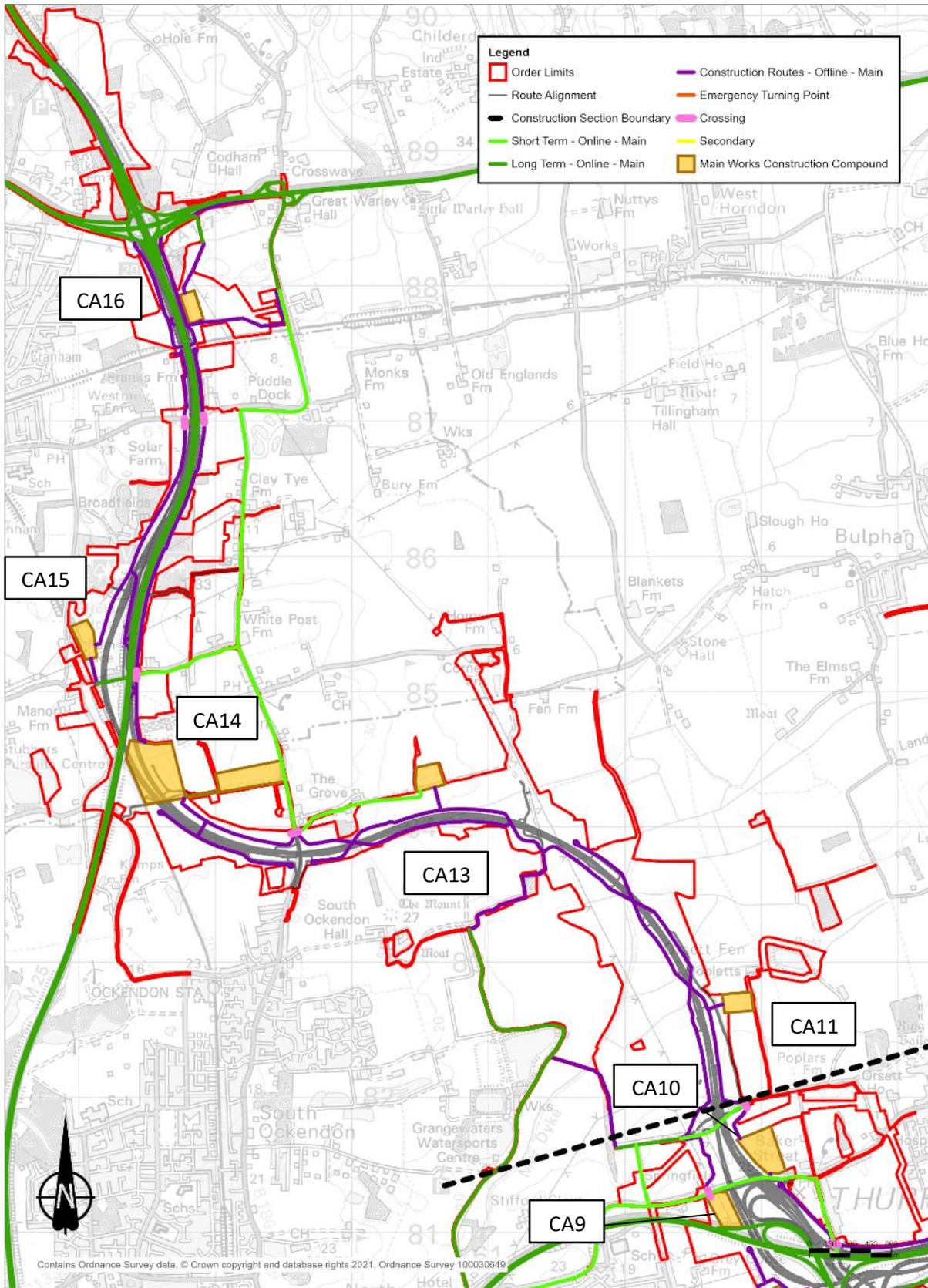
Plate 4.3 Compounds and HGV construction traffic routes (North Portal to A13)



- 4.2.11 Plate 4.4 below shows main works compounds:
- a. CA9 – north of the A13 and west of the Project alignment
 - b. CA10 – north of the A13 and east of the Project alignment
 - c. CA11 – north of the A13, east of the Project alignment near Fen Lane
 - d. CA13 – north of the Project alignment in an open field
 - e. CA14 – just east of the M25 and near Ockendon Road
 - f. CA15 – just west of the M25 and near Ockendon Road
 - g. CA16 – just east of the M25 and near the A127

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Plate 4.4 Compounds and HGV construction traffic routes (A13 to M25)



4.3 Proposed Utility Access Routes

- 4.3.1 Plate 4.5 to Plate 4.8 show the additional access routes associated with utility works (in addition to the main works access routes) and the proposed utility logistic hubs (ULH) locations.
- 4.3.2 There are two types of utility access route identified:
- a. 'Utilities Online Access' – These are access routes using the existing road network. The routes would access specific utility works areas.
 - b. 'Utilities Offline Access' – These are access routes off the road network. In several cases these are 'spurs' off the main works offline haul routes. The routes would be used to access utility logistic hubs and/or specific utility works areas.
 - c. 'Utilities Logistic Hub' - illustrates proposed utility logistic hub areas which would generally receive, store, and distribute the plant machinery and materials for specific utility works. They may include offices, welfare facilities, refuelling stations, security hubs, vehicle/wheel washing sites and parking areas similar in size to the main works satellite compounds
- 4.3.3 Note that usage of the Statutory Undertaker access routes shown, is envisaged to be very low and infrequent compared with the other routes.

Plate 4.5 Compounds, ULH and HGV construction traffic routes including Utilities (A2 to Thong Lane over LTC)

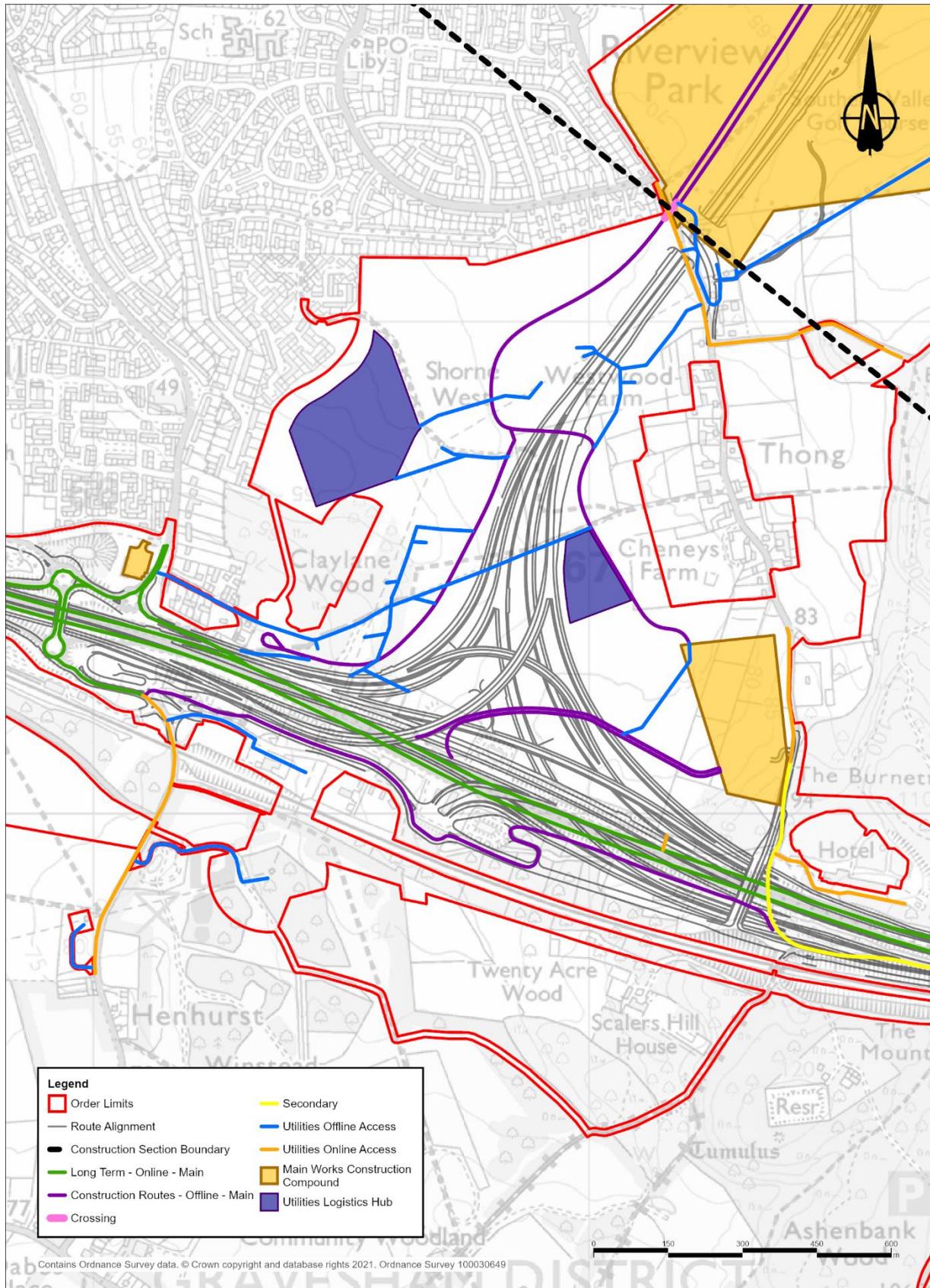


Plate 4.6 Compounds, ULH and HGV construction traffic routes including Utilities (South Portal to North Portal)

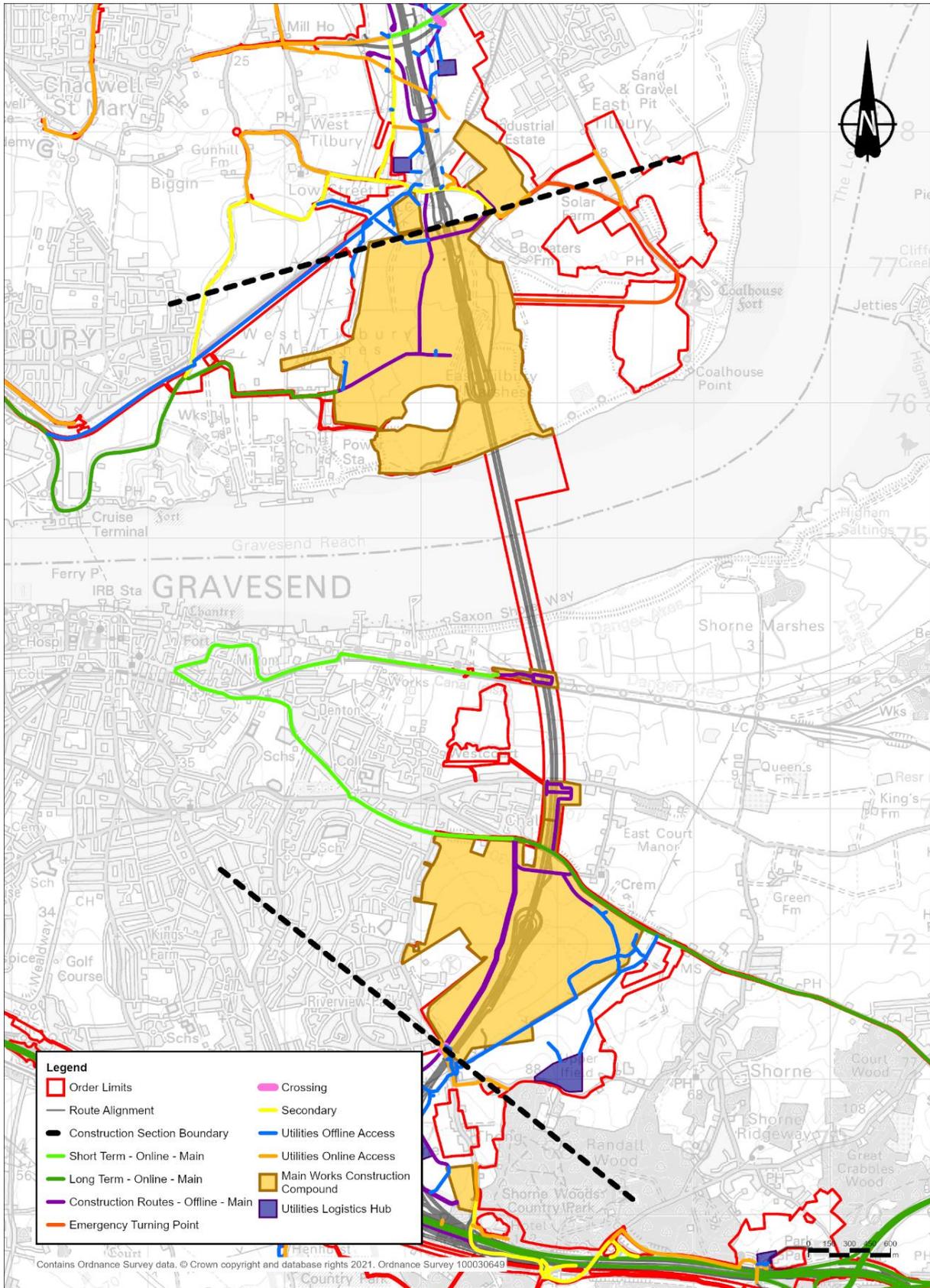


Plate 4.7 Compounds, ULH and HGV construction traffic routes including Utilities (North Portal to A13)

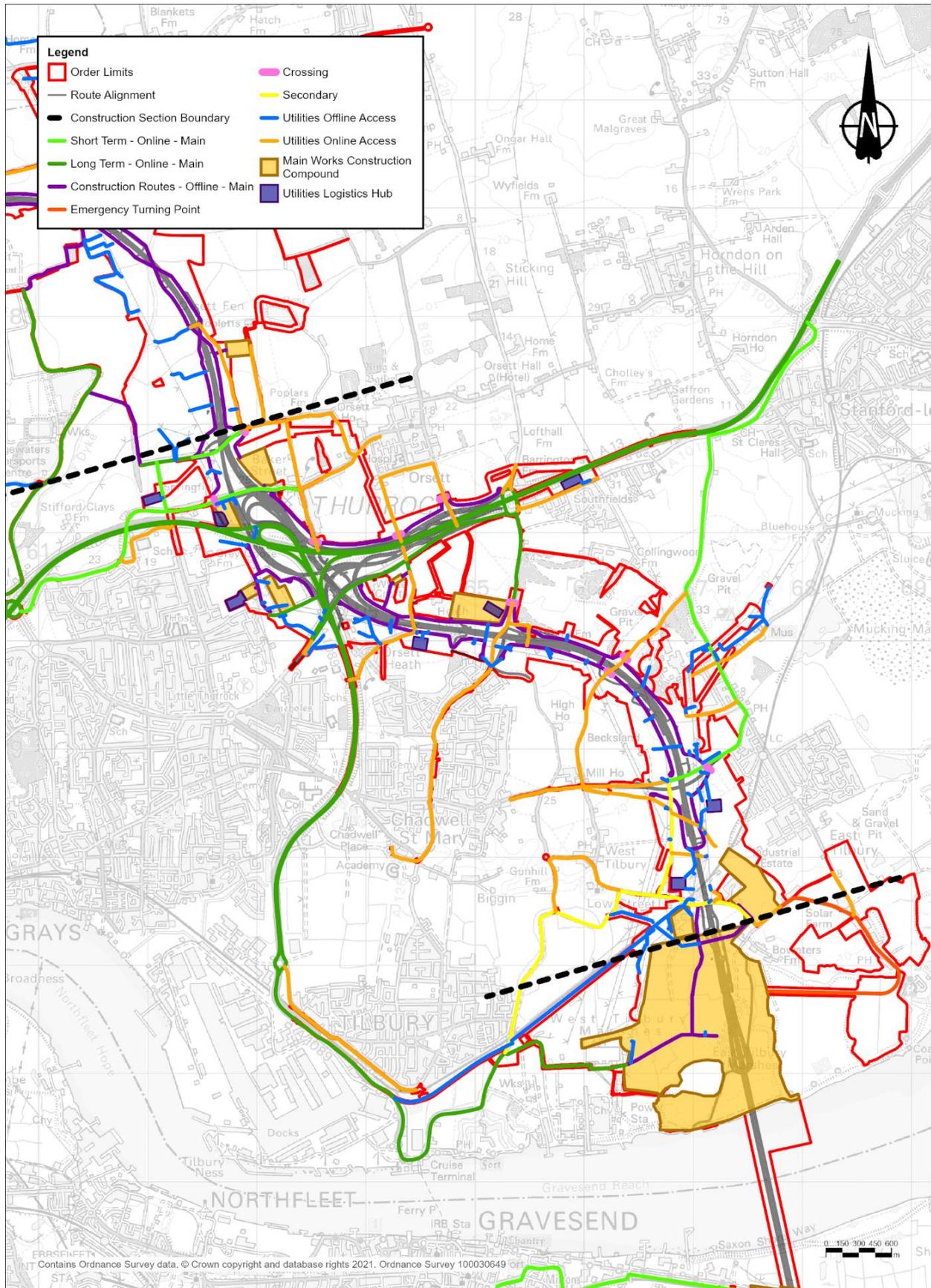
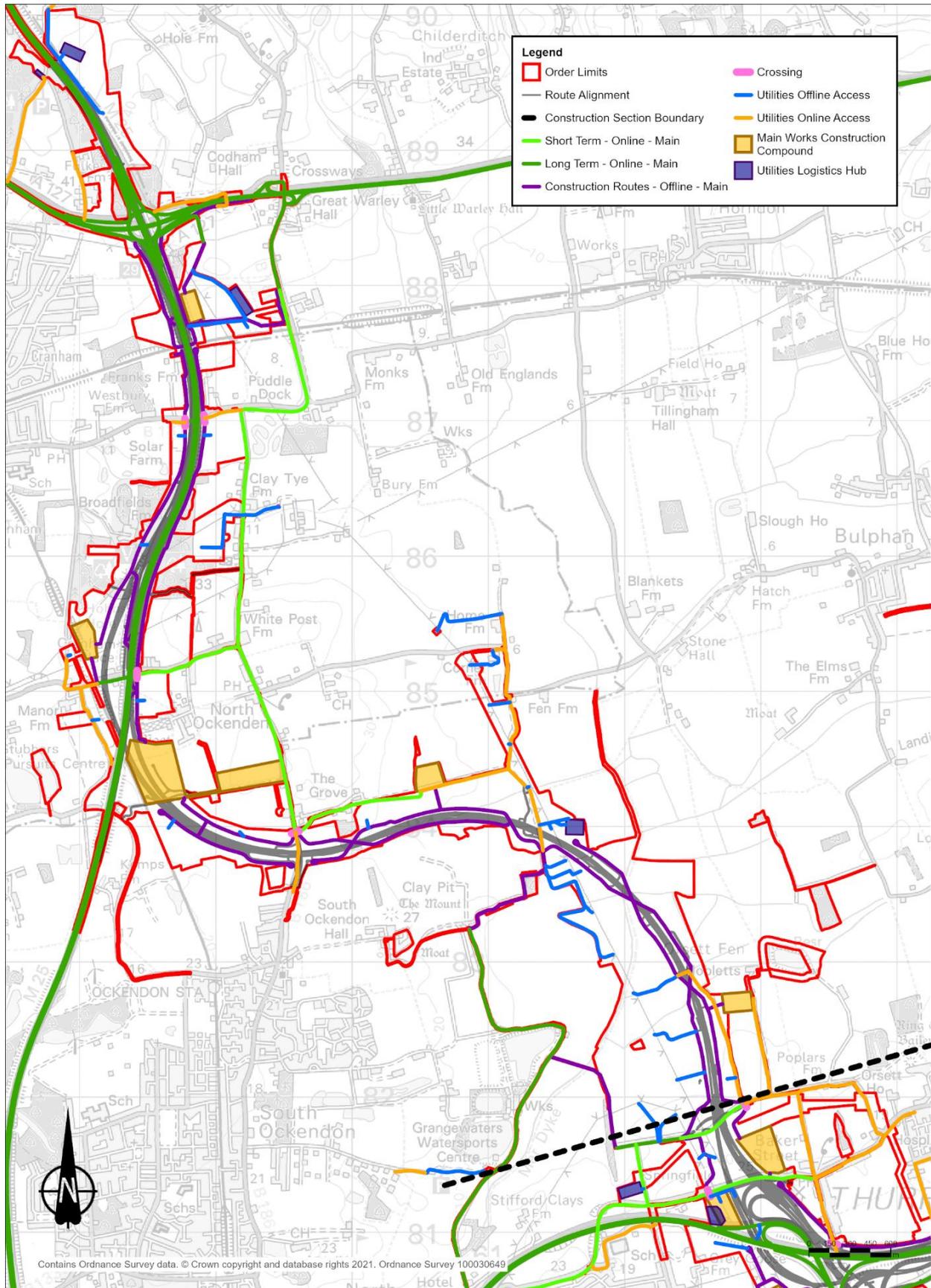


Plate 4.8 Compounds, ULH and HGV construction traffic routes including Utilities (A13 to M25)



- 4.3.4 Table 4.1 gives information about the proposed access routes (illustrated on Plate 4.1 to Plate 4.4 to each of the compounds. Primary access routes in some instances would have two phases, an initial access route (generally prior to construction of offline routes) and a following primary access route arrangement (post construction of the associated offline route).
- 4.3.5 Initial access (short-term) would be in place up to two years as mentioned previously, however Table 4.1 outlines an indicative period the offline route is likely to become available for each compound (in several instances the local road network may only be required for less than a year). It should be noted the durations are indicative approximations. Once the Contractor is appointed, detailed design would confirm the durations.
- 4.3.6 Compounds would be used to facilitate specific geographical works. The scopes of these works differ, therefore the operational period of each compound would also differ. The duration outlined in Table 4.1 is for the operational period of the compound (including mobilisation and demobilisation). Main compounds would generally be required for the full construction period (CA2, CA3, CA5, CA10 and CA14). Secondary routes are also shown for those compounds which would have them.

Table 4.1 Illustrative construction compound access routes (HGV Traffic)

Compound	Primary route	Primary duration	Secondary route
CA1 (Marling Cross compound)	Watling Street (A2) – Hever Court Road – Valley Drive	Full period compound is operational	
CA2 (A2 compound)	Watling Street (A2EB) (via Gravesend East junction northern roundabout)	Full period compound is operational	Brewers Road and Thong Lane (south of Thong village) via A2 slip roads
CA3 (Southern tunnel entrance compound)	A2 – A289 – Gravesend Road (A226)	Full period compound is operational	
CA3a (A226 Gravesend Road compound)	A226	Full period compound is operational	
CA3b (Milton compound)	A226 – Milton Road – Ordnance Road – Canal Road – Norfolk Road – Thames and Medway Canal	Full period compound is operational	

Compound	Primary route	Primary duration	Secondary route
CA5 (Northern tunnel entrance compound) & CA5a (Station road compound)	A13 – A1089 – Fort Road – offline access route (new Port of Tilbury2 access road also to be used)	Full period compound is operational	Fort Road – Coopers Shaw Road – Church Road – Station Road. And/or A1013, Buckingham Hill Road, Muckingford Road, Low Street Lane, Station Road (only short-term, initial 9-12 months)
CA6 (Brentwood Road compound)	A13 – Brentwood Road	Full period compound is operational	
CA7 (Stanford Road compound)	A1013 – Hornsby Lane and A13 – Brentwood Road – offline route	Full period compound is operational	
CA8(A&B) (Long Lane compound (A&B))	A13 – A1013 – Gammonfields Way	Full period compound is operational	
CA9 (Stifford Clays Road compound West)	A13 – Stifford Clays Road (initial) A13 – private road – offline route – Green Lane – offline route and via temp M25 offline access routes (once available)	Initial – first 6-12 months Remaining period compound is operational	
CA10 (Stifford Clays Road compound East)	A13 – Stifford Clays Road (initial) A13 – private road – offline route – Green Lane – offline route and via temp M25 offline access routes (once available)	Initial – first 6-12 months Remaining period compound is operational	
CA11 (Mardyke compound)	Stifford Clays Road – Green Lane (initial) A13 – private road – offline route – Green Lane – offline route and via temp M25 offline access routes (once available)	Initial – first 6-12 months Remaining period compound is operational	

Compound	Primary route	Primary duration	Secondary route
CA13 (Medebridge compound)	A127 – Warley Street (B186) – St Marys Lane (B187) – Clay Tye Road (B186) – North Road (B186) – track (initial) A13 – private road – offline route and via temporary M25 offline access routes (once available)	Initial – first 9-12 months Remaining period compound is operational	
CA14 (M25 compound)	A127 – Warley Street (B186) – St Marys Lane (B187) – Clay Tye Road (B186) – North Road (B186) (initial) M25 temporary access – offline route	Initial – first 12-24 months Remaining period compound is operational	
CA15 (Ockendon Road compound)	A127 – Warley Street (B186) – St Marys Lane (B187) – Clay Tye Road (B186) – North Road (B186) – Ockendon Road (initial) M25 temporary access – offline route	Initial – first 12-24 months Remaining period compound is operational	
CA16 (Warley street compound)	A127 junction – Warley Street (B186) – offline route and M25 junction 29 – offline route	Full period compound is operational	

4.3.7 The routes to site mentioned in this section would be adhered to as far as reasonably practicable. It is understood through discussion with local authorities that in some specific instances where heavy disruption and/or incidents occur on the network, vehicles may need to choose an alternative route. This would mainly be the case for specific, time-critical work activities (e.g. delivery of wet concrete).

4.3.8 Alternative routes would be contained in the TMP submitted to the SoS following consultation with the local authorities.

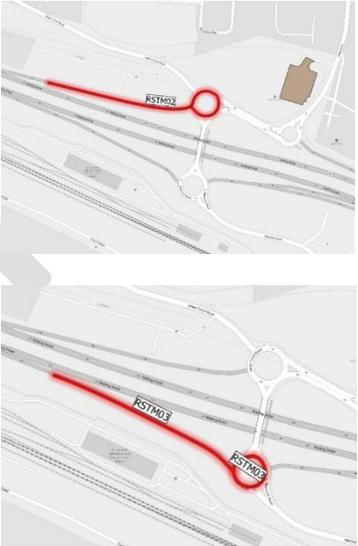
4.4 Speed limits (SRN and LRN)

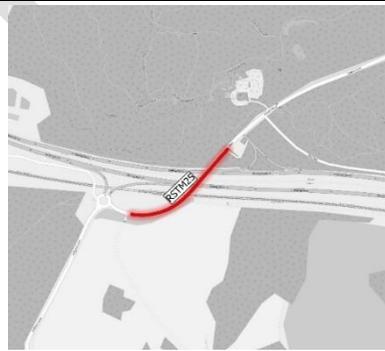
- 4.4.1 Traditionally, narrow lanes within roadworks on the SRN have been accompanied by a maximum speed reduced to 50mph. The Project would seek to retain 60mph where appropriate and where it is safe to do so.
- 4.4.2 LRN speed limits will be retained subject to the outcomes of discussions with local highway authorities.

4.5 Lengths of traffic management measures (in distance and duration)

- 4.5.1 To reduce the impact on local road users, the length of traffic management measures installed would be kept to a minimum and left *in situ* for the shortest duration as far as is reasonably practicable.
- 4.5.2 Where it is intended for roadworks to be left in place for defined periods without any construction works being undertaken, e.g. a weekend, the Contractors shall assess whether it is reasonably practicable and safe to remove the traffic management equipment during this period.
- 4.5.3 A full preliminary list of indicative traffic management measures (excluding hard shoulder closures and associated localised traffic management for highway gantries) that may be required to construct the Project can be found in Appendix A. It includes approximate extents of the traffic management to be installed, estimated duration of measure and which construction modelling phase they would be undertaken in.
- 4.5.4 Locations where traffic management measures (as shown in Appendix A) that are generally to be in place for greater than three months, are shown in Table 4.2 and Table 4.3. Table 4.2 sets out the indicative traffic management measures for the main works and Table 4.3 sets out the indicative traffic management measures associated with the utility works. Wherever practicably possible, traffic management would be shared by main works and utilities works so as to minimise disruption to the travelling public and local communities.
- 4.5.5 Where there is a need to install extended lengths of traffic management such as longitudinal trenches, the default length would be 300m sections. The exact length would be determined in the TMP taking into consideration local accessibility, traffic volumes, pedestrian movements and local safety considerations.
- 4.5.6 The power to impose the traffic management measures listed below will be included within the schedule of the draft DCO (REF TBC) which sets out temporary restrictions, closures, alterations and other regulations of streets. It should be noted that the DCO will also include a general power to temporarily close, alter, divert or restrict the use of any street but this will be subject to street authority approval.

Table 4.2 Indicative traffic management measures (main works)

Road	Traffic Measure envisaged	Diversion route	Envisaged length of TM	Description	Indicative location of TM
Gravesend East junction	Narrow lanes, lane closures and short-term closures	N/A	Includes Gravesend East junction extents	<p>To facilitate the works on and around Gravesend East junction, lane restrictions on the gyratories would be imposed for approximately 9-14 months.</p> <p>The works around Gravesend East junction (particularly north of the A2) are scheduled to be conducted early in the programme.</p> <p>The southern roundabout is envisaged to start early in the programme and be completed late in the programme (due to ensuring existing connections are maintained). As a result there is likely to be a period of time where little or no activity would take place. During this time, traffic management restrictions would be lifted, however a temporary alignment would be in place which would facilitate existing movements.</p>	

Road	Traffic Measure envisaged	Diversion route	Envisaged length of TM	Description	Indicative location of TM
A2	Narrow lanes, hard shoulder closure, reduced speed limit to 50mph	N/A	Circa 4.5km on each carriageway (9km total for westbound (WB) and eastbound (EB))	To facilitate the construction of the new junction and widening works. Traffic management on the A2 would be required for approximately two years during the construction period. Note, hard shoulder closure would also be required outside this two-year period.	
Brewers Road Bridge	Closure (bridge only)	Via Three Crutches roundabout and Gravesend East junction	Circa 300m	The proposed closure of Brewers Road would be required as the alignment of the new bridge is the same as for the existing bridge meaning there is no alternative but to close the road. Although access to Cobham Hall School and Nook Pet Hotel would not be directly affected, there would be an increase in journey times due to the diversion route. The closure is envisaged to be 19 months.	
A13	Narrow lanes, reduced speed limit to 60mph	N/A	Circa 1.2km	Narrow lanes may be required for tie-in and widening works. It is envisaged the EB and WB carriageways would be constructed at different times in the programme. The duration would be approximately three months for each carriageway.	

Road	Traffic Measure envisaged	Diversion route	Envisaged length of TM	Description	Indicative location of TM
Baker Street	Closure	Via Rectory Road	Circa 450m	<p>Baker Street closure is proposed to allow the safe construction of scheme elements around the A13. The section between the A13 and A1013 would be closed for approximately 16 months. During this time, Rectory Road would remain open.</p> <p>Access from Stifford Clays Road to Baker Street would be available.</p>	
Rectory Road	Closure	Via Baker Street	Circa 70m	<p>The proposed closure of Rectory Road would be required as the alignment of the new bridge is the same as for the existing bridge, meaning there is no alternative but to close the road. The bridge section of Rectory Road would be closed for approximately seven months.</p> <p>During this time Baker Street would be open and access from High Road and School Lane would be available.</p>	

Road	Traffic Measure envisaged	Diversion route	Envisaged length of TM	Description	Indicative location of TM
Ockendon Road	Closure	Via B186, West Road, Dennis Road, Dennises Lane and Stubbers Lane	Circa 150m	<p>The section of Ockendon Road approximately between the rail bridge and the existing properties would be required for around 19 months.</p> <p>It would be required to allow construction of scheme elements as well as to ensure safe management of significant earthworks in the area to reduce interface between construction and the public.</p>	
M25	Narrow lanes, hard shoulder closure, reduced speed limit to 50/60mph	N/A	Circa 5.1km northbound (NB) and circa 5.8km southbound (SB)	To facilitate works on the M25, traffic management would be required throughout the construction period on the M25NB (left image) and M25SB (right image).	

Road	Traffic Measure envisaged	Diversion route	Envisaged length of TM	Description	Indicative location of TM
A127	Narrow lanes, reduced speed limit to 50/60mph	N/A	Circa 400m each carriageway (800m total EB and WB)	To facilitate works around the M25 J29. Traffic management would be required throughout the construction period.	
A2, A127, A1089, A1013, A13, M25	Multiple night closures, several weekend or similar closures	N/A	See Appendix A	Multiple night and possibly weekend closures required throughout the programme for specific works including bridge works, tie-in works, utilities etc	See Appendix A
Local roads intersecting the Project mainline	Traffic lights, night closures and weekend closures	N/A	See Appendix A	Construction offline access (haul route) would generally follow the Project mainline trace and in some instances would cross the local road network. In such instances, traffic lights or similar would be used to allow construction vehicles to cross. For the local roads, once the new overbridge for the local road is constructed, it is possible in many instances to then remove these traffic control measures by allowing construction vehicles to cross under the overbridge. Overbridge construction programme for local roads would	See Appendix A

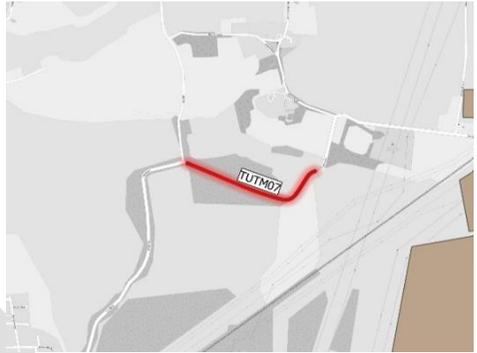
Road	Traffic Measure envisaged	Diversion route	Envisaged length of TM	Description	Indicative location of TM
				be prioritised based on traffic counts where possible. Infrequent night/weekend closures of local roads would be required to carry out specific works (e.g. bridge works, tie-in works, utility works).	

Table 4.3 Indicative traffic management measures (utilities-specific)

Road	Traffic Measure envisaged	Diversion route	Envisaged length of TM	Description	Indicative location of TM
Park Pale & Brewers Road junction	Lane closure and traffic lights. Potential short-term closure	N/A	Brewers Road A2 Bridge to Park Pale Overbridge (1.3km of affected road (in 300m sections))	The works are to divert a gas main. Reduced highway capacity in sections due to traffic management measures. Park Pale would not be closed for longer than a night/weekend. Closures would be minimal and infrequent. The works are scheduled to be conducted early in the programme and take approximately six months to complete.	

Road	Traffic Measure envisaged	Diversion route	Envisaged length of TM	Description	Indicative location of TM
Halfpence Lane	Lane closure and traffic lights. Potential short-term closure	N/A	1.1km from Brewers Road Roundabout South (1.1km of affected road (in 300m sections))	<p>The works are to divert a foul water main.</p> <p>Reduced highway capacity in sections due to traffic management measures.</p> <p>Halfpence Lane would not be closed for longer than a night/weekend.</p> <p>Closures would be minimal and infrequent.</p> <p>The works are scheduled to be conducted early in the programme and take approximately six months to complete.</p> <p>Once the works are completed, all traffic management restrictions would be lifted and no further visits would be required for these works.</p>	
A226 Gravesend Road	Lane closure and traffic lights	N/A	1.3km of affected road (in 300m sections) 100m	<p>The works are to establish compound connections for compounds CA3 & CA3a from those assets located within the A226 boundary and to divert existing assets to enable compound access to be constructed.</p>	

Road	Traffic Measure envisaged	Diversion route	Envisaged length of TM	Description	Indicative location of TM
				<p>Reduced highway capacity in sections due to traffic management measures.</p> <p>The works are scheduled to be conducted early in the programme and take approximately nine months to complete.</p>	
<p>Dock Road & Hume Avenue</p>	<p>Lane closure and traffic lights</p>	<p>N/A</p>	<p>1.4km of affected road (in 300m sections)</p>	<p>The works are to install a water main to add resilience to the existing water network.</p> <p>Reduced highway capacity in sections due to traffic management measures.</p> <p>The works are scheduled to be conducted early in the programme and take approximately nine months to complete.</p> <p>Once the works are completed all traffic management restrictions would be lifted and no further visits required for these works.</p>	

Road	Traffic Measure envisaged	Diversion route	Envisaged length of TM	Description	Indicative location of TM
Coopers Shaw Road	Lane closure and traffic lights. Potential short-term full closure.	N/A	580m of affected road (in 300m sections)	<p>The works are to install the permanent water supply for the North Portal building.</p> <p>Reduced highway capacity in sections due to traffic management measures.</p> <p>The works are scheduled to be conducted early in the programme and take approximately four months to complete.</p> <p>Once the works are completed all traffic management restrictions would be lifted and no further visits would be required for these works.</p>	
Rectory Road, Church Road, Station Road	Lane closure and traffic lights	N/A	1.4km of affected road (in 300m sections)	<p>The works are to install temporary compound supplies.</p> <p>Reduced highway capacity in sections due to traffic management measures.</p> <p>The works are scheduled to be conducted early in the programme and take approximately nine months to complete.</p> <p>Once the works are completed all traffic</p>	

Road	Traffic Measure envisaged	Diversion route	Envisaged length of TM	Description	Indicative location of TM
				<p>management restrictions would be lifted.</p> <p>Potentially further visits required to remove these works near project completion.</p>	
<p>Marshfoot Road, Chadwell Hill, Brentwood Road</p>	<p>Lane closure and traffic lights</p>	<p>N/A</p>	<p>2.4km through Chadwell St Mary. (2.4km affected road (in 300m sections))</p>	<p>The works are to install power supplies for the Project compounds located around the A13 junction (CA6-CA11).</p> <p>Reduced highway capacity in sections due to traffic management measures.</p> <p>The works are scheduled to be conducted first in the programme and take approximately 12 months to complete.</p> <p>Once the works are completed all traffic management restrictions would be lifted.</p> <p>Potentially further visits required to remove these works near project completion.</p>	

Road	Traffic Measure envisaged	Diversion route	Envisaged length of TM	Description	Indicative location of TM
Muckingford Road	Lane closure and traffic lights	N/A	2km of affected road (in 300m sections)	<p>The works are to divert utility assets affected by the Project that currently run adjacent to the highway and also carry out widening works for WCH.</p> <p>Reduced highway capacity in sections due to traffic management measures. The works are scheduled to be undertaken in Year 2 of the programme and take approximately six months.</p>	
Brentwood Road	Lane closure and traffic lights	N/A	800m south from Orsett Cock Roundabout. (800m of affected road (in 300m sections))	<p>The works are to install temporary supplies for Project compound CA6.</p> <p>Reduced highway capacity in sections due to traffic management measures. The works are scheduled to be conducted early in the programme and take approximately six months to complete.</p> <p>Potentially further visits required to remove these works near project completion.</p>	

Road	Traffic Measure envisaged	Diversion route	Envisaged length of TM	Description	Indicative location of TM
A1013	Lane closure and traffic lights	N/A	2.5km of affected road (in 300m sections)	The works are to install utility assets and carry out works to the A1013 as part of the Project. In some cases, lane closure may not be required where the road width permits. The works are scheduled to take approximately eight months to complete.	
Baker Street	Lane closure and traffic lights	N/A	550m of affected road (in 300m sections)	The works are to install a telecommunications network for the full length and an electrical network for the southern 150m. Reduced highway capacity in sections due to traffic management measures. The works are scheduled to take approximately five months to complete.	
B188, Stifford Clays Road	Lane closure and traffic lights	N/A	900m of affected road (in 300m sections)	The works are to install a permanent telecommunications network and provide a network supply for Project compounds. Reduced highway capacity in sections due to traffic management measures.	

Road	Traffic Measure envisaged	Diversion route	Envisaged length of TM	Description	Indicative location of TM
				<p>The works are scheduled to be conducted first in the programme and take approximately six months to complete.</p> <p>Once the works are completed all traffic management restrictions would be lifted.</p>	
Stifford Clays Road	Lane closure and traffic lights	N/A	450m of affected road (in 300m sections)	<p>Works are to install discharge connections to the foul water network.</p> <p>Reduced highway capacity in sections due to traffic management measures.</p> <p>The works are scheduled to be conducted first in the programme and take approximately four months to complete.</p> <p>Potentially further visits required to remove these works near project completion.</p>	

Road	Traffic Measure envisaged	Diversion route	Envisaged length of TM	Description	Indicative location of TM
Fen Lane & Green Lane	Temporary full closure (in sections)	N/A	1.8km of affected road (in 300m sections)	<p>Works are to install compound supplies and discharge connections to the foul water network.</p> <p>Highways closures in approximate 300m sections due to traffic management measures.</p> <p>The works are scheduled to be conducted first in the programme and take approximately nine months to complete.</p> <p>Potentially further visits required to remove these works near project completion.</p>	
B186 North Road	Lane closure and traffic lights	N/A	2km of affected road (in 300m sections)	<p>Works are to install compound and foul water discharge connections.</p> <p>Reduced highway capacity in sections due to traffic management measures.</p> <p>The works are scheduled to be conducted first in the programme and take approximately 12 months to complete.</p> <p>Potentially further visits required to remove these</p>	

Road	Traffic Measure envisaged	Diversion route	Envisaged length of TM	Description	Indicative location of TM
				works near project completion.	
St Marys Lane	Lane closure and traffic lights	N/A	2km of affected road (in 300m sections)	The works are to divert utility assets affected by the Project currently located adjacent to, and within the carriageway. Reduced highway capacity in sections due to traffic management measures. The works are scheduled to be undertaken in Year 1 and 2 of the programme and take approximately nine months to complete.	

4.6 Local road network

- 4.6.1 To facilitate construction of the Project, sections of the local road network would need to be used for construction activities. While this would be minimised as far as practicable, there is a requirement to use the LRN for a number of reasons, including:
- Closures (e.g. to carry out tie-in works for new overbridge)
 - Traffic lights (e.g. to carry out utility works on one side of the road)
 - Construction access route (e.g. to access compounds prior to construction of temporary haul routes)
- 4.6.2 In response to stakeholder requests and to help inform local authorities and other stakeholders, the tables in Appendix B briefly describe the proposed works around the LRN during construction as mentioned in Section 4 and in Appendix A.
- 4.6.3 Working with the relevant local authorities and stakeholders, it has been proposed to introduce restrictions for HGV vehicles which would be associated with construction of the Project.
- 4.6.4 Table 4.4 shows the local roads and the proposed restrictions for HGV vehicles associated with construction of the Project. The routes below have been highlighted through discussions with local authorities, with particular focus on roads which may be used as rat-run routes.

Table 4.4 Proposed restrictions for HGVs

Road	Road section	Type of restriction
Thong Lane	Between CA02 access off Thong lane and A226	HGV ban for deliveries and earthworks associated with main works
Brewers Road	Between Park Pale and A226 (including The Ridgeway and Peartree Lane)	HGV ban for all works
Castle Lane	Entire road	HGV ban for all works
The Street	Entire road	HGV ban for all works
Lower Higham Road	Entire road	HGV ban for deliveries and earthworks associated with main works
Rectory Road	From School Lane to Prince Charles Avenue	HGV ban for all works
School Lane	From Mill Lane to Rectory Road	HGV ban for all works
B188 High Road	From Mill Lane to Rectory Road	HGV ban for all works
Prince Charles Avenue	From Rectory Road to A128 Brentwood Road	HGV ban for all works

- 4.6.5 Further possible restrictions continue to be explored and discussed with stakeholders, including:
- a. Stifford Clays Road – Once the relevant offline haul routes are constructed, construction HGV traffic would use the offline haul route thereby reducing or avoiding the need to use Stifford Clays Road.
 - b. Section of the B186 – Following construction of the temporary access routes off the M25, HGVs would use these to access the worksites directly thereby reducing or avoiding the need to use sections of the B186.

4.7 Selection of diversion routes

- 4.7.1 The provision of traffic management may require diversion routes to be provided as required. The exact diversion route would be subject to engagement with the relevant authorities during the development of the TMP, working to mitigate the potential for the vehicles to use unofficial diversion routes.
- 4.7.2 Plate 4.9 to Plate 4.13 are illustrative diversion routes during the proposed longer-term closures outlined in Table 4.2. The red extents on the Plates show the approximate extent of the closure the yellow shows the possible diversion route during the closure.
- 4.7.3 The diversion route would be determined through discussions with the local authority closer to the time as other factors may need to be taken into account to make the decision (e.g. other works in the nearby area which may be external from the Project works).

Plate 4.9 Brewers Road closure possible diversion route (north to south)

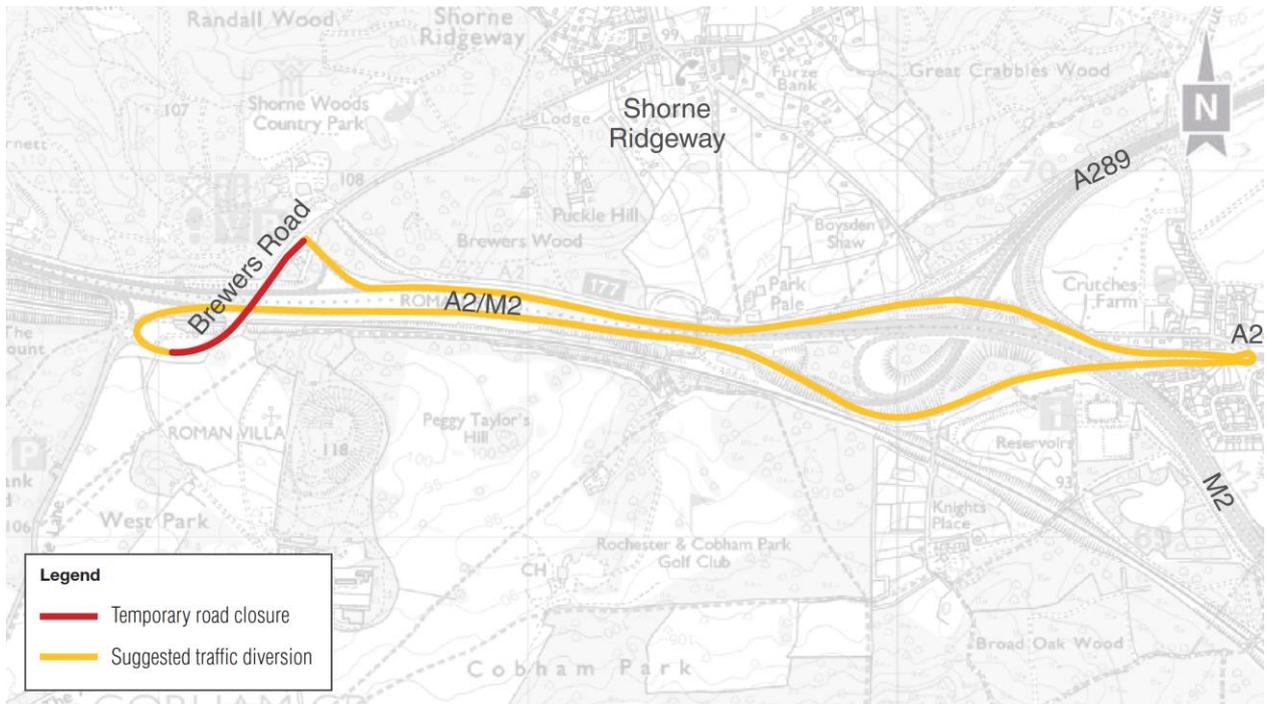


Plate 4.10 Brewers Road closure possible diversion route (south to north)

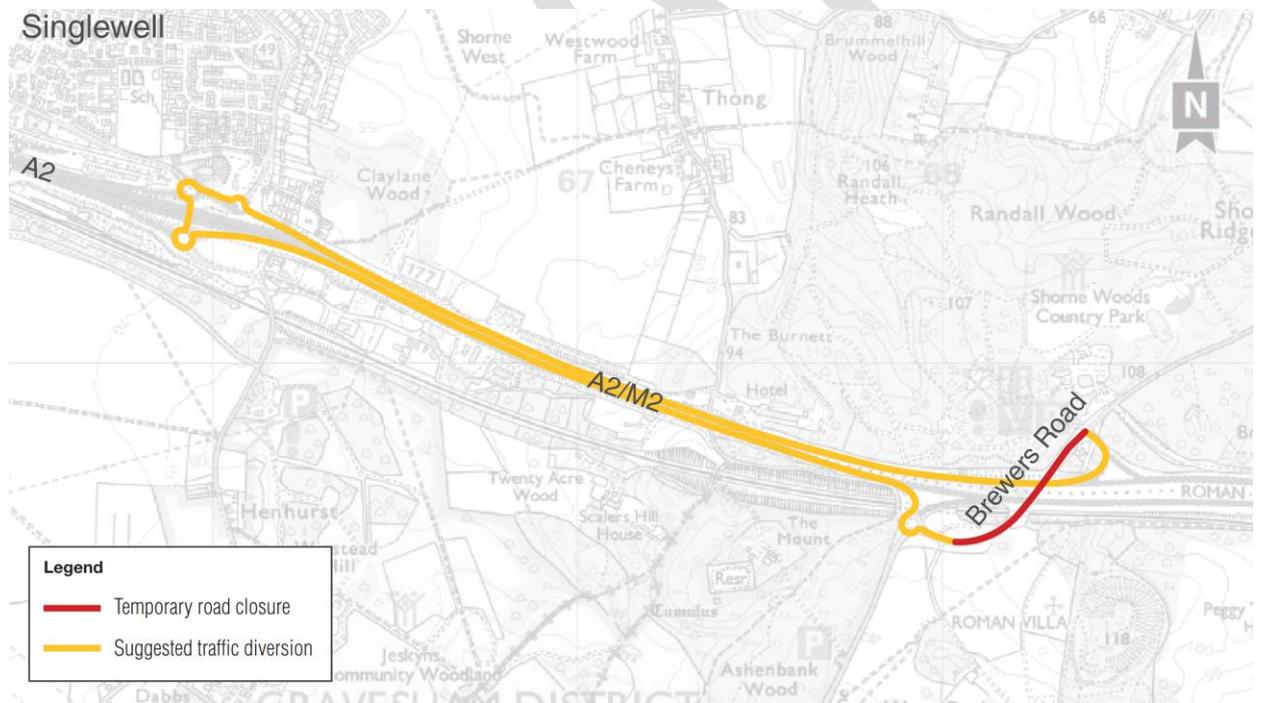


Plate 4.11 Baker Street possible diversion route

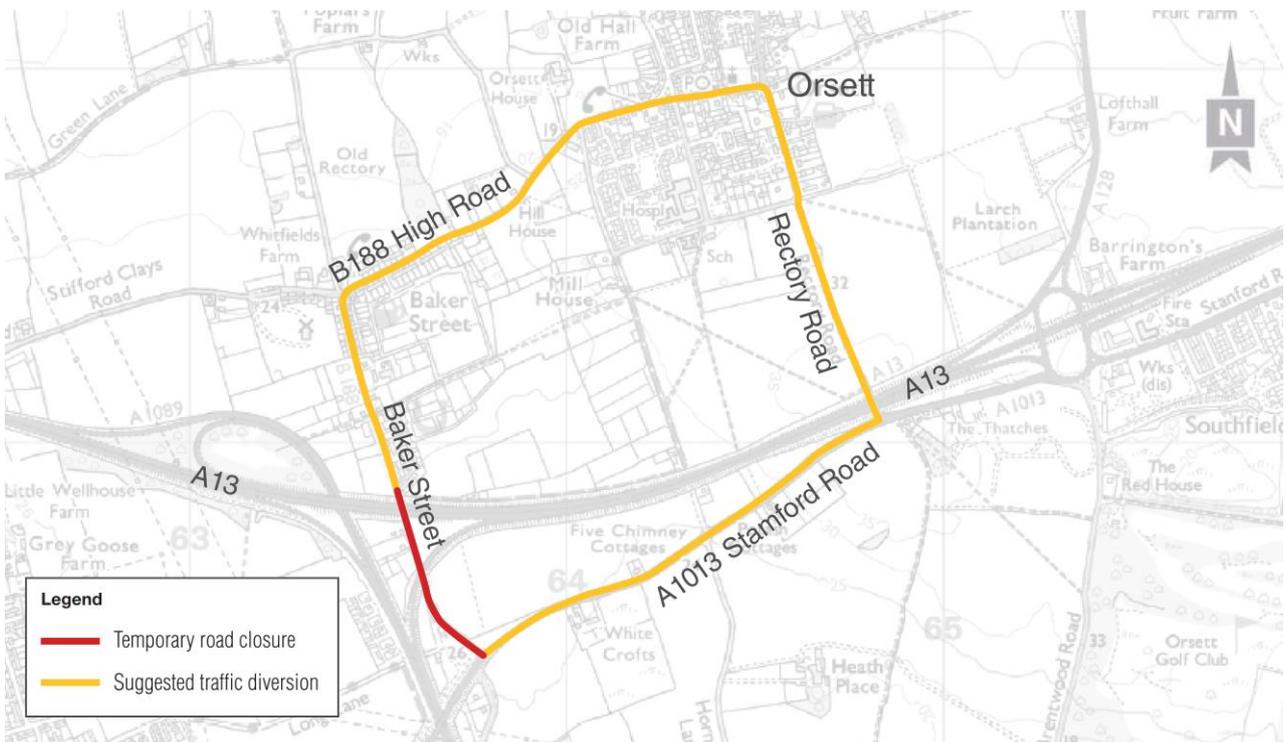


Plate 4.12 Rectory Road possible diversion route

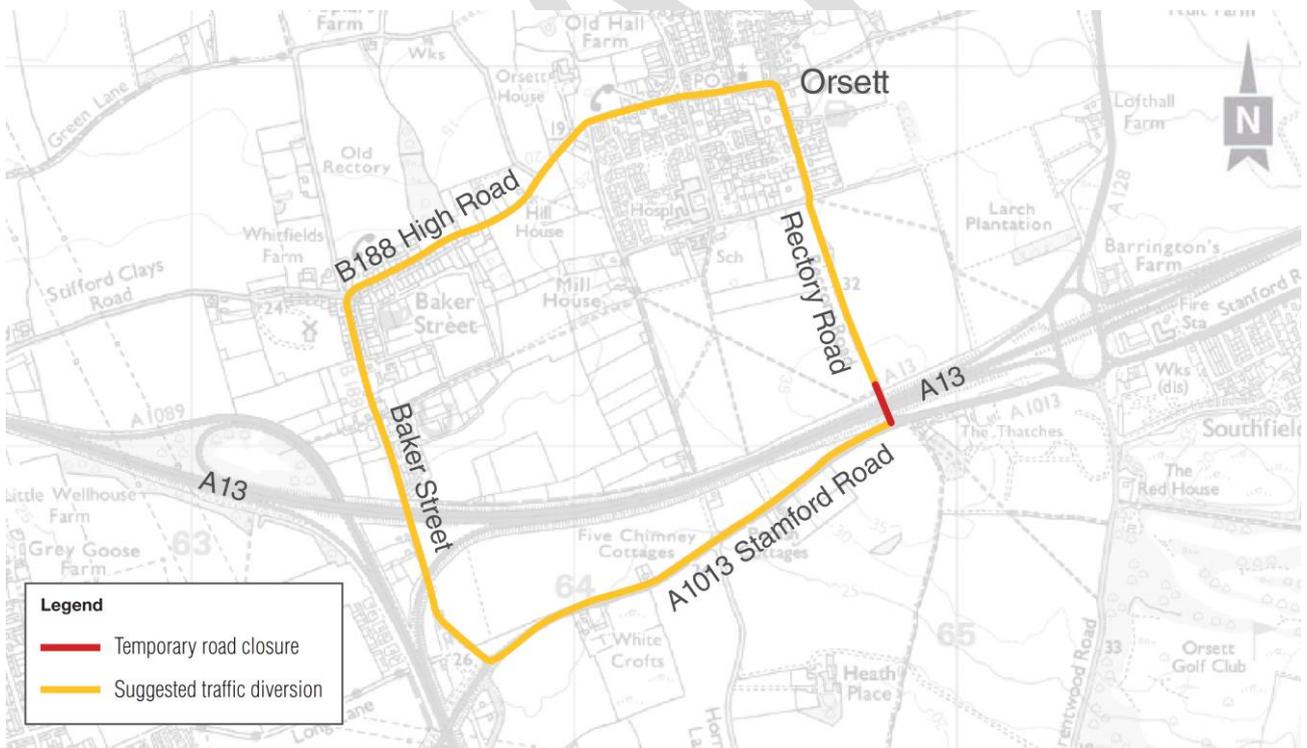
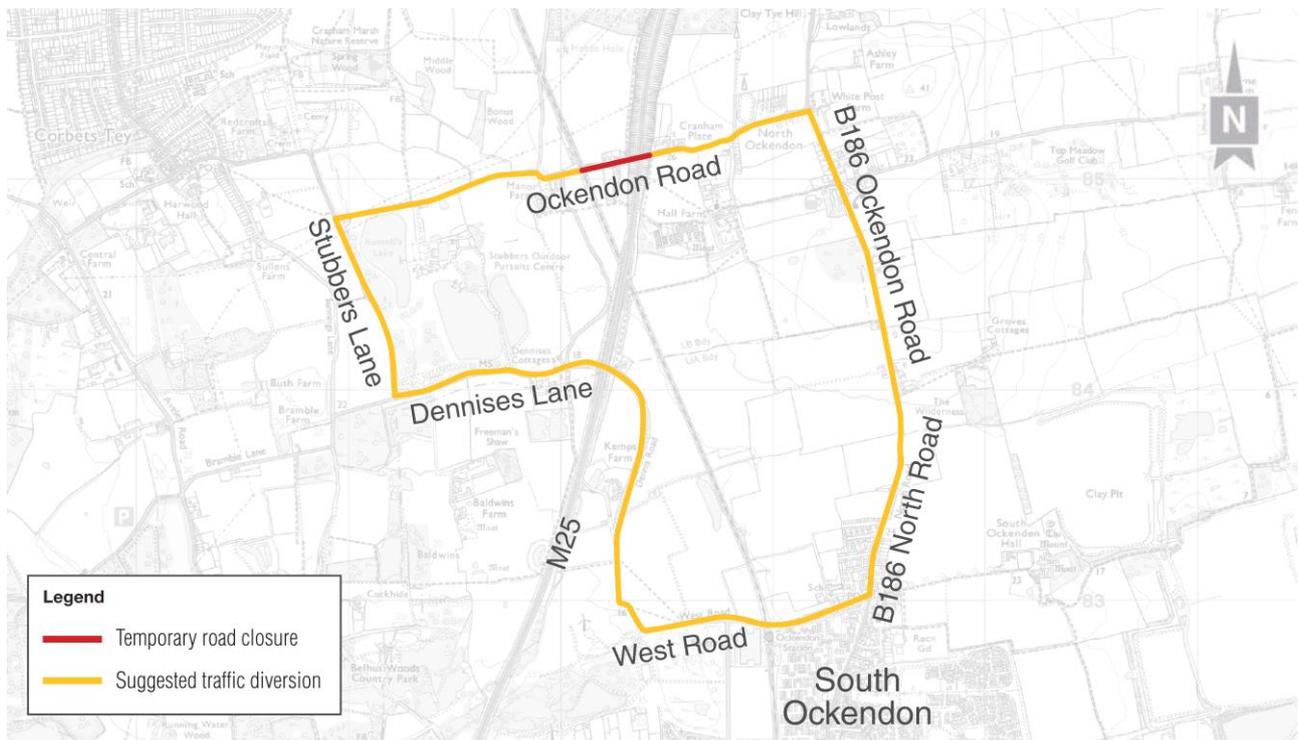


Plate 4.13 Ockendon Road possible diversion route



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5 Other considerations

5.1 Public Rights of Way management plan

- 5.1.1 Article 12, and Schedules 3 and 4 of the draft DCO (REF TBC) will list which PRowWs need to be provided with an alternative diversion route prior to the closure for construction purposes. In some cases, an alternative has been identified. In other cases, the DCO contains a provision which requires Highways England to provide reasonable access for pedestrians going to or from premises abutting a street or private means of access affected by the temporary closure, alteration, diversion or restriction of a street or private means of access under this article if there would otherwise be no such access.
- 5.1.2 Temporary diversion routes, where required, will be subject to engagement with the relevant authority to ensure the measures put in place are fully informed.

5.2 Adjacent roadworks and other traffic management

- 5.2.1 Table 5.1 highlights a number of significant projects that may have an interface with the construction of the Project.

Table 5.1 Adjacent projects

Road	Project	Interface
M25	M25 junction 28 Highways England junction improvement scheme	Overlapping traffic management installations Overnight closures and diversion route signing
M25 junction 29 / A127	Brentwood Enterprise Park	Localised junction improvements Overlapping traffic management installation Shared logistic/access routes
A1089 and Station road	Thurrock Flexible Generation Plant	Shared logistic/access routes
A2 / A1089	London Resort	Shared logistic/access routes with visitors Overlapping traffic management installations

- 5.2.2 The Traffic Management Forum is the forum by which the Project would share its proposals to enable integration with the projects highlighted in Table 5.1.

5.3 Significant events and seasonal traffic

- 5.3.1 As part of engagement, relevant authorities may highlight seasonal peaks and events that they consider require the removal of the traffic management.

5.4 Incident management

- 5.4.1 The Contractor delivering the works will have to comply with the Design Manual for Roads and Bridges GG 182 Major schemes: Enabling handover into operation and maintenance (Highways England), as well as operation throughout construction.

- 5.4.2 Part of the GG 182 requirements is the production of a DLOA that includes establishing the roles and responsibilities for incident management, looking at incident identification, response, and recovery.
- 5.4.3 Incident management for the SRN would be managed under the DLOA whereby should an incident occur, the division of responsibilities with respect to the management and mitigation of the incident is clearly stated.
- 5.4.4 Incident management for the LRN would be primarily managed by the local highway authority. However, through the development of any local operating agreements, the provision of mutual aid will be considered.

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References

Highways England (2020). Design Manual for Roads and Bridges, GG 182 Major schemes: Enabling handover into operation and maintenance. Revision 1. Accessed May 2021. <https://www.standardsforhighways.co.uk/dmrb/search/8027744b-971d-4ca7-ba6d-cf8fd03201af>

Department for Transport and Highways Agency (2009). Traffic Signs Manual Chapter 8 – Traffic Safety Measures and Signs for Road Works and Temporary Situations. Accessed May 2021.

https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/203669/traffic-signs-manual-chapter-08-part-01.pdf

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Glossary

Term	Explanation
M25	Orbital motorway, 17.8 miles (28.6 km) east south east of London's centre.
CRM	Customer relationship management
CA	Construction area or compound area
DCO	Development Consent Order
HGV	Heavy Goods Vehicle
LGV	Light Goods Vehicle
PRoW	Public Right of Way: A right possessed by the public, to pass along routes over land at all times. Although the land may be owned by a private individual, the public may still gain access across that land along a specific route. The mode of transport allowed differs according to the types of Public Right of Way, which consist of footpaths, bridleways and open and restricted byways.
TM	Traffic Management
TMP	Traffic Management Plan
oTMPfC	Outline Traffic Management Plan for Construction
NPSNN	National Policy Statement for National Networks
SoS	Secretary of State
CoCP	Code of Construction Practice
LRN	Local road network
SRN	Strategic road network
HS1	High Speed 1
NOMS	Network Occupancy Management System
NRSWA	New Roads and Street Works Act 1991
DLOA	Detailed Local Operating Agreement
DMRB	Design Manual for Roads and Bridges
TMF	Traffic Management Forum
MWC	Main works Contractors
LHA	Local highway authority
STAT	Statutory Bodies

Appendix A

A.1 Proposed traffic management measures

- A.1.1 This section lists the proposed traffic management measures across the Project (excluding hard-shoulder closures for access and localised highway gantry works on the SRN).
- A.1.2 Each traffic management measure is shown indicatively on a drawing. The drawings show the approximate location and extent of the measure as well as the ID.
- A.1.3 The corresponding tables in this section have six columns:
- a. TM ID – reference for each traffic measure (aligned to respective drawing)
 - b. Name – name of road or road section
 - c. Type – type of traffic management measures which include:
 - i. Closure – full carriageway closure of road
 - ii. Contraflow – typically traffic lights closing one half of the road
 - iii. Crossing point – where the haul routes bisect the local road network thereby requiring a crossing point to maintain flow for construction vehicles and public traffic (typically traffic lights)
 - iv. Lane closure – single lane closure on given road
 - v. Narrow lanes – maintaining same number of lanes (unless coupled with another measure) but with narrower lanes (generally on the SRN network with associated reduced speed limits)
 - vi. Switchover – where the alignment of the road is temporarily or permanently moved from one road alignment to another road alignment. The switchovers to temporary alignments are not envisaged to add more than a couple of minutes to the journey time (e.g. the road may need to be realigned to go around the overbridge works thereby increasing the length of the road by a few hundred meters). The switchovers to permanent alignments denote switching over to the proposed permanent alignment.
 - vii. Lane restrictions – exact traffic management measure is not yet known but it is likely that traffic flow would be maintained (i.e. the road would not be closed) however some restriction may be in place.
 - d. Description – very brief description of measure and works

- e. Estimated duration – the estimated duration the measure is in place for
- f. Phase – this has been provided to give an indication of when the measure would take place within the construction period. It should be noted that this information has been derived from the Project's transport model. This analysis simplified the construction programme into 11 phases. As a result, not all of the proposed traffic management measures align directly with a phase (e.g. a measure may be proposed for five months, but may be most closely aligned to a phase that lasts seven months, or vice versa)

A.1.4 Table A.1 shows the construction traffic phases created to model the proposed traffic management measures

Table A.1 Traffic model phases

Traffic Model Phases			
	From	To	Months
Phase 1	Jan-24	Aug-24	8
Phase 2	Sep-24	Feb-25	6
Phase 3	Mar-25	May-25	3
Phase 4	Jun-25	Oct-25	5
Phase 5	Nov-25	Mar-26	5
Phase 6	Apr-26	Aug-26	5
Phase 7	Sep-26	Mar-27	7
Phase 8	Apr-27	Nov-27	8
Phase 9	Dec-27	Mar-28	4
Phase 10	Apr-28	Jul-28	4
Phase 11	Aug-28	Dec-29	17

A.1.5 Plate A.1 to Plate A.2 (2 images) depict the approximate location and extents of the traffic management measures that are envisaged to be required on the road network for roads elements south of the river. Each traffic management measure has an associated ID, shown on the plates. Table A.2 (1 images) gives information for each of the traffic management measures relating to the roads south elements including the ID, name of the road/element, the type of traffic management measure, a brief description, the approximate duration of the measure and the traffic model phase when the works may be carried out.

Plate A.1 Roads South traffic management measures location plan (1 of 2)

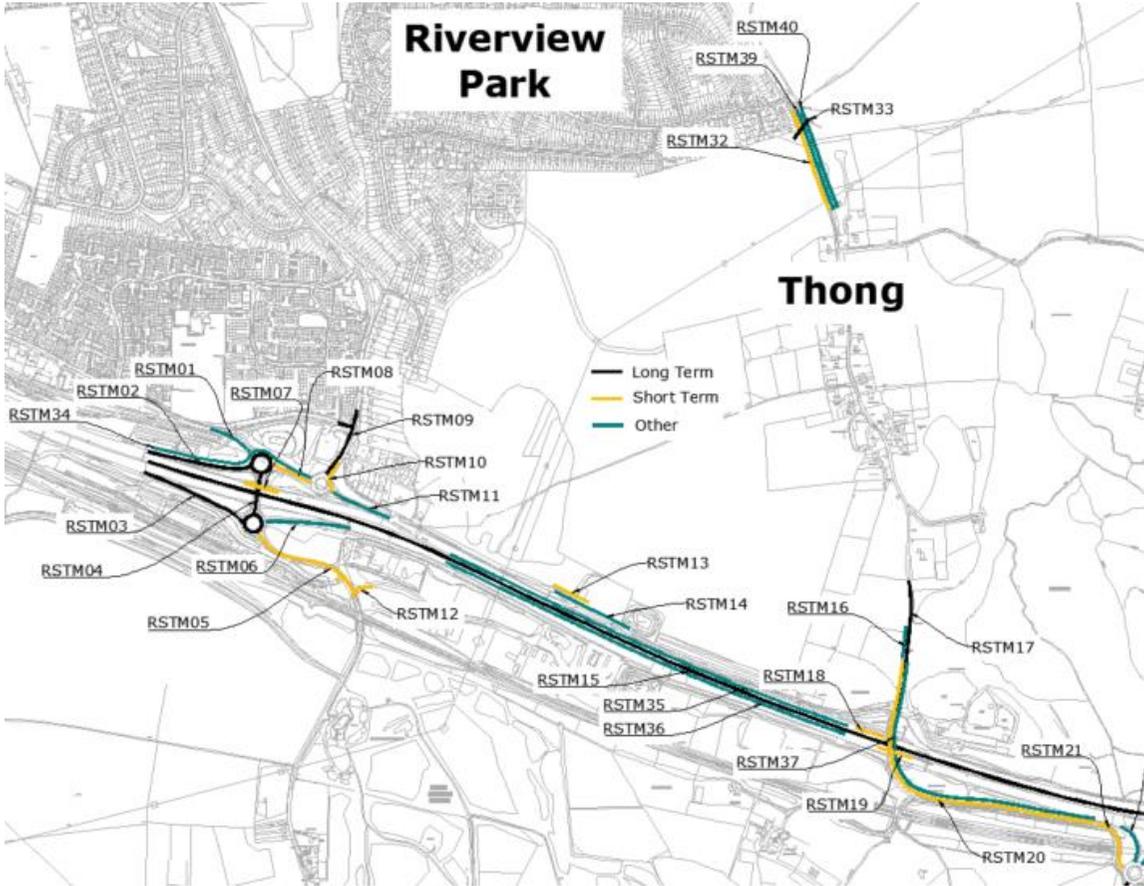


Plate A.2 Roads South traffic management measures location plan (2 of 2)

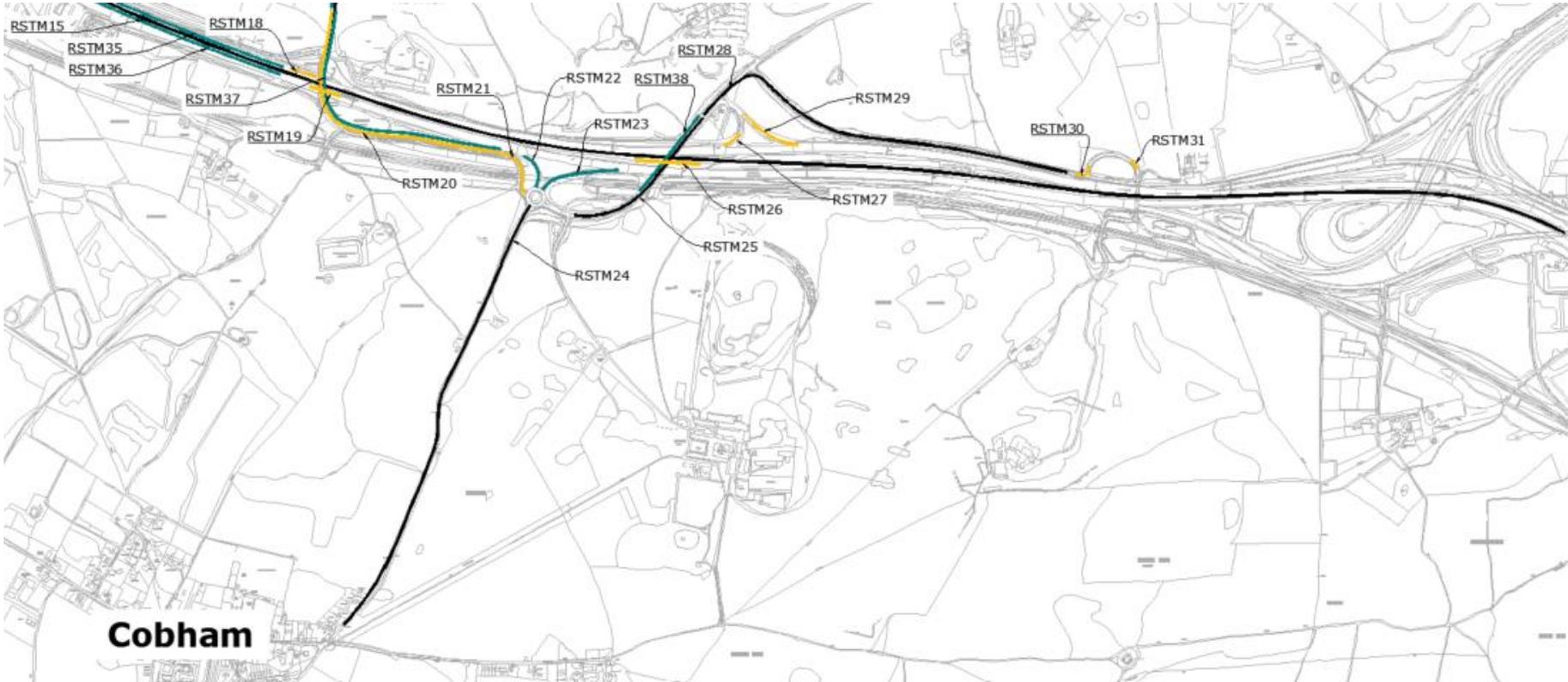


Table A.2 Roads South traffic management measures

TM ID	Name	Type	Description	Estimated Duration	Phase
RSTM01	Hever Ct Rd	Closures & lane restrictions	Carry out nearby works & modifications to local utility networks	2 Weeks	1
RSTM02	Gravesend East Junction (North)	Lane restrictions	Carry out nearby works & modifications to local utility networks	9 Months	1
RSTM03	Gravesend East Junction (South)	Lane restrictions	Carry out nearby works	14 Months	1,2
RSTM04	Gravesend East Junction (Bridge)	Lane restrictions	Carry out bridge widening & modifications to local utility networks	4	1
RSTM05	Henhurst Rd	Closures & lane restrictions	Carry out nearby works & modifications to local utility networks	Nights/Weekends	TBC
RSTM06	A2WB Off-Slip	Closure	Perm closure to new alignment	Nights/Weekends	TBC
RSTM07	A2	Closure	Bridge widening works	Nights/Weekends	TBC
RSTM08	Hever Ct Rd	Closure	Carry out nearby works & modifications to local utility networks	Nights/Weekends	TBC
RSTM09	Valley Drive	Contraflow	Modifications to local utility networks	6 Months	1
RSTM10	Valley Drive	Lane closure	Carry out nearby works & modifications to local utility networks	Nights/Weekends	TBC
RSTM11	A2EB On-Slip	Closure	Perm closure to new alignment & modifications to local utility networks	Nights/Weekends	TBC
RSTM12	Access	Closure	Carry out nearby works & modifications to local utility networks	Nights/Weekends	TBC
RSTM13	A2	Closure	New bridge works & modifications to local utility networks	Nights/Weekends	TBC
RSTM14	A2EB	H5 closure	Construction access works & modifications to local utility networks	2 Weeks	1
RSTM15	A2	Narrow lanes, 50mph	Carry out nearby works & modifications to local utility networks	24 Months	6,7,8,9,10
RSTM16	Thong Lane	Contraflow	Construction access works & modifications to local utility networks & installation of temporary compound CA02 connections	1 Week	1
RSTM17	Thong Lane	Contraflow	Modifications to local utility networks	1 Month	1
RSTM18	A2	Closure	New bridge works & modifications to local utility networks	Nights/Weekends	TBC
RSTM19	A2	Closure	Bridge demolition works & modifications to local utility networks	Nights/Weekends	TBC
RSTM20	Thong Lane	Closure	Carry out nearby works & modifications to local utility networks	Nights/Weekends	TBC
RSTM21	Thong Lane	Closure	Carry out nearby works & modifications to local utility networks	Nights/Weekends	TBC
RSTM22	A2WB On-Slip	Perm Closure	Perm closure to new alignment & modifications to local utility networks	N/A	TBC
RSTM23	A2WB Off-Slip	Perm Closure	Perm closure to new alignment & modifications to local utility networks	N/A	TBC
RSTM24	HalfPence Lane	Contraflow (300m sections)	Modifications to local utility networks	6 Months	1
RSTM25	Brewers Rd	Closure	Bridge works & modifications to local utility networks	19 Months	6,7,8
RSTM26	A2	Closure	Bridge demolition works	Nights/Weekends	TBC
RSTM27	A2EB Off-Slip	Closure	Carry out nearby works	Nights/Weekends	TBC
RSTM28	Brewers Rd & Park Pale	Contraflow	Modifications to local utility networks	6 Months	2,3
RSTM29	A2EB On-Slip	Closure	Carry out nearby works	Nights/Weekends	TBC
RSTM30	Park Pale	Closure	Carry out nearby works & modifications to local utility networks	Nights/Weekends	TBC
RSTM31	Park Pale	Contraflow	Carry out nearby works & modifications to local utility networks	Nights/Weekends	TBC
RSTM32	Thong Lane	Closure	Bridge works & modifications to local utility networks	Nights/Weekends	TBC
RSTM33	Thong Lane	Crossing Point	Allow construction vehicles to cross	Until access under overbridge	1,2,3,4,5,6,7
RSTM34	Gravesend East Junction (Northern Section)	Switchover	Switch to permanent alignment	Weekend	1
RSTM35	A2EB	Switchover	Switch to permanent alignment (maintaining No. of lanes)	Weekend	6
RSTM36	A2WB	Switchover	Switch to permanent alignment (maintaining No. of lanes)	Weekend	8
RSTM37	Thong Lane (Over A2)	Switchover	Switch to permanent alignment	Weekend	9
RSTM38	Brewers Road	Switchover	Switch to permanent alignment	Weekend	8
RSTM39	Thong Lane (Over LTC)	Switchover	Switch to permanent temp alignment	Weekend	4
RSTM40	Thong Lane (Over LTC)	Switchover	Switch to permanent alignment	Weekend	7

- A.1.6 Plate A.3 and Plate A.4 depict the approximate location and extents of the traffic management measures that are envisaged to be required on the road network for tunnel elements. Each traffic management measure has an associated ID, also shown on the plates. Table A.3 (1 images) gives information for each of the traffic management measures relating to the tunnel elements including the ID, name of the road/element, the type of traffic management measure, a brief description, the approximate duration of the measure and the traffic model phase when the works may be carried out.

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Plate A.3 Tunnel traffic management measures location plan (1 of 2)

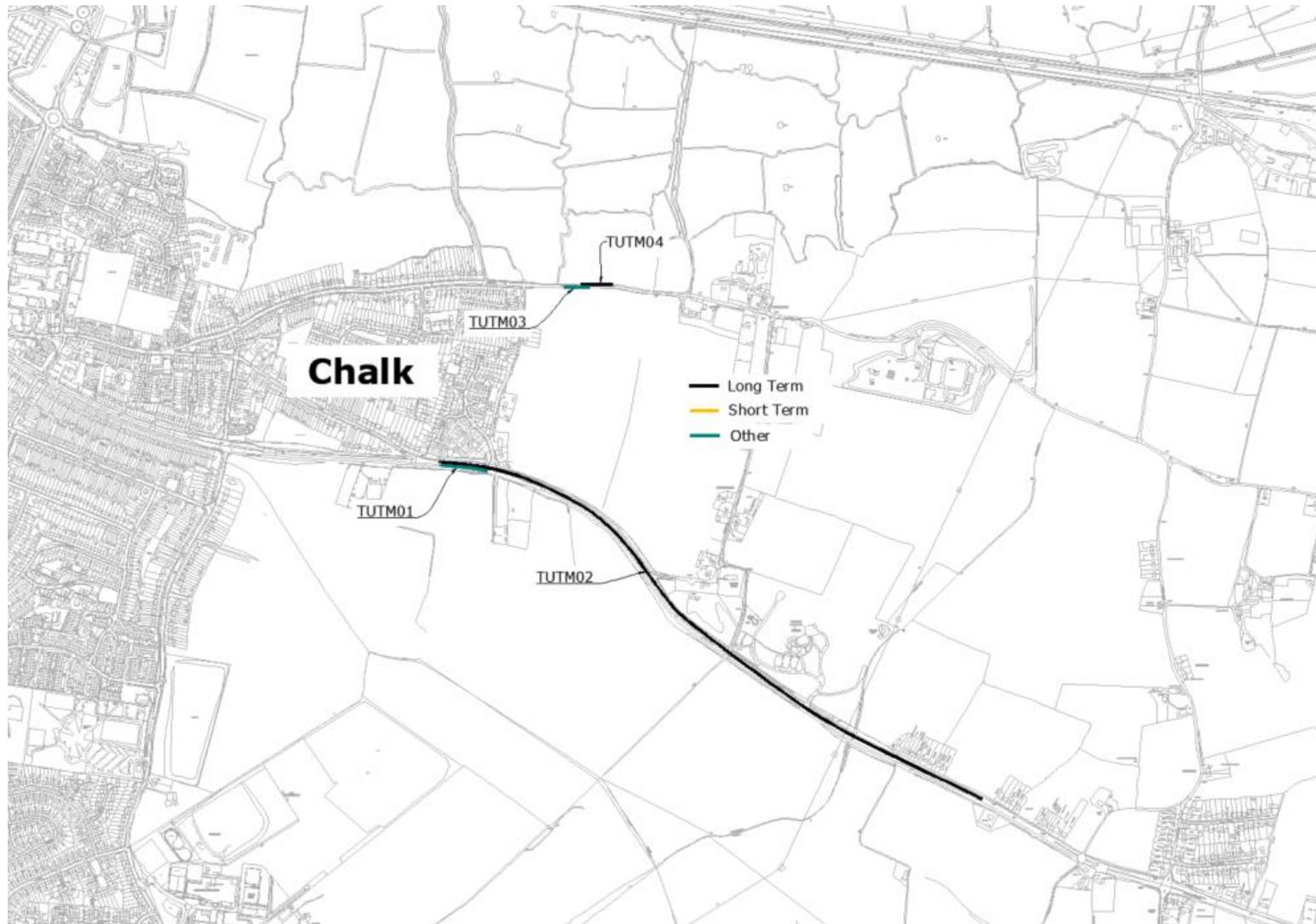


Plate A.4 Tunnel traffic management measures location plan (2 of 2)

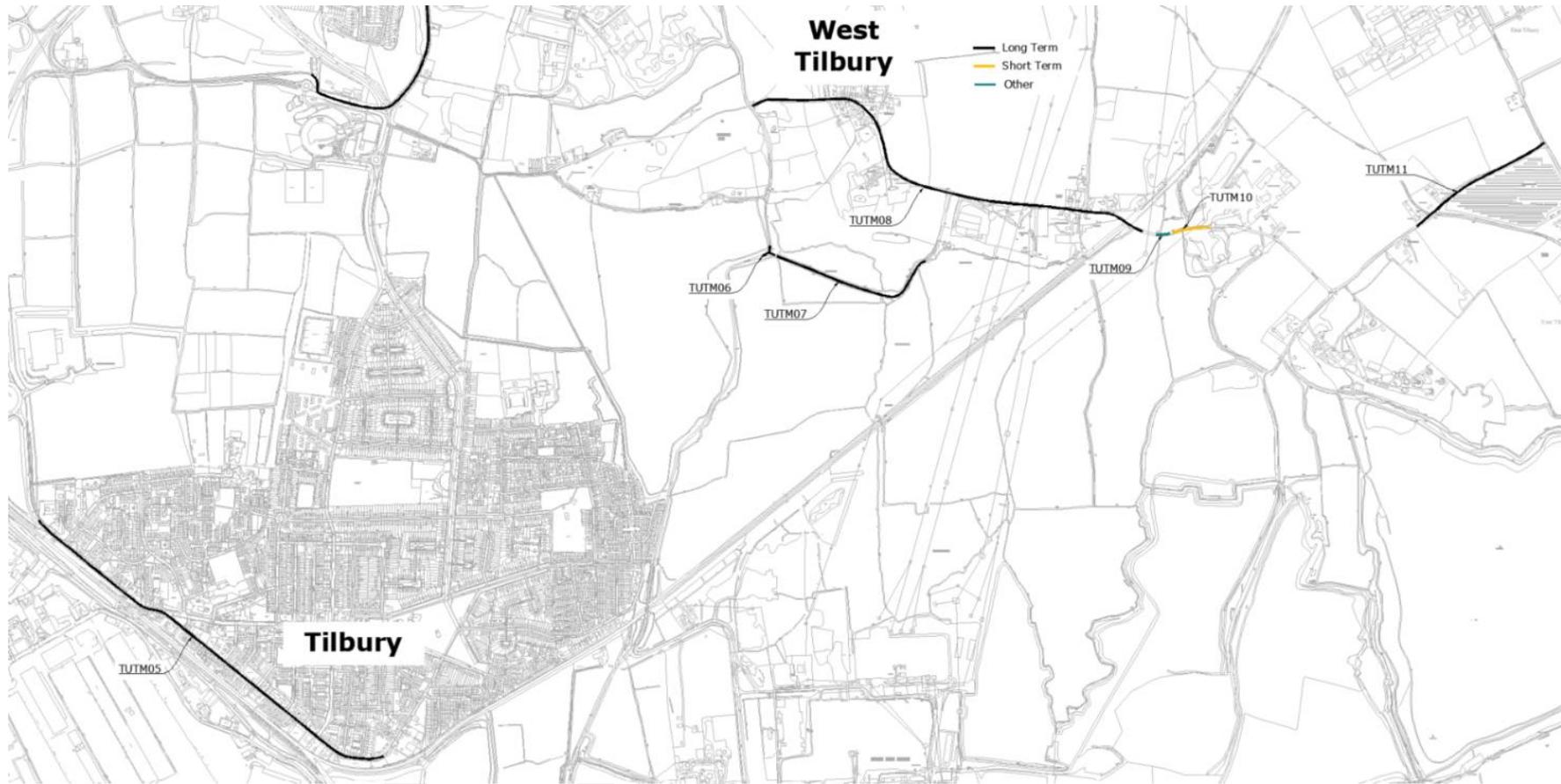


Table A.3 Tunnel traffic management measures

TM ID	Name	Type	Description	Estimated Duration	Phase
TUTM01	A226	Contraflow	Construction access works & modifications to local utility networks & installation of temporary compound CA03 & CA03a connections	4 Weeks	1
TUTM02	A226	Contraflow (300m sections)	Modifications to local utility networks	9 Months	2,3
TUTM03	Lower Higham Rd	Contraflow	Construction access works & modifications to local utility networks	2 Weeks	1
TUTM04	Lower Higham Rd	Contraflow	Modifications to local utility networks	2 Weeks	1
TUTM05	Dock Road	Contraflow (300m sections)	Installation of temporary compound CA05 connections	9 Months	1,2
TUTM06	Cooper Shaw Rd/Gun Hill/Fort Rd	3-Way lights	Modifications to local utility networks	2 Weeks	2
TUTM07	Cooper Shaw Road	Contraflow (300m sections)	Modifications to local utility networks	4 Months	2
TUTM08	Rectory Rd/Church Rd/Station Rd	Contraflow (300m sections)	Modifications to local utility networks & installation of temporary compound CA05 connections	9 Months	3,4
TUTM09	Station Rd	Contraflow	Construction access works & modifications to local utility networks & installation of temporary compound CA05 connections	4 Weeks	1
TUTM10	Station Rd	Contraflow	Carry out nearby works & removal of OHL equipment	Nights/Weekends	TBC
TUTM11	Love Lane/Princess Margaret Rd/Station Rd	Contraflow (300m sections)	Installation of temporary compound CA05 connections	2 Months	3

A.1.7 Plate A.5 to Plate A.11 (seven images) depict the approximate location and extents of the traffic management measures that are envisaged to be required on the road network for roads elements north of the river. Each traffic management measure has an associated ID, also shown on the plates. Table A.4 Table A.6 (three images) give information for each of the traffic management measures relating to the roads north elements including the ID, name of the road/element, the type of traffic management measure, a brief description, the approximate duration of the measure and the traffic model phase when the works may be carried out.

Plate A.5 Roads North traffic management measures location plan (1 of 7)

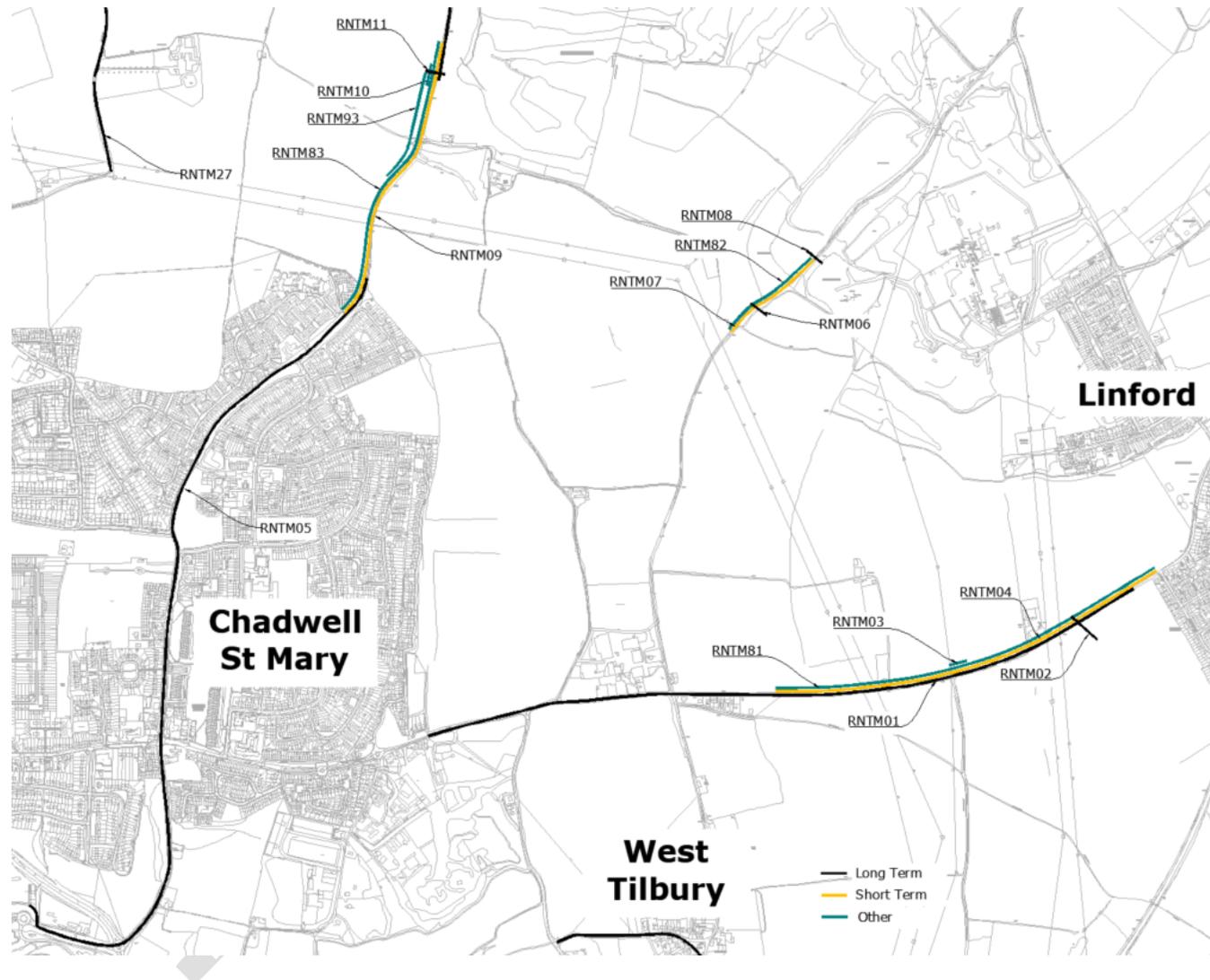


Plate A.6 Roads North traffic management measures location plan (2 of 7)

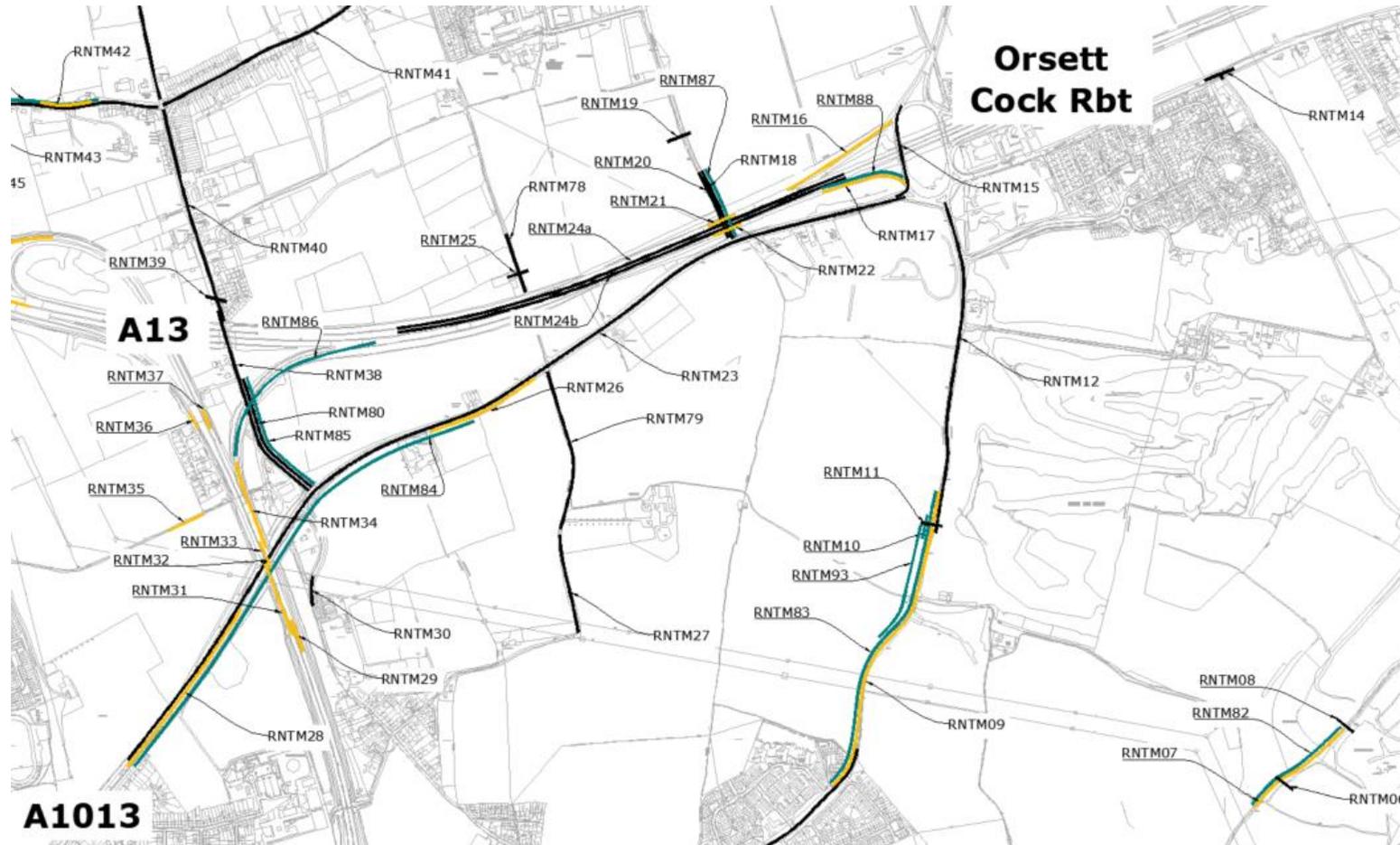


Plate A.7 Roads North traffic management measures location plan (3 of 7)

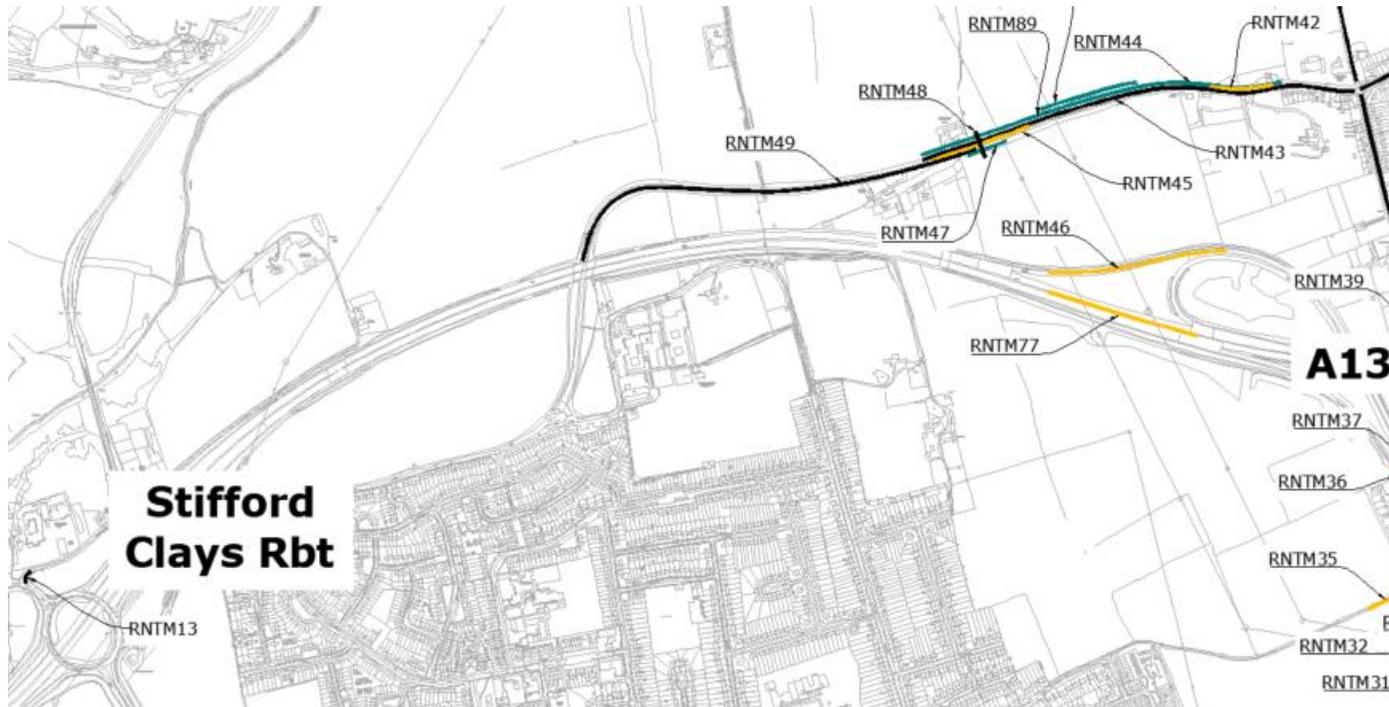


Plate A.8 Roads North traffic management measures location plan (4 of 7)

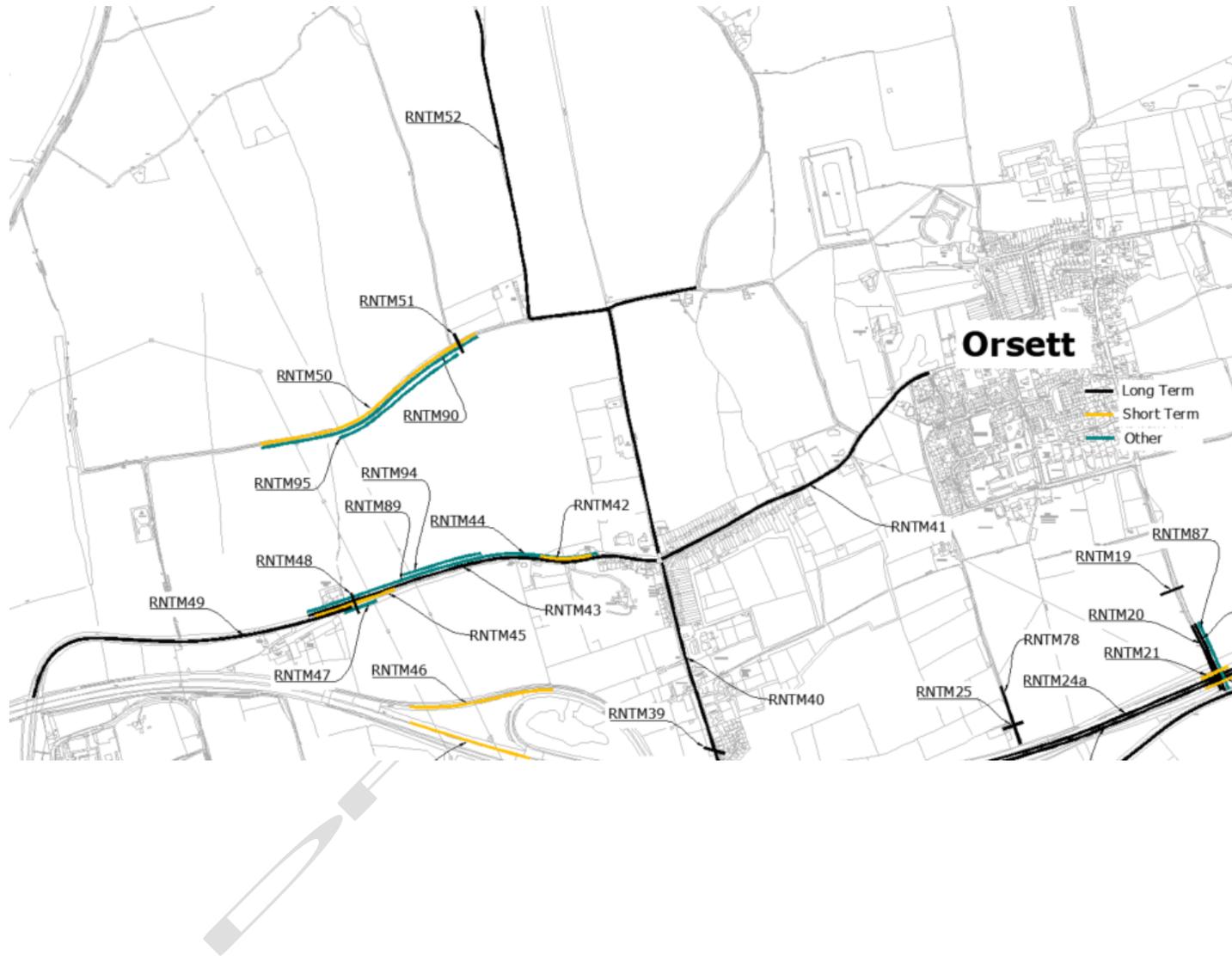


Plate A.9 Roads North traffic management measures location plan (5 of 7)

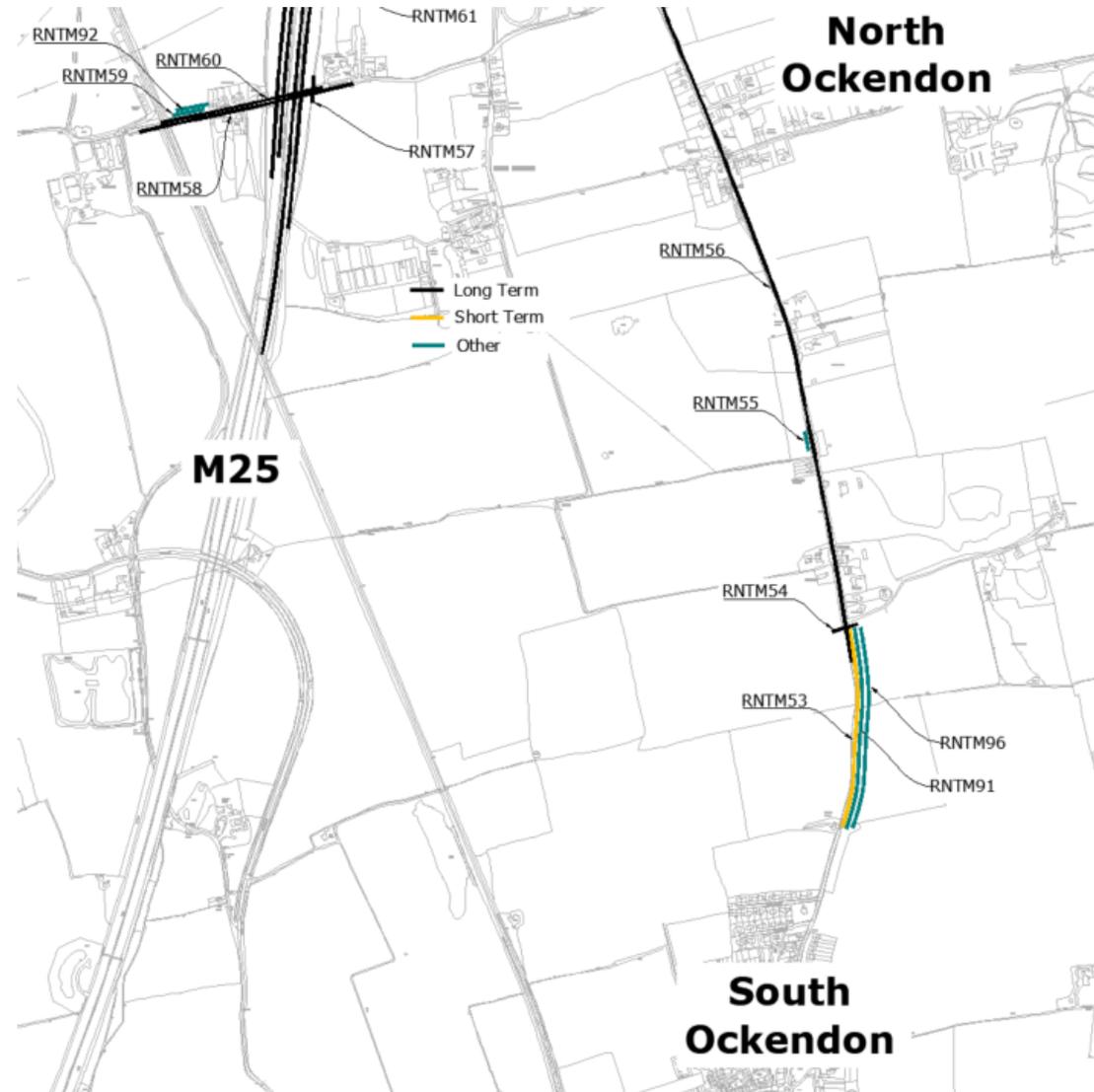


Plate A.10 Roads North traffic management measures location plan (6 of 7)

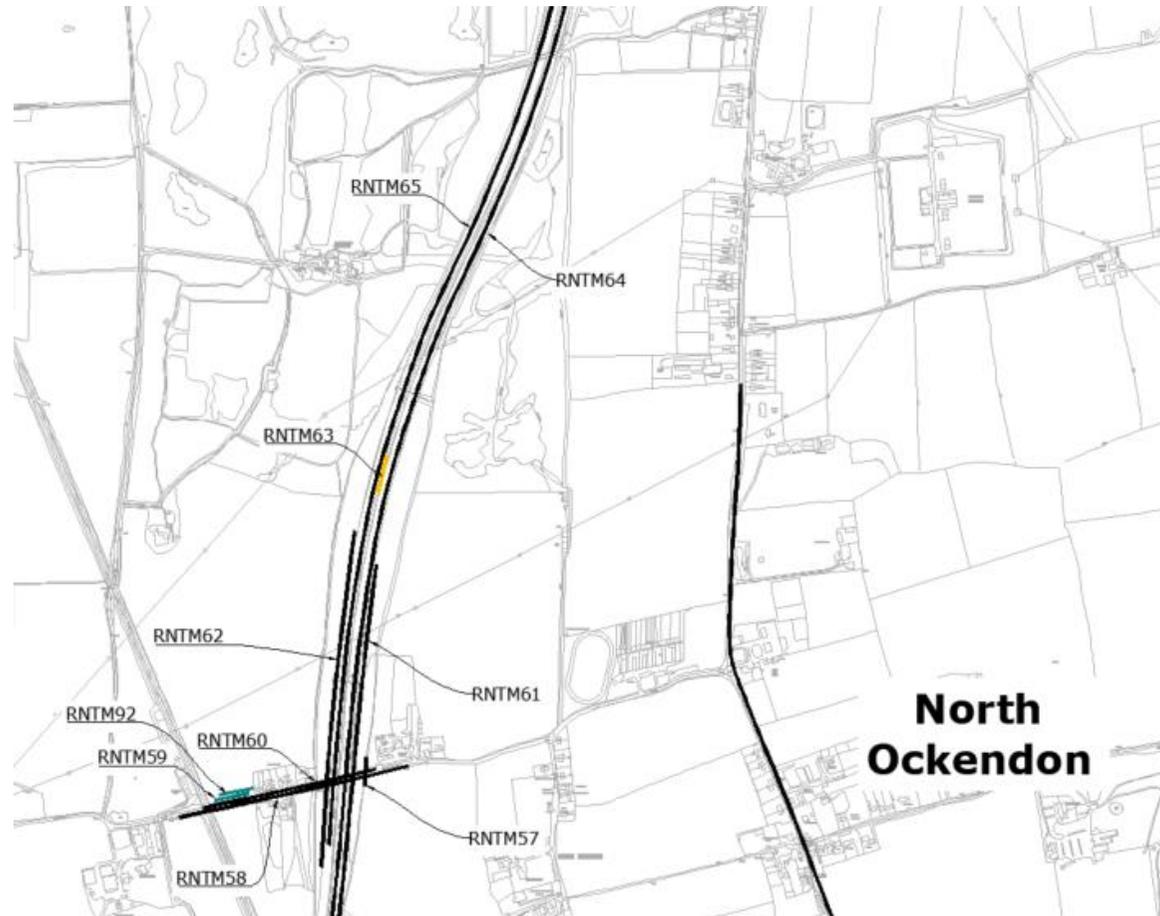


Plate A.11 Roads North traffic management measures location plan (7 of 7)

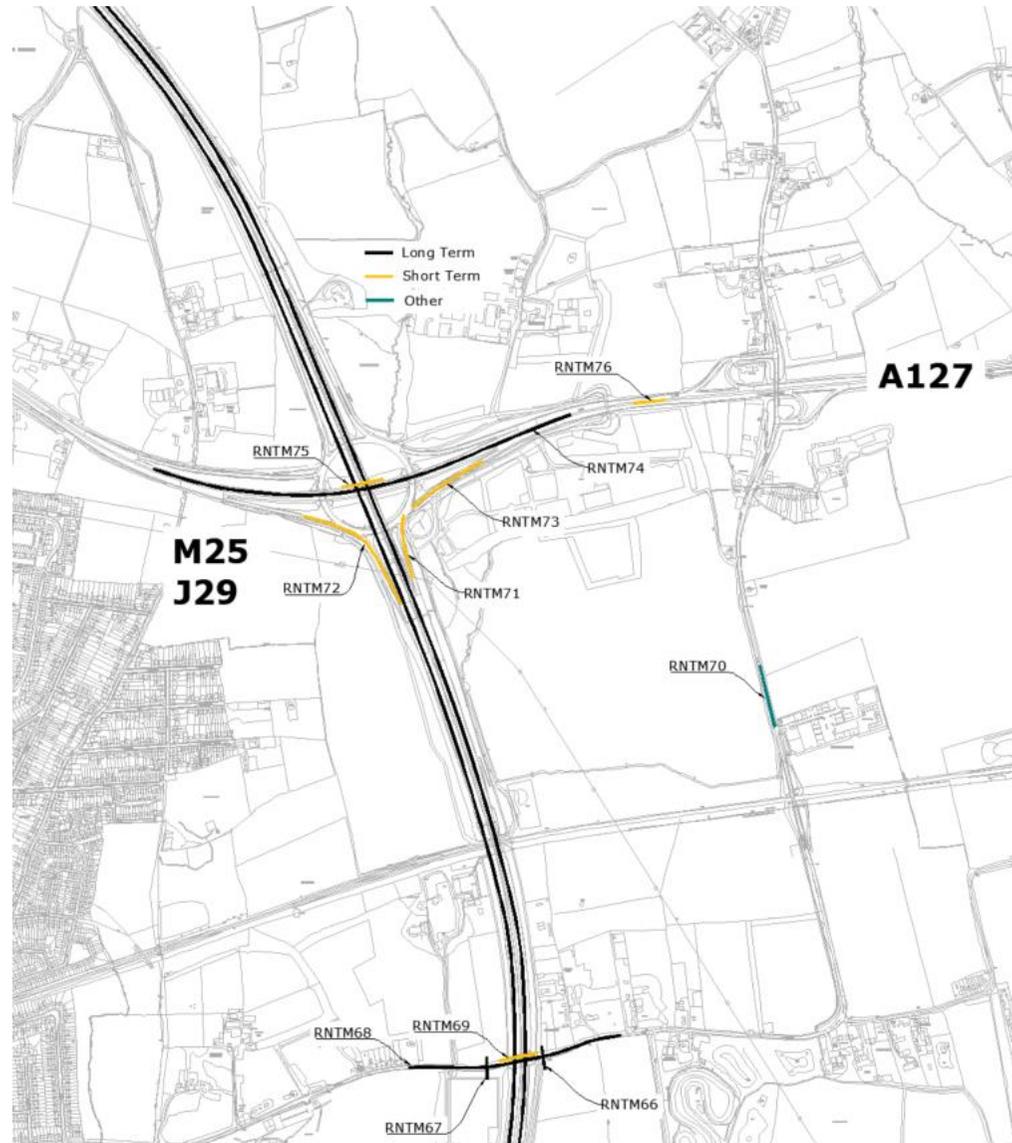


Table A.4 Roads North traffic management measures (1 of 3)

TM ID	Name	Type	Description	Estimated Duration	Phase
RNTM01	Muckingford Rd	Contraflow (300m sections)	Carry out nearby works & modifications to local utility networks	6 Months	3,4
RNTM02	Muckingford Rd	Crossing Point	Allow construction vehicles to cross	Until access under overbridge	1,2,3,4
RNTM03	Muckingford Rd	Contraflow	Construction access works & modifications to local utility networks	1 Week	1
RNTM04	Muckingford Rd	Closure	Bridge works & modifications to local utility networks	Nights/Weekends	TBC
RNTM05	Marshfoot Rd/Chadwell Hill/Brentwood Rd	Contraflow (300m sections)	Installation of new electricity network for Compounds CA06 to CA11	12 Months	1,2
RNTM06	Hoford Rd	Crossing Point	Allow construction vehicles to cross	Until access under overbridge	1,2,3,4,5,6
RNTM07	Hoford Rd	Closure	Bridge works & modifications to local utility networks	Nights/Weekends	TBC
RNTM08	Hoford Rd	Crossing Point	Allow construction vehicles to cross	Until access under overbridge	1,2,3,4,5,6
RNTM09	Brentwood Rd	Closure	Bridge works & modifications to local utility networks & installation of temporary compound CA06 connections	Nights/Weekends	TBC
RNTM10	Brentwood Rd	Contraflow	Construction access works & installation of temporary compound CA06 connections	4 Weeks	1
RNTM11	Brentwood Rd	Crossing Point	Allow construction vehicles to cross	Until access under overbridge	1,2,3,4,5,6
RNTM12	Brentwood Rd	Contraflow (300m sections)	Modifications to local utility networks & installation of temporary compound connections	6 Months	1
RNTM13	Medebridge Rd	Lane restrictions	Install traffic measures for construction vehicles	4 Months	1
RNTM14	A1013	Contraflow	Construction of a new permanent access & modifications to local utility networks	1 Month	1
RNTM15	Orsett Cock Rbt	Lane restrictions	Temporary modifications to local utility networks	1 Month x 2	3, 10
RNTM16	A13EB Off-Slip	Closure	Carry out nearby works	Nights/Weekends	TBC
RNTM17	A13WB On-Slip	Closure	Carry out nearby works	Nights/Weekends	TBC
RNTM18	Rectory Rd	Closure	Installation of new high pressure gas pipeline	2 weeks	2
RNTM19	Rectory Rd	Crossing Point	Allow construction vehicles to cross	Until access under overbridge	1,2,3,4,5,6,7,8,9
RNTM20	Rectory Rd	Closure	Bridge works	7 Months	9
RNTM21	A13	Closure	Bridge works	Nights/Weekends	TBC
RNTM22	A13	Closure	Bridge demolition works & modifications to local utility networks	Nights/Weekends	TBC
RNTM23	A1013	Contraflow	Carry out nearby works & modifications to local utility networks	8 Months	4,5
RNTM24a	A13EB	Narrow lanes, 60mph	Carry out nearby works	3 Months	10
RNTM24b	A13WB	Narrow lanes, 60mph	Carry out nearby works	3 Months	4
RNTM25	Mill Lane	Crossing Point	Allow construction vehicles to cross	Until A13EB tie in works	1,2,3,4,5,6,7,8,9,10
RNTM26	A1013	Closure	Carry out nearby works & modifications to local utility networks & installation of temporary compound CA07 connections	Nights/Weekends	TBC
RNTM27	Hornsby Lane	Perm closure	Perm closure to new alignment & modifications to local utility networks	N/A	1,2,3,4,5,6,7,8,9,10,11
RNTM28	A1013	Closure	Carry out nearby works	Nights/Weekends	TBC
RNTM29	A1089SB	Lane Closure	Carry out nearby works	Nights/Weekends	TBC
RNTM30	Heath Road	Lane restrictions	Carry out nearby works & modifications to local utility networks	1 Month	5
RNTM31	A1089NB	Lane closure	Carry out nearby works	Nights/Weekends	TBC
RNTM32	A1089	Closure	Bridge demolition works & removal of OHL equipment	Nights/Weekends	TBC
RNTM33	A1089	Closure	Bridge works & removal of OHL equipment	Nights/Weekends	TBC

Table A.5 Roads North traffic management measures (2 of 3)

TM ID	Name	Type	Description	Estimated Duration	Phase
RNTM34	A13WB to A1089SB	Closure	Carry out nearby works	Nights/Weekends	TBC
RNTM35	Long Lane	Closure	Carry out nearby works & modifications to local utility networks & installation of temporary compound CA08 connections	Nights/Weekends	TBC
RNTM36	A1089NB Off-Slip to A13WB	Closure	Bridge works	Nights/Weekends	TBC
RNTM37	A1089	Closure	Bridge works	Nights/Weekends	TBC
RNTM38	Baker Street	Closure	Carry out nearby works	16 Months	6,7,8
RNTM39	Baker Street	Crossing Point	Allow construction vehicles to cross	Until A13EB tie in works	1,2,3,4,5,6,7,8,9,10
RNTM40	Baker Street	Contraflow (300m sections)	Modifications to local utility networks	5 Months	7
RNTM41	High Road	Contraflow (300m sections)	Modifications to local utility networks & installation of temporary compound CA09 & CA10 connections	6 Months	1
RNTM42	Stifford Clays Rd	Closure	Carry out nearby works & modifications to local utility networks & installation of temporary compound CA09 & CA10 connections	Nights/Weekends	TBC
RNTM43	Stifford Clays Rd	Contraflow (300m sections)	Modifications to local utility networks & installation of temporary compound CA09 & CA10 connections	4 Months	1
RNTM44	Stifford Clays Rd	Contraflow	Construction access works & modifications to local utility networks & installation of temporary compound CA09 & CA10 connections	2 Weeks	1
RNTM45	Stifford Clays Rd	Closure	Carry out nearby works & modifications to local utility networks	Nights/Weekends	TBC
RNTM46	A13EB Off-Slip to A1089SB	Closure	Carry out nearby works & modifications to local utility networks	Nights/Weekends	TBC
RNTM47	Stifford Clays Rd	Contraflow	Construction access works & modifications to local utility networks	1 Week	1
RNTM48	Stifford Clays Rd	Crossing Point	Allow construction vehicles to cross	Until access under overbridge	1,2,3,4,5,6,7
RNTM49	Stifford Clays Rd	Contraflow (300m sections)	Modifications to local utility networks & installation of temporary compound CA09 connections	Nights/Weekends	1
RNTM50	Green Lane	Closure	Bridge works & modifications to local utility networks & installation of temporary compound CA09 connections	Nights/Weekends	TBC
RNTM51	Green Lane	Crossing Point	Allow construction vehicles to cross	Full period	1,2,3,4,5,6,7,8,9,10,11
RNTM52	Fen Lane/Green Lane	Closure (in sections)	Installation of temporary compound CA11 connections	9 Months	1,2
RNTM53	B186	Closure	Bridge works & modifications to local utility networks & installation of temporary compound CA13 & CA14 connections	Nights/Weekends	TBC
RNTM54	B186 North Road	Crossing Point	Allow construction vehicles to cross	Until access under overbridge	1,2,3,4,5,6,7
RNTM55	B186	Contraflow	Construction access works & modifications to local utility networks & installation of temporary compound CA13 & CA14 connections	4 Weeks	1
RNTM56	B186	Contraflow (300m sections)	Installation of temporary compound CA13 & CA14 connections	12 Months	1,2
RNTM57	Ockendon Rd	Crossing Point	Allow construction vehicles to cross	Full period	1,2,3,4,5,6,7,8,9,10,11
RNTM58	Ockendon Rd	Closure	Bridge works & earthworks logistics route & modifications to local utility networks	19 Months	4,5,6,7
RNTM59	Ockendon Rd	Contraflow	Construction access works & modifications to local utility networks & installation of temporary compound CA15 connections	2 Weeks	1
RNTM60	Ockendon Rd	Contraflow	Modifications to local utility networks & installation of temporary compound CA15 connections	6 Months x 2	1,6
RNTM61	M25SB	Narrow lanes	Construction access works	7 Months	3,4
RNTM62	M25NB	Narrow lanes	Construction access works	7 Months	3,4
RNTM63	M25	Closure	Bridge works & removal of OHL equipment	Nights	TBC
RNTM64	M25SB	Narrow lanes, 60mph	Carry out nearby works	38 Months	4,5,6,7,8,9,10
RNTM65	M25NB	Narrow lanes, 60mph	Carry out nearby works	28 Months	5,6,7,8,9,10
RNTM66	St Marys Lane	Crossing Point	Allow construction vehicles to cross	Full period	1,2,3,4,5,6,7,8,9,10,11

Table A.6 Roads North traffic management measures (3 of 3)

TM ID	Name	Type	Description	Estimated Duration	Phase
RNTM67	St Marys Lane	Crossing Point	Allow construction vehicles to cross	Full period	1,2,3,4,5,6,7,8,9,10,11
RNTM68	St Marys Lane	Contraflow	Carry out nearby works & modifications to local utility networks	9 Months	2,3
RNTM69	St Marys Lane	Closure	Bridge works & modifications to local utility networks	Nights/Weekends	TBC
RNTM70	B186	Contraflow	Construction access works & modifications to local utility networks	4 Weeks	1
RNTM71	M25SB On-Slip	Closure	Carry out nearby works	Nights/Weekends	TBC
RNTM72	M25NB Off-Slip	Closure	Carry out nearby works	Nights/Weekends	TBC
RNTM73	A127WB Off-Slip	Closure	Carry out nearby works	Nights/Weekends	TBC
RNTM74	A127	Narrow lanes, 50mph	Carry out nearby works & modifications to local utility networks	27 Months	4,5,6,7,8
RNTM75	A127	Closure	Bridge works & modifications to local utility networks	Nights/Weekends	TBC
RNTM76	A127	Closure	Bridge works & modifications to local utility networks	Nights/Weekends	TBC
RNTM77	A13	Closure	Modifications to local utility networks	Nights/Weekends	TBC
RNTM78	Mill Lane	Closure	Modifications to local utility networks	2 Weeks	2
RNTM79	Hornsby Lane	Contraflow (300m sections)	Modifications to local utility networks	2 Months	2
RNTM80	Baker Street	Contraflow (300m sections)	Modifications to local utility networks	6 Months	1,2
RNTM81	Muckingford Rd	Switchover	Switch to permanent alignment	Weekend	4
RNTM82	Hoford Rd	Switchover	Switch to permanent alignment	Weekend	6
RNTM83	Brentwood Rd	Switchover	Switch to permanent alignment	Weekend	7
RNTM84	A1013	Switchover	Switch to permanent alignment	Weekend	9
RNTM85	Baker Street	Switchover	Switch to permanent alignment	Weekend	8
RNTM86	A13WB to A1089SB	Switchover	Switch to permanent alignment	Weekend	4
RNTM87	Rectory Rd	Switchover	Switch to permanent alignment	Weekend	9
RNTM88	A13WB On-Slip	Switchover	Switch to permanent alignment	Weekend	4
RNTM89	Stifford Clays Rd	Switchover	Switch to permanent alignment	Weekend	7
RNTM90	Green Lane	Switchover	Switch to permanent alignment	Weekend	8
RNTM91	B186 North Road	Switchover	Switch to permanent alignment	Weekend	8
RNTM92	Ockendon Rd	Switchover	Switch to permanent alignment	Weekend	7
RNTM93	Brentwood Rd	Switchover	Switch to permanent temp alignment	Weekend	4
RNTM94	Stifford Clays Rd	Switchover	Switch to permanent temp alignment	Weekend	5
RNTM95	Green Lane	Switchover	Switch to permanent temp alignment	Weekend	6
RNTM96	B186 North Road	Switchover	Switch to permanent temp alignment	Weekend	4

Appendix B

B.1 Construction and utilities works on local road network

- B.1.1 The tables below show the indicative construction activities for the local roads south of the River Thames and north of the River Thames respectively. 'Main works' are related to construction elements associated with the permanent designed scheme (including earthworks, structures, roads, drainage etc). 'Utility' are works related to both the temporary utility works (e.g. temporary power to compounds) and the permanent utility works (e.g. diversion of assets, permanent power to the tunnels etc). There are many utility networks across the Project which require temporary and/or permanent diversion to allow main construction works to proceed (e.g. power, gas, foul sewers, water, communications etc).
- B.1.2 The table below shows indicative construction activities on/near the local road network (south of the River Thames).

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Table B.1 Indicative Construction Activities on/near the local road network (south of the River Thames).

Road	Main works location	Main works construction information (indicative)	Nearby utility information (indicative)
Thong Lane	Bridge over A2	<p>A new proposed green bridge to the west of the existing bridge is proposed. The foundation for the bridge can be constructed offline without impacting the existing Thong Lane. It should be noted that construction vehicles would use Thong Lane between CA2 and Halfpence Lane roundabout for a period of time to access the works between the A2 and HS1. Construction HGVs would be banned from use through Thong village (between CA2 access and the A226) other than for specific utility works.</p> <p>While the main access to CA2 would be via the A2, staff would be able to access via Thong Lane (it is likely local workforce may use the Thong Lane access if more convenient whereas staff coming from further would generally use the A2 access).</p> <p>In order to tie-in the new structure to the existing road a weekend closure or similar of Thong Lane (starting approximately 300m north of the A2, to the A2) would be required.</p>	<p>Diverting and installation of utility networks would require areas of Thong Lane beyond the new structure, both north and south, in which to connect to the existing networks to be utilised. Compound supplies for CA2 are envisaged to be provided from the Inn On The Lake area and require the area north of the Thong Lane Bridge for a period of time to install the new assets. These works would require the use of traffic lights and single lane closures to control traffic around the works area.</p>
Thong Lane	Between Halfpence Lane and A2	<p>Thong Lane is proposed to be realigned in this location which would connect Halfpence Lane roundabout and the new Thong Lane structure over the A2. In order to access the works, Thong Lane would be used between CA2 Halfpence Lane roundabout. The new alignment is mostly offline, meaning the majority of work would not affect Thong Lane in this location.</p> <p>Several night and/or weekend closures would be required to complete the tie-in works for both the temporary and permanent alignments during the construction period.</p>	<p>It is envisaged that the associated diverting and installation of utility networks would be completed at the same time as the construction of the new infrastructure to ensure network connectivity and customer supply.</p>

Road	Main works location	Main works construction information (indicative)	Nearby utility information (indicative)
Thong Lane	Bridge Over Lower Thames Crossing	<p>A new large green bridge is proposed across the Project alignment. To construct the structure a temporary realignment of Thong Lane to the north would be required approximately between Shorne Ifield Road and Southern Valley Golf Club entrance.</p> <p>A few night/weekend or similar closures would be required for tie-in works for both the temporary realignment and permanent new alignment over the green bridge during the construction period.</p> <p>Access across Thong Lane at this location would also be required to allow movement of material across the site. Temporary traffic signals or similar would be installed on Thong Lane to allow construction traffic to cross Thong Lane throughout the construction period. It is however planned that the majority of the works south of Thong Lane would use the A2 and the works north of Thong Lane would use the A226, thereby limiting movements across Thong Lane.</p> <p>Access to the works around this area would be via offline haul routes and not via Thong Village or Riverview Park.</p>	<p>To maintain utility network connections within the area, assets would be diverted into the new green bridge. To connect them to the existing networks, works areas will be required north and south of the existing and proposed structure for a period of time. This would be completed via single lane closures and traffic lights.</p> <p>Two high pressure gas pipelines would be diverted under Thong Lane and there are currently overhead power lines located on pylons over Thong Lane that would require diverting. It is currently envisaged that works to these assets will not impact the use of Thong Lane, however short-term night and/or weekend closures may be required on the grounds of safety to complete these works.</p>
Brewers Road	Bridge Over A2	<p>A replacement bridge is proposed at the Brewers Road bridge. Due to constraints, the existing bridge would need to be demolished before constructing the replacement. As a result access over the A2 would be closed at this location for approximately 19 months with a diversion route in place. The eastbound slips on and off the A2 would remain open other than for specific works which would require night and/or weekend closures.</p>	<p>To maintain utility network connections within the area, assets would be diverted into the new bridge permanently, but will temporarily be diverted out of the area of demolition and construction. To connect them to the existing networks, works areas would be required north and south of the existing and proposed structure for a period of time prior to the bridge works commencing. These areas would be</p>

Road	Main works location	Main works construction information (indicative)	Nearby utility information (indicative)
		The diversion route would likely be via Three Crutches roundabout.	controlled using traffic lights and single lane closures.
Valley Drive	Valley Drive Roundabout	No significant works are proposed on Valley Drive or the Valley Drive roundabout other than minor realignment works. Access to the A2 eastbound from the Valley Drive roundabout would be maintained although would need to be closed for a weekend or similar to allow the switch from the current alignment to the new proposed alignment.	There is a significant amount of utility infrastructure around the southern end of Valley Drive that would need to be relocated to ensure it is operational when the Project is complete; as such, areas of the highway boundary are likely to be restricted for use. For safety reasons, Valley Drive and the A2 eastbound on-slip may have lane reduction and traffic measures in place to complete some of the works.
Hever Court Road	North-west arm of Gravesend East junction north roundabout	Minor works are required to Hever Court Road where it connects into the northern roundabout of the Gravesend East junction. Traffic restrictions would be required to carry out these works in the form of lane restrictions and short-term closures.	All required utility works would be considered as part of the main works for the installation and reconnection of utility networks.
Henhurst Road	Between HS1 and Gravesend East junction southern roundabout	Works are required to Henhurst Road between the point it goes over HS1 and the southern roundabout of the Gravesend East junction. Henhurst Road would stay open other than for a few specific works which may require weekend or similar short-term closures.	All required utility works would be considered as part of the main works for the installation and reconnection of utility networks. There are currently overhead power lines located on pylons over Henhurst Road that would require works associated with the diversion over the A2. It is currently envisaged that works to these assets would not impact the use of Henhurst Road, however night and/or weekend closures may be required on the grounds of safety to complete these works.

Road	Main works location	Main works construction information (indicative)	Nearby utility information (indicative)
Park Pale	At U-bend near Park Pale bridge	<p>Minor works are required to Park Pale which involve altering an access. Park Pale may require a night or weekend closure for tie-in works but would otherwise be largely unaffected during the construction period by main works.</p>	<p>Installation of a gas pipeline would be installed using traffic lights and single lane closure moving along the road with the works area. This is envisaged to take 6 months.</p> <p>Albeit not envisaged, night and/or weekend closures may be required on the grounds of safety to complete these works.</p>
Gravesend East junction	A2 junction	<p>The northern roundabout and associated slips are proposed to be widened including the bridge over the A2.</p> <p>The northern roundabout and associated works are scheduled to take place early in the programme and would take approximately nine months to complete. The works would require traffic restrictions in the form of lane restrictions however the roundabout would remain open other than for specific works which may require night and/or weekend closures.</p> <p>Similarly, the bridge over A2 would remain open other than for specific works which may require night and/or weekend closures.</p> <p>The southern roundabout would be constructed in phases, and as such would likely be worked on throughout construction (generally at the start and then at the end). The roundabout would remain open other than for certain specific works which may require night and/or weekend closures. Due to the need to phase the works for the southern roundabout and associated elements it may be the case that activity levels fluctuate throughout construction, which would mean periods of little work and periods of substantial work. Access on</p>	<p>There is a significant amount of utility infrastructure around the southern end of Valley Drive that would need to be relocated to ensure it is operational when the Project is complete; as such, areas of the highway boundary are likely to be restricted for use. For safety reasons, Valley Drive and the A2 eastbound on-slip may have lane reduction and traffic measures in place to complete some of the works.</p>

Road	Main works location	Main works construction information (indicative)	Nearby utility information (indicative)
		and off the A2 from the southern roundabout would be maintained throughout other than for specific tie-in works which would require night, weekend or similar closures.	
A226 / Gravesend Road	Mainly between St Marys Church and Chalk Road	<p>A works access would be required off the A226 into and out of site (CA3). Traffic signals may be required to allow construction traffic and public traffic to be managed. It is proposed that access into site would be off the A226 via a left turn and exit would be vice versa (right turn only out of site onto the A226).</p> <p>It should be noted that two other smaller construction sites are proposed (CA3a and CA3b) which would require access using the local road access, namely Lower Higham Road, Milton Road, Ordnance Road, Canal Road and Norfolk Road.</p>	Compound utility connections and required diversions would be completed under traffic lights and single lane closures that move with the works area.
Halfpence Lane	From Brewers Road Roundabout South	N/A	Installation of foul water pipeline would be installed using traffic lights and single lane closure moving along Halfpence Lane with the works area. This is envisaged to take a couple of months.

B.1.3 The table below shows indicative construction activities on/near the LRN (north of River Thames).

Table B.2 Indicative construction activities on/near the LRN (north of River Thames).

Road	Main works location	Main works construction information (indicative)	Nearby utility information (indicative)
Fort Road	Entire road	<p>Fort Road would be used to access worksites between the River Thames and the Tilbury Loop railway line, namely the works associated with the tunnel bores. The bulk of the traffic movements would use the stretch of Fort Road south of the Tilbury Loop railway line, with a construction haul route created from Fort Road to worksites.</p> <p>The section of Fort Road to the north of the Tilbury Loop railway line would be a secondary access which would allow access to the sites between the River Thames and the Tilbury Loop railway line via Station Road.</p>	Utility compound connections would be completed under traffic lights and single lane closures.
Station Road	Section between Church Road and intersection with Love Lane	<p>Station Road would be used as a secondary access to the worksites between Tilbury Loop railway line and the River Thames. Station Road has a level crossing and is not suitable for a large number of vehicle movements, therefore the main access to the worksites south of Tilbury Loop railway line would be via Fort Road and a temporary construction haul route. Station Road would initially be used for site setup prior to construction of the temporary haul route and consequently used mainly for staff access rather than for larger vehicles. The temporary haul route is programmed to be constructed very early in the programme, therefore the usage of Station Road by HGVs is envisaged to be limited.</p>	Utility diversions would be completed using traffic lights and single lane closures.
Princess Margaret Road	Entire road	There is no intention to use the road as a construction route for HGVs other than possibly for emergency access should it be required.	A crossing of the highway may be required and could be undertaken on a weekend using traffic lights and single lane closures.

Road	Main works location	Main works construction information (indicative)	Nearby utility information (indicative)
Love Lane	Princess Margaret Road to site	N/A	Road closure would be required for the installation of compound supplies. Closure would be required as Love Lane is too narrow to safely pass works area.
Muckingford Road	Intersection with Hoford Road to the Princess Margaret Road roundabout	<p>Muckingford Road would be used for initial access to the area prior to the construction of the offline haul routes. Traffic volumes using the route would be low as they would mainly be facilitating site setup and the construction of the offline haul routes. The access is not intended to be used to facilitate main civil works (e.g. the Muckingford Road overbridge). Once the haul routes are in the place, construction traffic volumes would increase but use the offline routes. The offline routes would intersect Muckingford Road and would need a crossing point.</p> <p>Traffic lights or similar would be installed on Muckingford Road to allow construction traffic to cross. The traffic signals would be in place until the new overbridge is constructed. Once the Muckingford Road overbridge is constructed and opened, the traffic lights would be removed and construction traffic would be able to cross under the new bridge.</p> <p>Traffic management measures (in the form of contraflow) would be required for a period of time to allow Muckingford Road to be widened where the new bridge ties into the existing and for the proposed WCH route. The traffic management may involve the installation of traffic signals to allow a one-way system.</p> <p>Muckingford Road would also be closed for a weekend or similar at the location of the new bridge for tie-in</p>	<p>Diverting and installation of utility networks would require areas of Muckingford Road beyond the new structure, both east and west, in which to connect to the existing networks to be utilised. Multiple crossings of the highway may be required and could be undertaken using traffic lights and single lane closures.</p> <p>There are currently overhead power lines located on pylons over Muckingford Road that would require works associated with the diversions. It is currently envisaged that works to these assets would not impact the use of Muckingford Road, however night closures may be required on the grounds of safety to complete these works.</p>

Road	Main works location	Main works construction information (indicative)	Nearby utility information (indicative)
		works of the new overbridge but otherwise would remain open throughout construction.	
Brentwood Road	Between Orsett Cock roundabout and the Project alignment	<p>The stretch of Brentwood Road would be used for construction traffic to access the worksite (CA6) and also to access the temporary offline haul routes. Once they meet the Project alignment, construction vehicles would either go north or south of the temporary offline haul routes to access the worksites. Construction HGV traffic would not go further south than the proposed new Brentwood Road overbridge i.e. would not go through the residential areas of Chadwell St Mary.</p> <p>The stretch between the Orsett Cock junction and the Project alignment would be heavily used for the duration of the Project.</p> <p>Traffic signals or similar would be required to manage the construction and public traffic at the location where the offline haul routes meet the road.</p> <p>Brentwood Road would need a slight alignment change to facilitate works on the bridge. As such, Brentwood Road would be closed for a number of weekends to tie-in the temporary alignment and also subsequently tie-in the permanent alignment. Other than these infrequent weekend closures, the road would remain open.</p>	<p>Diverting and installation of utility networks would require areas of Brentwood Road beyond the new structure, both north and south, in which to connect to the existing networks to be utilised.</p> <p>There are currently overhead power lines located on pylons over Brentwood Road that would require works associated with the diversions.</p> <p>These works are likely to be managed via the use of traffic lights and single lane closures, however short-term closures may be required on the grounds of safety to complete these works.</p>
Brentwood Road, Chadwell Hill & Marshfoot Road	Brentwood Road, Lower Thames Crossing south	N/A	Installation of compound electricity supplies potentially requires the use of traffic lights and single lane closure for 12 months. Lane closure would move along the alignment with the works.
Hornsby Lane	Intersection with Project alignment	Hornsby Lane is proposed to be stopped up either side of the new road. Hornsby Lane is planned to be stopped	Modifications to the local utility networks would be required which

Road	Main works location	Main works construction information (indicative)	Nearby utility information (indicative)
		<p>up early in the construction programme with a turning arrangement constructed prior to closing to allow vehicles to turn around.</p>	<p>may require lane narrowing and traffic lights around the works area on the grounds of safety. These are proposed in the period that Hornsby Lane would be stopped up.</p> <p>There are currently overhead power lines located on pylons over Hornsby Lane that would require works associated with the diversions. It is currently envisaged that works to these assets would not impact the use of the Hornsby Lane turnaround, however night closures may be required on the grounds of safety to complete these works.</p>
Heath Road	<p>Approximate stretch from A1013 and 250m south of A1013 (where overhead pylons are)</p>	<p>The alignment of Heath Road in this stretch is proposed to be slightly altered with the access to the A1013. Heath Road would remain open for the duration of construction as would its connection with the A1013 in some form other than for specific tie-in works which would require weekend or similar closures.</p>	<p>Local works would be required to the utility networks within this area. There are currently overhead power lines located on pylons over Heath Road that would require works associated with the diversions.</p> <p>These works are likely to be managed via the use of traffic lights and single lane closures, however short-term closures may be required on the grounds of safety to complete these works.</p>
A1013 / Stanford Road	<p>Orsett Cock junction and Gammonfields Way</p>	<p>Stanford Road is proposed to be realigned as part of the works which include the construction of three new structures. The works around the area, particularly between the A1013 and A13 are substantial. As a result, there would be significant construction activity within the</p>	<p>Local works would be required to the utility networks within this area. These works are likely to be managed via the use of traffic lights and single lane closures where</p>

Road	Main works location	Main works construction information (indicative)	Nearby utility information (indicative)
		<p>area, from piling activities and earthworks to road construction.</p> <p>Traffic restriction on the A1013 would be required in localised areas and would change during construction to allow construction vehicles and staff to access the works area around the road, predominantly to access the junction works between the A1013 and A13.</p> <p>The A1013 is however envisaged to remain open throughout the works other than for specific works which would require several night closures and a few weekend closures.</p> <p>The works would be conducted in phases, whereby temporary/ permanent alignments may be used to ensure the A1013 remains open. Signage would be prevalent on the road to ensure the road user is aware of the current arrangement.</p>	<p>required. Any closures required are likely to be as part of a wider closure proposal.</p> <p>Within this area there are currently overhead power lines located on pylons over Stanford Road that would require works associated with the diversions. It is currently envisaged that works to these assets would not impact the use of Stanford Road, however night closures may be required on the grounds of safety to complete these works.</p> <p>East of the roundabout a section of the A1013 would require traffic lights and a single lane closure for a month to complete a new access to a permanent gas compound.</p>
Baker Street	Entire road	<p>Significant works are proposed between the A13 and A1013 around the existing Baker Street alignment. As such it is proposed the approximate section between the A13 and A1013 would be closed to allow these works to be safely carried out. It should be noted, while Baker Street is closed, Rectory Road would be open.</p> <p>Construction vehicles would use Baker Street initially for specific works, namely site preparation works.</p> <p>Construction haul routes would be constructed alongside the alignment which construction vehicles would use going forward.</p> <p>Baker Street would not be used as a through connection for construction works other than during the closure.</p>	<p>Utility works required would largely be via the use of traffic lights and single lane closures where required. Any closures required are likely to be as part of a wider closure proposal.</p>

Road	Main works location	Main works construction information (indicative)	Nearby utility information (indicative)
		<p>Crossing points of Baker Street would be required to access the works north of the A13 and east of Baker Street as well as the works south of the A13 east of the A1089. During the closure, the crossing points would be within the closure limits. When Baker Street is open, crossing points north and south of the A13 would be implemented. Traffic signals or similar would be installed to allow construction traffic to cross while allowing public traffic to use the road.</p>	
Rectory Road	Rectory Road bridge	<p>A new bridge is proposed for Rectory Road which would cross the A13 and Lower Thames Crossing link roads and therefore would have to be longer than the existing. In order to construct the new bridge, the existing bridge would first have to be demolished. As such it is proposed the crossing would be closed for approximately seven months. It should be noted, while Rectory Road is closed, Baker Street would be open. Rectory Road would be used by construction traffic for specific work only. Rectory Road would not be used as a through road for construction works. Temporary haul routes would be constructed along the Project link roads and facilitate the bulk of construction traffic. The haul route would need to cross Rectory Road to access works to the east of Rectory Road therefore traffic signals or similar would be installed to manage the traffic crossing, prior to the closure. The traffic volumes crossing would be low as the works required north of the A13, and east of Rectory Road would not be significant.</p>	<p>The only utility impact on traffic associated with Rectory Road would be the potential two-week closure in which a diverted high-pressure gas pipeline would be installed. All other works would be expected to be completed alongside the road, however traffic lights, lane narrowing or short-term night and/or weekend closures may be required on the grounds of safety.</p>
Stifford Clays Road	Stifford Clays roundabout to CA10 access	<p>Stifford Clays Road would initially be used as a construction route to access the construction sites (CA9 and CA10). This use would be until an offline link is constructed to the sites from the Stifford Clays junction. This temporary offline link is envisaged to be</p>	<p>Diverting of and installation of utility networks would require areas of Stifford Clays Road beyond the new structure, both east and west, in which to connect to the existing</p>

Road	Main works location	Main works construction information (indicative)	Nearby utility information (indicative)
		<p>constructed and available for construction vehicles within approximately the first six months of the construction period. Once the temporary link is open, the stretch of Stifford Clays Road would not be used other than for infrequent and specific works.</p> <p>Stifford Clays Road would however need to be crossed by construction traffic via a crossing point which would likely be in the form of traffic signals or similar. This would allow construction vehicles to cross the road to access worksites between the A13 and Stifford Clays Road. The temporary traffic signals would be in place until the new Stifford Clays Road overbridges are in place which would allow construction traffic to access by going under the new overbridges.</p> <p>Stifford Clays Road would need to be realigned as part of the works which include two new bridges. The realignment and bridges would largely be constructed offline allowing Stifford Clays Road to remain open.</p> <p>In localised areas temporary realignment of Stifford Clays Road would be required to ensure it remains open. For tie-in works of these temporary routes as well as connecting the permanent alignment into the existing, short-term closures of Stifford Clays Road would be required. These would be generally be night/weekend or similar closures required a few times within the construction period.</p>	<p>networks to be utilised. Multiple crossings of the highway may be required and could be undertaken using traffic lights and single lane closures.</p> <p>There are currently overhead power lines located on pylons over Stifford Clays Road that would require works associated with the diversions. It is currently envisaged that works to these assets would not impact the use of Stifford Clays Road, however night closures may be required on the grounds of safety to complete these works.</p>
Fen Lane	North of Stifford Clays Road	It is not envisaged Fen Lane would be required to facilitate main works as haul routes would first be installed prior to gaining access to the areas just north of Green Lane. Once haul routes are created early in the programme, access to worksites would use the temporary routes.	Fen Lane would be used for the installation of compound utility supplies and accesses to works. These would be managed via traffic lights and single lane closures. Where this cannot be safely

Road	Main works location	Main works construction information (indicative)	Nearby utility information (indicative)
			implemented, a short-term closure would be required for a period of weeks.
Green Lane	Entire road	<p>Green Lane would be used by construction vehicles initially to facilitate the construction of offline haul routes. Once the haul routes are complete, a section of Green Lane would continue to be used as well as a works access from the Stifford Clays junction to the offline haul routes alongside the Project alignment.</p> <p>Green Lane would need a slight temporary alignment change to facilitate works on the bridge. As such Green Lane would be closed for a weekend or similar to tie-in the temporary alignment and also subsequently tie-in the permanent alignment. Other than these infrequent weekend closures, the road would remain open.</p> <p>A crossing point of Green Lane would also be required to allow construction vehicles to travel north and south along the alignment. Stop/Go signs or similar would be required to manage the construction and public traffic during the construction period.</p>	There are currently overhead power lines located on pylons over Green Lane that would require works associated with the diversions. It is currently envisaged that works to these assets would not impact the use of Green Lane, however short-term closures may be required on the grounds of safety to complete these works.
B186 / North Road	Between CA14 and proposed overbridge	<p>A new bridge is proposed for North Road which would cross over the Project alignment.</p> <p>During construction a temporary localised realignment of North road would be required to facilitate the completion of the bridge and associated embankment. As such a few night/weekend closures would be required during the construction period to tie-in the temporary alignment and subsequently the new permanent bridge alignment, and the existing. Other than these works, North Road would remain open.</p>	<p>Diverting of and installation of utility networks for customer and compound supplies would require areas of North Road beyond the new structure, both north and south, in which to connect to the existing networks to be utilised.</p> <p>These works are likely to be managed via the use of traffic lights and single lane closures however short-term night and/or weekend closures may be required on the</p>

Road	Main works location	Main works construction information (indicative)	Nearby utility information (indicative)
		<p>Prior to the overbridge construction, a crossing point of North Road would be required to allow construction vehicles to travel along the alignment. Traffic signals or similar would be required to manage the construction traffic crossing the alignment prior to completion and opening of the overbridge. Once the overbridge is complete and open, construction traffic would pass under the bridge and the temporary traffic signals could be removed.</p> <p>A small section of North Road (north of the Project alignment) would be used initially to access CA13.</p>	<p>grounds of safety to complete these works.</p>
B186 / Clay Tye Road	Entire road	<p>Clay Tye Road would initially be used by construction vehicles to access the worksites CA14 and CA15. It is proposed works accesses are constructed off the M25 to allow construction vehicles to access the Project alignment and worksites along the route directly from the M25. Once the temporary M25 accesses are complete, which would likely be constructed in the vicinity of Ockendon Road, Clay Tye Road would no longer be used by large construction traffic.</p> <p>Depending on where they would be travelling from, staff may use Clay Tye Road throughout construction.</p>	<p>Any proposed utility works that impact the highway within this area would be managed via traffic lights and single lane closures that would move with the works area.</p>
B186 / Warley Street	Entire road	<p>Warley Street between the A127 junction and the entrance of CA16 (approximately 200-300m north of the bridge over railway) would be used by construction vehicles throughout construction. Construction vehicles from the A127 would not go further south than the entrance to CA16 following construction of the temporary M25 works accesses.</p>	<p>Utility works within this area would require short-term lane narrowing. If this is not possible then short-term closures and traffic lights would be used to complete highway crossings.</p>

Road	Main works location	Main works construction information (indicative)	Nearby utility information (indicative)
		<p>Traffic signals or similar may be required to manage construction vehicles turning off and on Warley Street from the construction site.</p>	
<p>B187 / St Marys Lane</p>	<p>M25 to Warley Street</p>	<p>The M25 bridge over St Marys Lane would need to be widened as part of the scheme. The majority of the works would be able to take place without closing St Marys Lane, with access to the worksites from offline haul routes running alongside the M25.</p> <p>Certain specific works would require short-term night/weekend or similar closures of St Marys Lane but otherwise it would remain open.</p> <p>Crossing points for construction vehicles on St Marys Lane would be required. It is likely a crossing point just east and just west of the M25 would be required to allow construction vehicles to travel alongside the M25 to carry out widening works. The M25 widening works on the western side would largely be conducted from the local ground level and some from the M25.</p> <p>It is envisaged the underpass would also be used by appropriately sized construction vehicles to enable access to the east side of the M25 and subsequently along the eastern side of the M25.</p> <p>The M25 widening works on the eastern side would be conducted both from the local ground level and from the M25. The section between the Shoeburyness railway line and the river (between Cranham Golf Course and Thames Chase Forest) would be constructed from the local ground level as well as from the M25 level. Access to the local ground level in this stretch would be via St Marys Lane (via offline routes on the western side and St Marys Lane underpass). The remainder of the</p>	<p>Utility works within this area would require short-term lane narrowing. If this is not possible then short-term closures and traffic lights would be used to complete highway crossings.</p>

Road	Main works location	Main works construction information (indicative)	Nearby utility information (indicative)
		<p>eastern M25 widening works would largely be constructed from the M25 level.</p> <p>In order to facilitate construction vehicle movements using the underpass, the pavement may be narrowed or closed, however pedestrian access would remain open in some form. Traffic signals or similar would be implemented to manage the public and construction traffic in this short (circa 120m) stretch of St Marys Lane.</p> <p>The section of St Marys lane between Clay Tye Road and Warley Street would be initially used by construction traffic to access worksites CA14, CA15 and the temporary haul routes alongside the Project alignment. Once the temporary works accesses of the M25 are constructed, construction traffic would not use St Marys Lane other than the section mentioned above (the circa 120m stretch).</p>	
Ockendon Road	Tilbury Loop line to (and across) M25	A new bridge over the proposed Lower Thames Crossing slip along with a large cutting is required as part of the scheme around Ockendon Road. As such, it is proposed Ockendon Road would be closed in this stretch for approximately 19 months.	Utility works within this area would require short-term lane narrowing. If this is not possible then short-term closures and traffic lights would be used to complete highway crossings.
Ockendon Road	Between M25 and CA14 access	This stretch of road would be initially used to allow construction vehicles to access the works either side of the M25. Following construction of the temporary M25 accesses and associated offline haul routes, this section would not be required.	Utility works within this area would require short-term lane narrowing. If this is not possible then short-term closures and traffic lights would be used to complete highway crossings.
Folkes Lane	From A127 to Folkes Lane car park	N/A	Access would be required for approximately a year along Folkes Lane, of which, some of the required

Road	Main works location	Main works construction information (indicative)	Nearby utility information (indicative)
			traffic movements may require the infrequent use of escorted vehicles and Stop/Go boards.
Mill Lane	Both sides of the A13	N/A	Access would be required for circa a year along Mill Lane to complete utility crossings of the A13, of which, some of the required traffic movements may require the infrequent use of escorted vehicles and Stop/Go boards.
Dock Road & Hume Avenue	South of Asda roundabout	N/A	Installation of new water main potentially requires the use of traffic lights and single lane closure for six months. Lane closure would move along the alignment with the works.
Coopers Shaw Road	Gun Hill, Fort Road junction to Church Road	N/A	Installation of new water main potentially requires the use of traffic lights and single lane closure for two months. Lane closure would move along the alignment with the works. Potential to close Coopers Shaw Road and divert along Church Road to expedite works and improve safety.
B188	Stifford Clays Road to Orsett	N/A	Utility installation is proposed outside of the highway, however for safety, single lane closures and traffic lights may be required for a short period of time (weeks).

Road	Main works location	Main works construction information (indicative)	Nearby utility information (indicative)
Blackshots Lane	North of housing	N/A	Potential weekend closure to install utility compound connection if single lane and traffic lights not feasible.
Beredens Lane	Access from Warley Road	N/A	Access would be required for approximately a year along Beredens Lane, of which, some of the required traffic movements may require the infrequent use of escorted vehicles and Stop/Go boards.

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Lower Thames Crossing Outline Materials Handling Plan

DATE: June 2021

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Lower Thames Crossing

Outline Materials Handling Plan

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Table 6.1 Volume and type of excavated materials (as dug)	32

Cover Note

This document is a draft of one of a series of Control Documents that will form part of our planned DCO application. Following this consultation we will carefully consider your feedback as we finalise the documents for our planned submission of the DCO application for the Lower Thames Crossing later this year.

The outline Materials Handling Plan (oMHP) would be a companion document to the outline Site Waste Management Plan (oSWMP), providing further details on material movements associated with the road. It covers the flow of materials into the Order Limits and materials out of it, taking into consideration the proximity and capacity of existing transport infrastructure. Our contractor would produce a MHP in accordance with this document.

The following contains a draft copy of this document to provide an example of how mitigation and commitments would be secured within the DCO application when it is submitted.

The oMHP reflects the changes to the design described in this consultation. Updates will be made to this document to reflect feedback received from stakeholders ahead of submitting the document as part of the DCO application.

As this is a draft control document, there will be references to the upcoming Development Consent Order (DCO). Any documents referenced that will form the DCO will be mentioned with a (REF TBC).

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1 Introduction

1.1 Purpose of this document

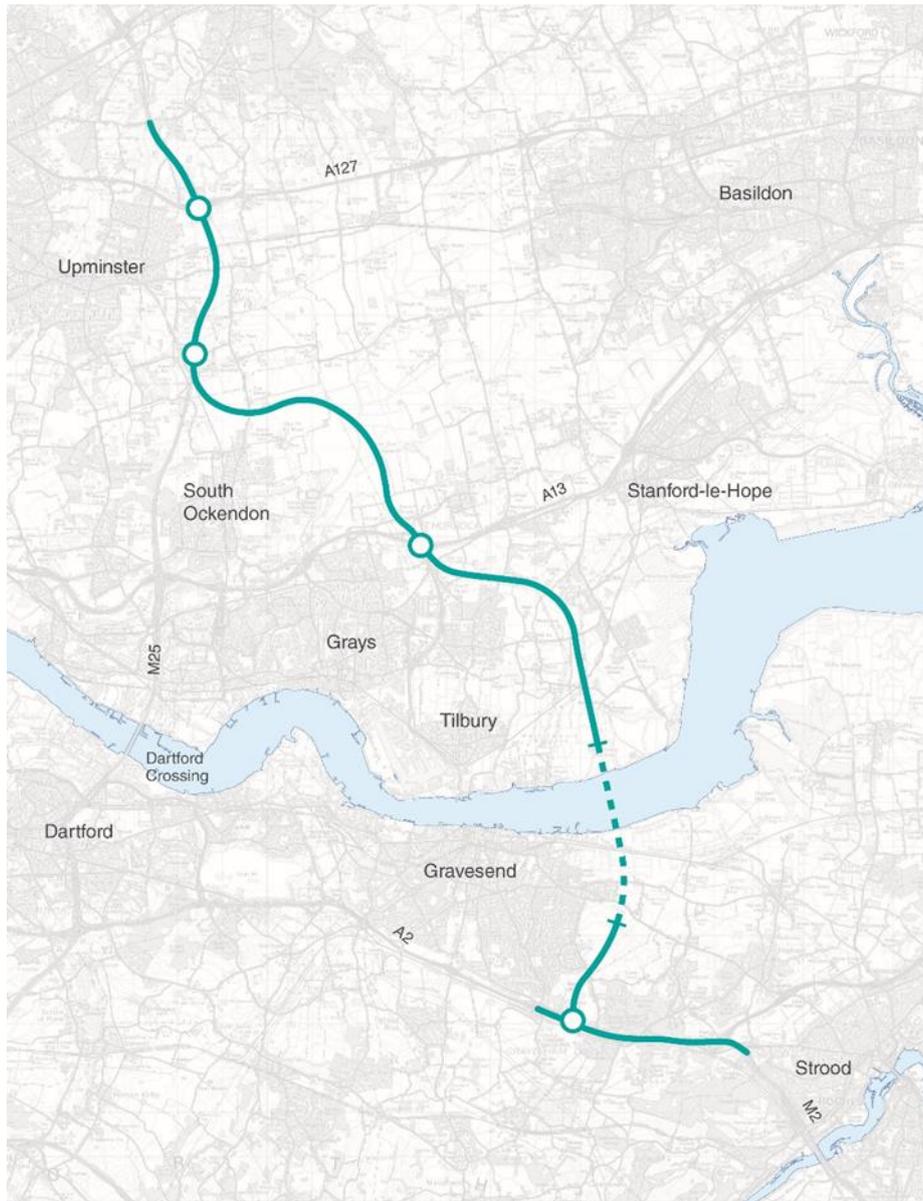
- 1.1.1 This outline Materials Handling Plan (oMHP) sets out the approach and high-level principles for handling construction materials and waste on the Lower Thames Crossing Project (the Project), both inside and outside the Order Limits. Securing mechanisms are covered in Section 2.
- 1.1.2 This oMHP considers the handling of excavated materials for reuse as well as excavated waste materials, and the delivery of large and/or frequent materials defined as 'bulk deliveries', which are considered to be the most logistically challenging types of deliveries and therefore potentially of most impact. Optimisation of deliveries and load capacities to minimise vehicle movements are key considerations.
- 1.1.3 Smaller less frequent deliveries, although not specifically addressed in this document, would also be required to meet the principles set out in this document (Section 2.3) to optimise deliveries and minimise vehicle movements.
- 1.1.4 It is relevant to all construction works required for the project. Construction traffic movements are considered in the Outline Traffic Management Plan for Construction (oTMPfC)
- 1.1.5 This document describes methods of transportation for bulk materials, taking into consideration the use and upgrading of existing infrastructure. Consideration of multimodal transport options includes the use of rail and river to minimise road miles, where reasonably practicable, and the utilisation of internal haul routes.
- 1.1.6 The Outline Site Waste Management Plan sets out the overarching principles and procedures that would be applied for the management of waste during the construction of the Project. This relates to the handling of excavated waste materials (Section 5.4).

1.2 The Project

- 1.2.1 The A122 Lower Thames Crossing (the Project) would provide a connection between the A2 and M2 in Kent, east of Gravesend, crossing under the River Thames through a tunnel, before joining the M25 south of junction 29. The Project route is presented in Plate 1.1.
- 1.2.2 The A122 road would be approximately 23km long, 4.25km of which would be in tunnel. On the south side of the River Thames, the Project route would link the tunnel to the A2 and M2. On the north side, it would link to the A13 and junction 29 of the M25. The tunnel entrances would be located to the east of the village of Chalk on the south of the River Thames and to the west of East Tilbury on the north side.
- 1.2.3 Junctions are proposed at the following locations:
- New junction with the A2 to the south-east of Gravesend
 - Modified junction with the A13/A1089 in Thurrock
 - New junction with the M25 between junctions 29 and 30

- 1.2.4 To align with NPSNN policy and to help the Project meet the Scheme Objectives, it is proposed that road user charges would be levied. Vehicles would be charged for using the new tunnel.
- 1.2.5 The Project route would be three lanes in both directions, except for:
- a. link roads
 - b. stretches of the carriageway through junctions
 - c. the southbound carriageway from the M25 to the junction with the A13/A1089, which would be two lanes
- 1.2.6 In common with other A-roads, the A122 would operate with no hard shoulder but would feature a 1m hard strip on either side of the carriageway. It would also feature technology including stopped vehicle and incident detection, lane control, variable speed limits and electronic signage and signalling. Our A122 road design outside of the tunnel includes emergency areas spaced at intervals between 800 metres and 1.6km (less than one mile). The tunnel would include a range of enhanced systems and response measures instead of emergency areas.
- 1.2.7 The A122 would be classified as an 'all-purpose trunk road' with green signs. For the benefit of safety, walkers, cyclists, horse-riders and slow-moving vehicles would be prohibited from using it.
- 1.2.8 The Project would include adjustment to a number of side roads. There would also be changes to a number of public rights of way, used by walkers, cyclists and horse riders. Construction of the Project would also require the installation and diversion of a number of utilities, including gas pipelines, overhead power lines and underground electricity cables, as well as water supplies and telecommunications assets and associated infrastructure.
- 1.2.9 The Project has been developed to avoid or minimise significant effects on the environment. Some of the measures adopted include landscaping, noise mitigation, green bridges, floodplain compensation, new areas of ecological habitat and two new parks.

Plate 1.1 Lower Thames Crossing Route



Related Project documents

- 1.2.10 The DCO Application will include the following documents that should be read alongside the oMHP:
- a. The Code of Construction Practice (CoCP), which includes the Register of Environmental Commitments (REAC)
 - b. Transport Assessment (REF TBC)
 - c. Assessments supporting the Environmental Statement (REF TBC), including:
 - i. Environmental Statement Chapter 5: Air Quality
 - ii. ES Appendix 11.1: Excavated Materials Assessment

- iii. Environmental Statement Chapter 11: Material Assets and Waste
- iv. Environmental Statement Chapter 12: Noise and Vibration
- d. Outline Site Waste Management Plan
- e. Outline Traffic Management Plan for Construction (oTMPfC)
- f. Preliminary Navigational Risk Assessment (REF TBC)
- g. Framework Construction Travel Plan (FCTP)

1.3 Assumptions and limitations

1.3.1 This oMHP has been developed having regard to the following assumptions and limitations, which are discussed throughout the document:

- a. The geographical context and footprint of the Project, including practicalities and constraints of the road and tunnel alignment (geographical and environmental constraints) (Section 3), would not change.
- b. Quantities of construction materials and waste are indicative (Section 5).
- c. Transport and logistics constraints and opportunities would not change significantly. For example, train routes remain open (Section 5).
- d. The condition of existing infrastructure to be used for material movement is adequate and appropriate. Condition surveys will be undertaken prior to Works commencement (Section 6).
- e. There would be sufficient industry capacity in terms of materials and plant to supply the Project demands. Discussions with suppliers indicates that capacity does exist.
- f. Transportation of excavated material is not currently planned between construction sites on opposite sides of the River Thames via the existing road network to reduce vehicle movements through the existing Dartford Crossing
- g. Optimise material movement or transfer between two different construction compounds or construction sites (within the Order Limits) would be agreed and managed in accordance with the appropriate regulatory consents to be obtained by the appointed Main Works Contractor (MWC).

1.3.2 It should be noted that commercial and procurement elements, eg the potential for specific suppliers to support a multimodal transportation approach, have not been considered as part of the document.

2 Planning requirements and Project commitments

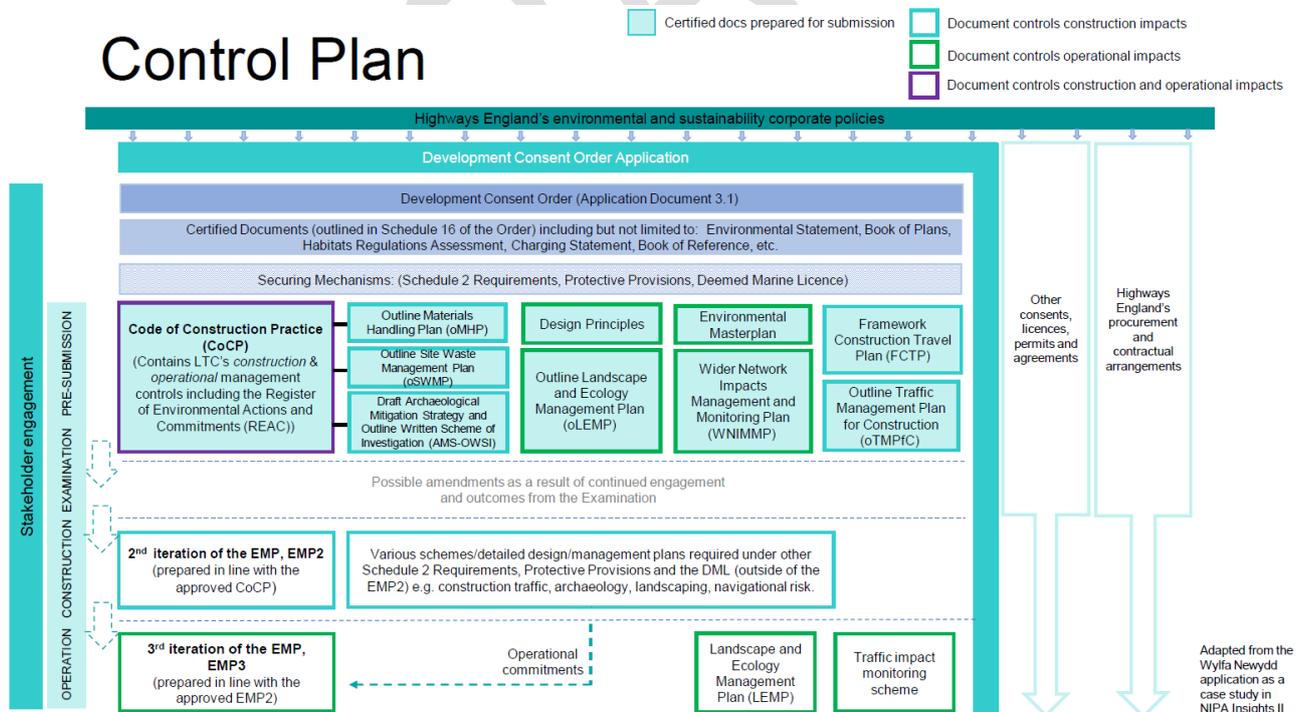
2.1 Planning requirements and the Development Consent Order

2.1.1 This oMHP should be read alongside Requirement 4 of the Schedule 2 Requirements to the Development Consent Order (DCO), which requires plans for the management of materials to be in place prior to commencing construction. Plate 2.1 provides an extract from the Project Control Plan, which illustrates the securing mechanisms.

2.1.2 Requirement 4 to the Schedule 2 Requirements state that no part of the authorised development is to commence until an Environmental Management Plan (Second Iteration), formed substantially in accordance with the CoCP has been submitted to and approved in writing by the Secretary of State, following consultation by the undertaker with the relevant planning authority and/or Natural England (as appropriate). Under Requirement 4(3), the EMP (second iteration) must include a plan for the management of materials, which must be in accordance with this document.

2.1.3 This oMHP provides the framework and principles that the contractor must adhere to when developing a more detailed plan – the Materials Handling Plan (Second Iteration), which would be required as part of the Environmental Management Plan (Second Iteration).

Plate 2.1 Extract from the Project Control Plan



2.2 Construction phase Materials Handling Plan

- 2.2.1 This oMHP sets out the principles for material movements and handling during the construction phase of the Project, providing the framework for a more detailed Materials Handling Plan (MHP) to be produced for the construction phase of the Project (see Control Plan flow diagram in Plate 2.1).
- 2.2.2 The construction phase MHP will set out a detailed approach for material movement and handling, aligning to the principles set out in this oMHP. It will require information from a number of Project elements developed during the construction stage, including the following:
- a. Detailed design
 - b. Detailed construction programme
 - c. Detailed ground investigation
 - d. Detailed written scheme investigation
 - e. Excavated material mass haul strategy
 - f. Traffic management plan
 - g. Environmental Management Plan and Site Waste Management Plan
- 2.2.3 Information which will be required to form part of the construction phase MHP is shown in Table 2.1 below.

Table 2.1 Detail required in the construction phase MHP

Information topic	Details
Project Information	<ul style="list-style-type: none"> • Roles and responsibilities of involved parties in the transportation and handling of material • Location of compounds and worksites
Construction details	<ul style="list-style-type: none"> • Summary of the appointed contractors construction programme, • Modularisation and off-site manufactured plan and • Excavated materials plan, including tracking record of when and where material is excavated and placed for use within the Order Limits or management offsite
Site layout plans	<ul style="list-style-type: none"> • Welfare and office space plan • Parking, loading and unloading and laydown area plan • Plant and materials storage • Excavated and demolition material storage and processing plan • Vehicle and pedestrian routes • Haul road crossings • Emergency and first aid points • Waste management areas • Wheel wash facilities and

Information topic	Details
	<ul style="list-style-type: none"> Equipment charging and fuelling areas.
Traffic management (in accordance with the oTMPfC)	<ul style="list-style-type: none"> Access plans to each Compound Parking arrangements for delivery vehicles Pedestrian, cyclist, bus and general traffic considerations Vehicle swept path analysis modelling.
Delivery and transport management	<ul style="list-style-type: none"> Details of how the Contractor implements a delivery management system Trip demand forecasting Proposed timing windows for vehicle movements to and from Site, taking local conditions into consideration Details of abnormal load requirements, including appropriate planning and notification to relevant stakeholders e.g. local authorities, emergency services etc

2.3 Commitments to secure mitigation of impacts

2.3.1 As part of the planning process and in line with industry best practice, the Project has made commitments to secure mitigation of its construction materials handling operations. These will be secured in the DCO through Schedule 2 Requirements via the CoCP and REAC. This oMHP reflects those commitments.

2.4 Principles to optimise materials logistics

2.4.1 A number of principles will be applied to reduce material movements for construction, including the following, which are explained in greater detail below:

- a. Design for manufacture and assembly, build offsite, and modular construction
- b. Consolidation of deliveries
- c. Maximising load density (removing unused space on vehicles)
- d. Retention and reuse of site-generated materials such as excavated soils, vegetation, and demolition waste where possible.
- e. The proximity principle (of sourcing materials as close to the Project as possible)
- f. Use of multimodal transport

Design for manufacture and assembly

2.4.2 Design for manufacture and assembly, is the prefabrication of all or part of an item offsite, for delivery then assembly and installation to form a completed asset, such as a piece of equipment or structure, with minimal onsite works.

- 2.4.3 Modular construction reduces vehicle trips and associated emissions, and can reduce overall construction times by improving the efficiency of delivery and assembly on site. It can also reduce construction activity risks.
- 2.4.4 The Contractors will be required to review the design to investigate the use of prefabricated structures and components and encourage a process of assembly rather than construction onsite, where economically and technically feasible.

Consolidation

- 2.4.5 Consolidation is the grouping of materials from multiple deliveries onto fewer vehicles to minimise the overall number of deliveries.
- 2.4.6 Provision has been made within compounds for mass storage of materials and equipment and to manage delivery flows to individual worksites.
- 2.4.7 The Contractors will also be required to detail their performance in terms of reducing site traffic through consolidation.

Load density maximisation

- 2.4.8 The Project will require Contractors to plan and detail how they will maximise load density for all vehicle trips (the amount of weight that can be safely loaded per unit volume). This will reduce road miles travelled, emissions and road risks.

The proximity principle

- 2.4.9 Priority would be given to sourcing primary, secondary and recycled aggregates from Kent, Essex and Greater London whenever the design specification permits and supply is available, to embody the proximity principle of sourcing materials as close to the Project as possible.
- 2.4.10 The Contractor will use the BRE Framework Standard for Responsible Sourcing (BES 6001) (BRE, 2008), to verify imported materials are sustainably sourced and managed, to reduce impacts throughout the supply chain.

MW002 Multimodal transport

- 2.4.11 Multimodal transport refers to the use of road, water, and rail in combination to optimise material transport and delivery.
- 2.4.12 The Project will seek to reduce road vehicle miles travelled using a combination of modes of transport, using a 'final mile' strategy to transport the materials efficiently to site from the main delivery terminal or depot. (See Section 6 for the final mile approach).
- 2.4.13 The location of the main construction compounds of the Project provides for access to ports, rail in limited locations and the strategic road network (SRN) (Section 6).

2.5 Managing construction delivery movements

- 2.5.1 The following measures will manage unavoidable construction vehicle movements, which are explained in greater detail in the sections below:
- a. Traffic management plans (in accordance with the oTMPfC)
 - b. Queuing and holding points at site entrances within the Order Limits

- c. Supply chain data analysis (information to provide an understanding of vehicle movements associated with deliveries, so that improvements and efficiencies can be implemented)
- d. Materials distribution management (planning the flow and movement of materials to optimise movements and avoid stockpiling)
- e. Delivery booking system
- f. Movement of Abnormal Indivisible Loads
- g. Mitigating measures for vulnerable road users
- h. Construction site good housekeeping and safety

Traffic management plans

- 2.5.2 The preparation of traffic management plans (TMPs) for construction is a requirement of the draft DCO (Schedule 2 Requirement 10) and will be prepared by the contractors to optimise vehicle movements with the aim of reducing impacts and improving safety.
- 2.5.3 The oTMPfC provides an overview of the approach that will be followed and will inform the preparation of a TMP for construction by the contractors. This will require approval by the Secretary of State following consultation with the relevant highway authority/authorities.

Vehicle holding points

- 2.5.4 To manage the arrival of vehicles to the site compounds, the Project will make provision for vehicle holding points with reception and booking-in areas, located inside the Order Limits and close to agreed work site entrances.
- 2.5.5 These areas will receive and process vehicles making deliveries on a scheduled basis, to minimise the risk of queuing on the highway (in accordance with the oTMPfC).

Supply chain data analysis

- 2.5.6 Supply chain data analysis will provide an understanding of vehicle movements associated with deliveries, so that improvements and efficiencies can be implemented.
- 2.5.7 Construction sites will be fitted with technology such as Automatic Number Plate Recognition, to enable the MWC to track and analyse data relating to vehicle movements for the Project. This will help to drive conformity with agreed delivery hours, delivery routes, delivery of pre-booked materials, idling times, near misses and any non-conformity. This would enable Contractors to review, assess and improve performance where necessary.
- 2.5.8 The use and management of couriers will also form part of the data analysis to understand and aid the maximisation of load capacity.

Materials distribution management

- 2.5.9 The Project will implement a systematic approach to logistics management to drive efficiencies. A delivery management system will coordinate materials distribution to compounds to optimise movements and avoid stockpiling.
- 2.5.10 The Contractors will monitor material quantity requirements to avoid over-ordering, reducing risk of oversupply and damage on site, which could lead to waste materials being generated

Delivery booking system

- 2.5.11 The Contractors will implement a delivery booking system for all construction deliveries associated with their site. A delivery booking system will enable forward planning and coordination of delivery vehicle movements including management of non-conformances to delivery slots and proactive resolution of peaks in demand.
- 2.5.12 The delivery booking system would also allow the recording of driver details, registration numbers and arrival and departure times.

Movement of Abnormal Indivisible Loads

- 2.5.13 The tunnel boring machines (TBMs), bridge structures and associated specialist equipment including tower cranes, mobile cranes and plant, would be delivered as Abnormal Indivisible Loads. This would also include wide loads and long loads (loads of exceptional length) for items such as bridge spans, crawler crane assemblies, and self-propelled modular transporters (used for manoeuvring heavy and large loads).
- 2.5.14 The CoCP confirms that Contractors must follow relevant legal requirements and planning processes for the transportation of Abnormal Indivisible Loads, including the assessment of structures, junctions and routes for the movement of these loads. This may require modification of junctions or temporary removal of street furniture and lighting for example, to enable a load to pass. All such movements would be carefully planned in consultation with the relevant highway authorities and the police (and detailed in the Traffic Management Plan for Construction).

Mitigating measures for vulnerable road users

- 2.5.15 To mitigate the impact of HGVs and other construction vehicles on vulnerable road users, the Project will apply the Fleet Operator Recognition Scheme (FORS) and Construction Logistics and Community Safety scheme, which demand collaborative action and reporting to prevent fatal, serious and near-miss collisions between vehicles servicing construction projects and vulnerable road users including pedestrians, cyclists and motorcyclists. This is a requirement of the CoCP.

Construction site good housekeeping and safety

- 2.5.16 All vehicle movements on the Project construction sites will be managed in accordance with the requirements set out in the CoCP. This also includes good housekeeping and site security.

3 Environmental setting and existing infrastructure – considerations and constraints

3.1 Context

- 3.1.1 The geographical context and extent of the Project means that there are a number of constraints, including environmental and physical infrastructure, to consider in the planning of material movement for the Project. These are detailed below, and the relevant locations are indicated on Plate 3.1 and Plate 3.2.

3.2 Environmentally sensitive sites

Thames Estuary and Marshes Ramsar

- 3.2.1 The Thames Estuary and Marshes Ramsar is a designated site of international importance located on the southern side of the River Thames, near Gravesend. In order to reduce harm to the Ramsar and its functionally linked habitat, the Project is not seeking to create a new jetty (deep or shallow water) on the south side of the River Thames within the Project's Order Limits. This forms a constraint on river transport of materials into or out of construction compounds on the south side of the River Thames.

Port of Tilbury²

- 3.2.2 The Port of Tilbury² has an area of land committed to environmental mitigation as part of its DCO. This area would be the only practicable location to site a direct rail connection to the construction compound at the North Portal (CA05 and CA05A). In light of the alternative existing rail facilities available in the immediate vicinity of the North Portal, it is considered disproportionate to construct a new temporary rail spur which would have the effect of dislodging the Port of Tilbury's environmental mitigation. As a result, a direct rail connection is not considered appropriate for material movement on the north side of the River Thames.

3.3 Existing amenities

- 3.3.1 The Milton Rifle Range (a police training site) is located within the Thames Estuary and Marshes Ramsar. This creates a physical barrier to access to the River Thames from southern worksites within the project Order Limits. This forms a further constraint on river transport of materials into or out of sites via the river on the southern side of the River Thames.

3.4 Use of the strategic and local road network

- 3.4.1 There are a limited number of SRN routes within the vicinity of the Order Limits.
- 3.4.2 The Project would primarily use direct access from the A2 and A226 to compounds south of the River Thames, and the A13, A1089, and the M25 to compounds north of the River Thames for construction traffic movements, however, this is not possible in all locations so the local road network will need to be used where required. The forecast impact to the road network is described in the Transport Assessment (REF TBC).

- 3.4.3 Where construction traffic uses local roads, it will be via a limited number of routes across the geography of the Project (refer to the CoCP for detail on mitigation and limitations for vehicle routes) Additional measures to ensure safe use of the road network for construction traffic will be developed in consultation with the relevant local authorities and secured in the traffic management plan developed during construction using the principles set out in the oTMPfC.

3.5 River infrastructure and water transport

- 3.5.1 On the north bank of the River Thames, there are three operational jetties in close proximity to the Order Limits (the North Portal area), however all the jetties are fully utilised by existing landowners and business owners and do not have additional capacity for import of materials for the construction of the Project.
- 3.5.2 The busy navigational channel of the River Thames precludes the potential for the creation of a new jetty (deep or shallow water) on the north and south sides of the river within the Order Limits.

3.6 Land features and infrastructure

- 3.6.1 The Tilbury Loop railway line forms a physical barrier to the continuation of offline access (construction traffic access via the haul roads inside the Order Limits) between the north bank of the River Thames and the intersection of the Order Limits with the M25.
- 3.6.2 Substation Road (located between the North Portal and the Tilbury Loop railway line) is a privately owned road. We propose to use this road to access compounds at the North Portal (CA05 and CA05a), whilst seeking to balance that use with the road owner's operational requirements.
- 3.6.3 Parts of Medebridge Road in South Ockendon form a private road owned and maintained by Veolia UK. This road has been identified as a key access route to worksites north of the A13, to minimise the use of the local road network in this area. We also propose to use this road to access compounds north of the A13 (CA11 & CA13), whilst seeking to balance that use with the road owner's operational requirements.

3.7 Permitted activities

- 3.7.1 The construction compound at the North Portal (CA05) would be located within the extent of two commercial landfill sites. In order for the Project to undertake construction activities in this area, including material excavation, storage and treatment, the DCO will address existing and required permitting requirements to provide for authorisation and regulation of any activities in that setting.

3.8 Proposed developments

Thurrock Flexible Generation Plant

- 3.8.1 The Thurrock Flexible Generation Plant is a project proposed by Statera Energy (SE), situated to the west of the North Portal. The proposed Order Limits of SE's DCO overlap with those of the Project.

3.8.2 It is currently anticipated that if both projects are granted their DCOs the construction periods would be undertaken at the same time, including use of the same road and access points for the Projects CA05 and CA05a construction compounds.

3.8.3 The two projects would work together to ensure neither impedes the delivery of the other whilst ensuring impacts on the local road network are minimised.

The London Resort

3.8.4 The London Resort is a major proposed development on both the north and south sides of the River Thames, which has submitted a DCO application. The construction programme for the London Resort is understood to coincide with that of the Project.

3.8.5 The Project would seek to work with London Resorts promotor to minimise disruption on the road network.

Plate 3.1 Geographical features and existing infrastructure south of the River Thames

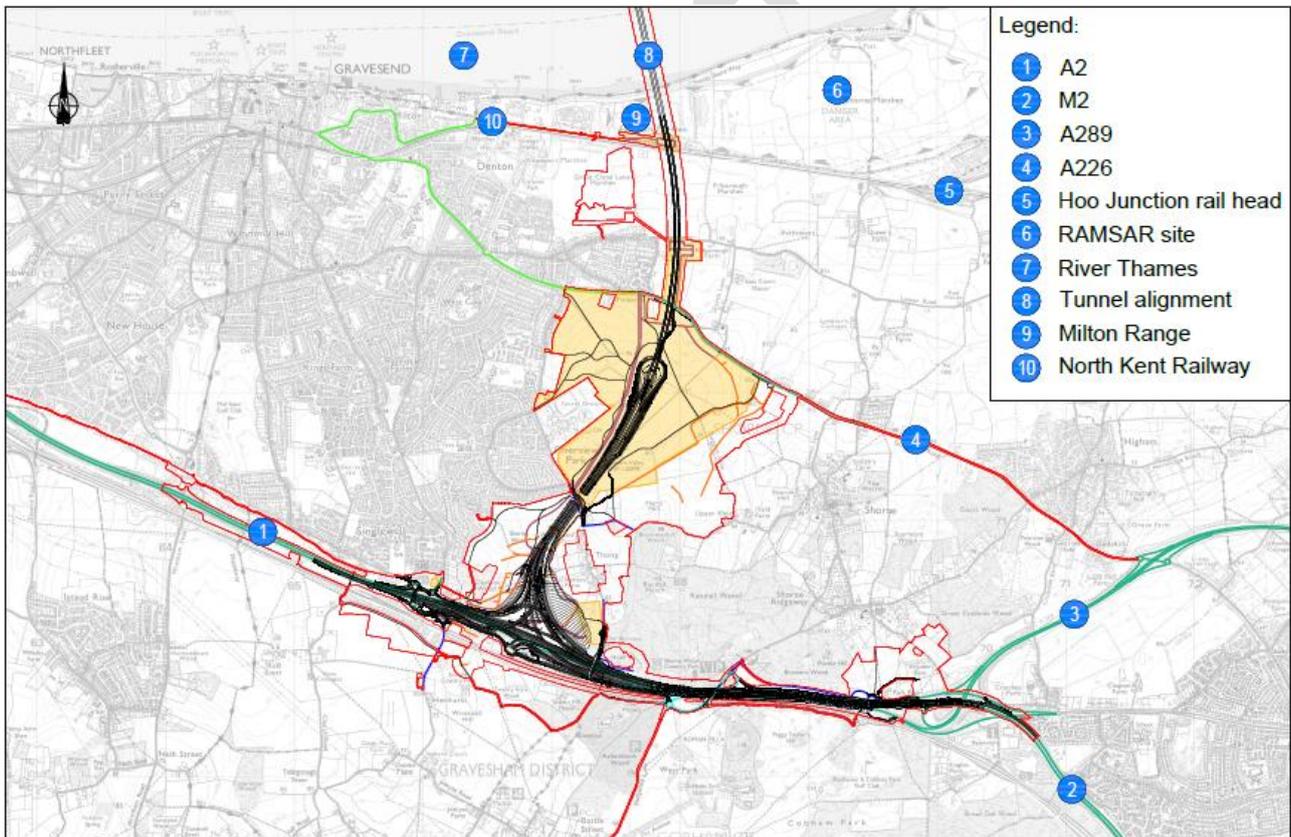
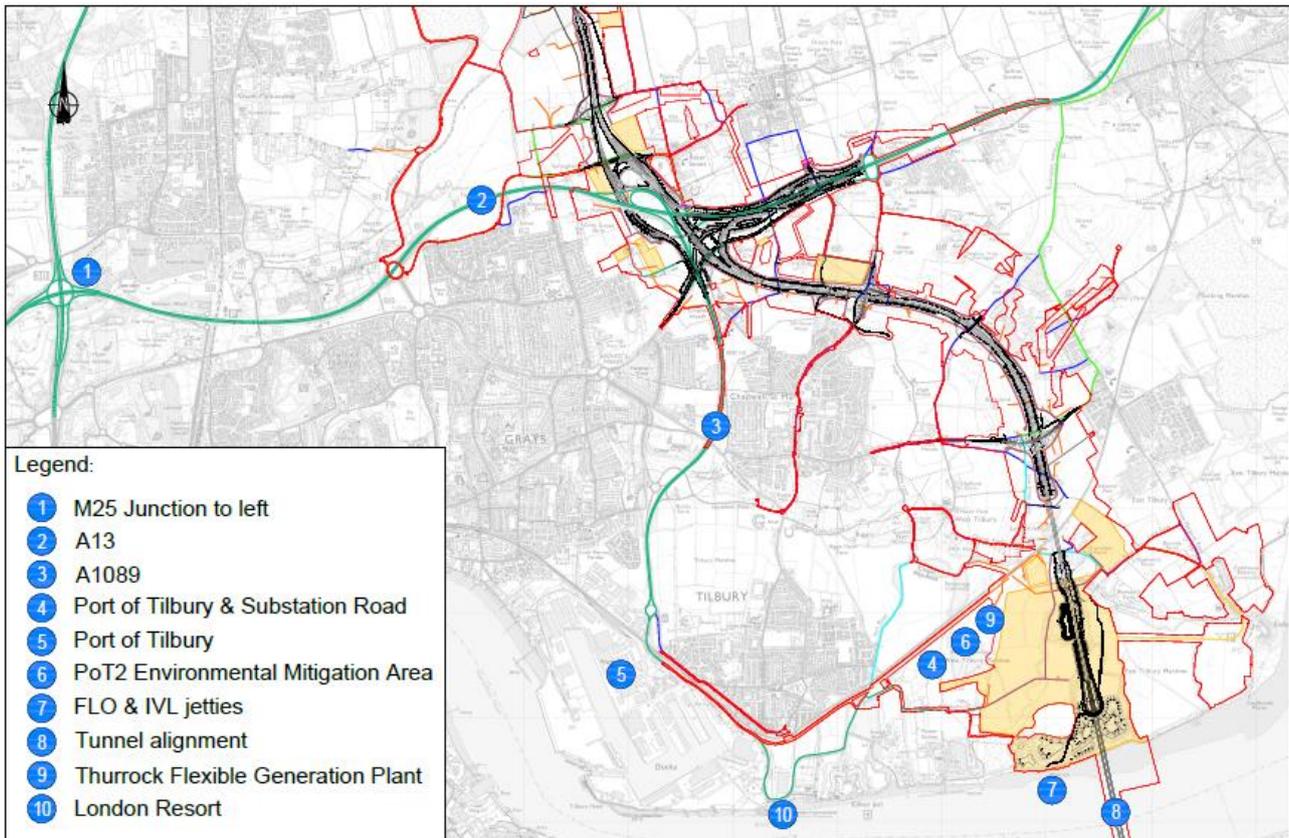


Plate 3.2 Geographical features and existing infrastructure north of the River Thames



4 Construction logistics on large-scale projects

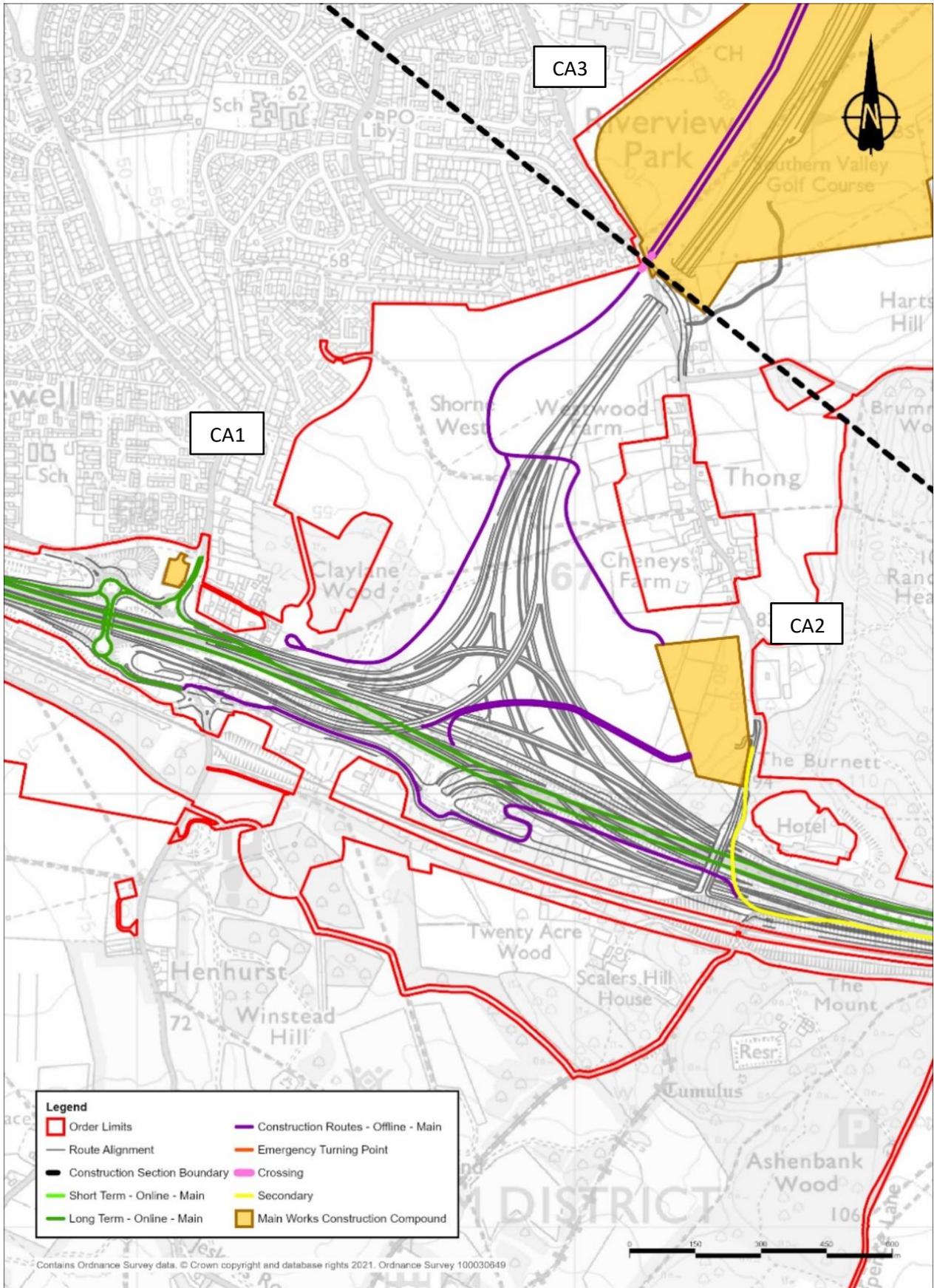
4.1 The need for construction compounds

- 4.1.1 To optimise the management of construction logistics on large-scale (major) projects, construction compounds are needed to provide appropriately located areas for specific activities, such as storing, managing and maintaining plant, storage and use of materials, operational activities such as concrete batching, and for workers' welfare and office facilities.
- 4.1.2 This is relevant to this oMHP because the use of compounds will optimise vehicle movement for material movements, storage and use. The Project has defined two types of compound – construction compounds for the main construction works, and utilities logistic hubs (ULHs) for works that are utility-specific.

4.2 Construction compounds

- 4.2.1 Construction compound locations have been identified based on the following requirements:
- To support the type, scale and complexity of works such as the tunnel portal sites
 - To facilitate material deliveries and storage (of both imported and excavated materials) in key locations
 - To be in suitable proximity to worksites and existing transport infrastructure, such as the strategic road network, rail and river access, to optimise vehicle movements and minimise impact on the environment and community
 - To provide the necessary facilities and operations capability to the Project construction workforce (including offices, welfare, catering, storage, and materials processing)
 - To be close to existing transport networks to enable the Project workforce to commute to their place of work (compounds often provide a base location for the start and end of the working day)
 - To respond to feedback from stakeholders
- 4.2.2 Based on the above criteria, it has been identified that 18 construction compounds are required for the main works.
- 4.2.3 Plate 4.1 to Plate 4.4 show the main works construction compounds
- 4.2.4 Plate 4.1 below shows main works compounds:
- CA1 – near Gravesend East junction
 - CA2 – near the A2 and Thong Lane
 - CA3 – north of the dashed line (part of CA3)

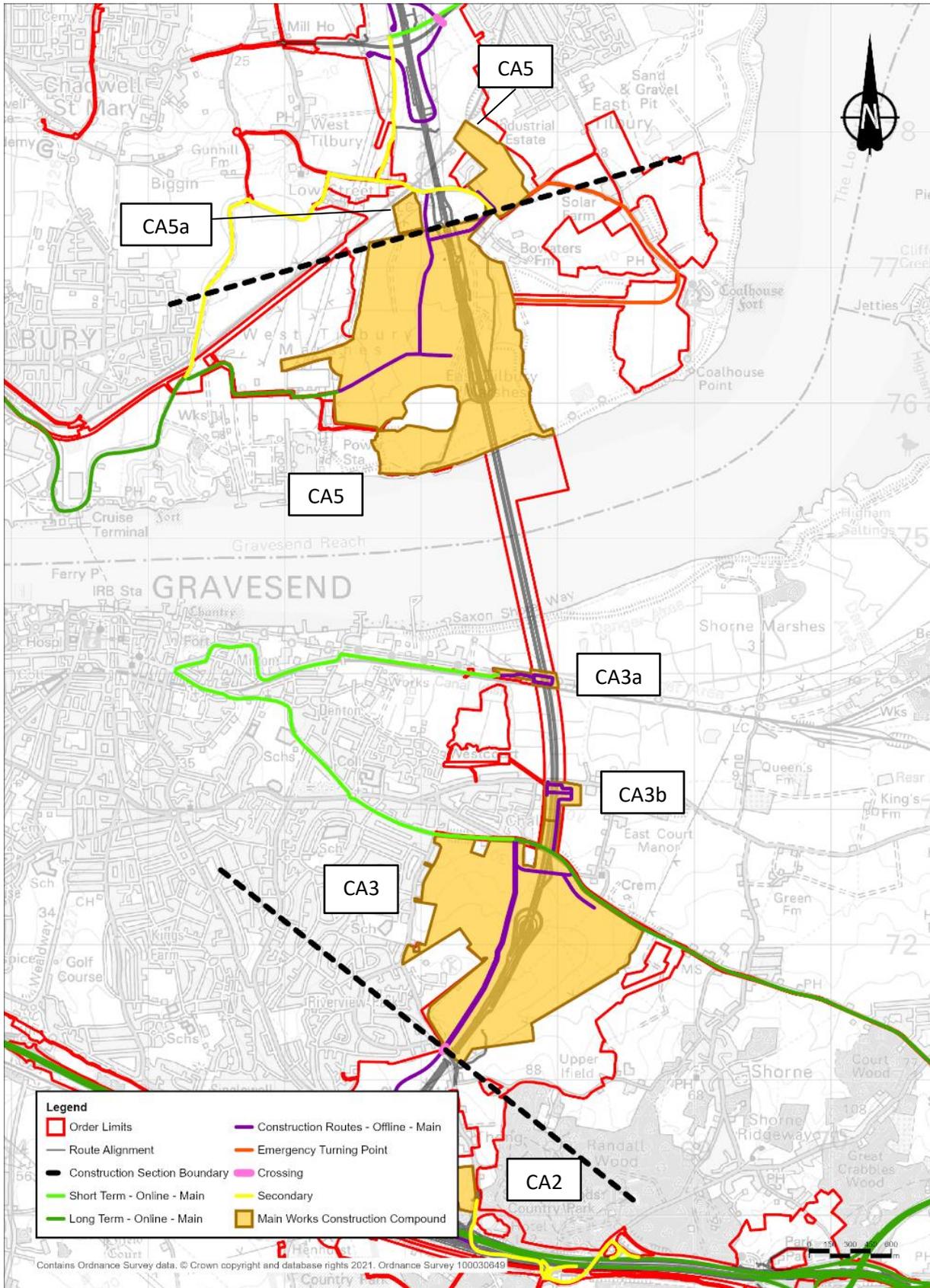
Plate 4.1 Compounds and HGV construction traffic routes (A2 to Thong Lane over LTC)



- 4.2.5 Plate 4.2 below shows main works compounds:
- a. CA3 – around proposed southern tunnel portal
 - b. CA5 – around proposed northern tunnel portal (including the section between the dashes line and tilbury loop line, east of the Project alignment)
 - c. CA5a – between dashed line and tilbury loop line (west of the Project alignment)

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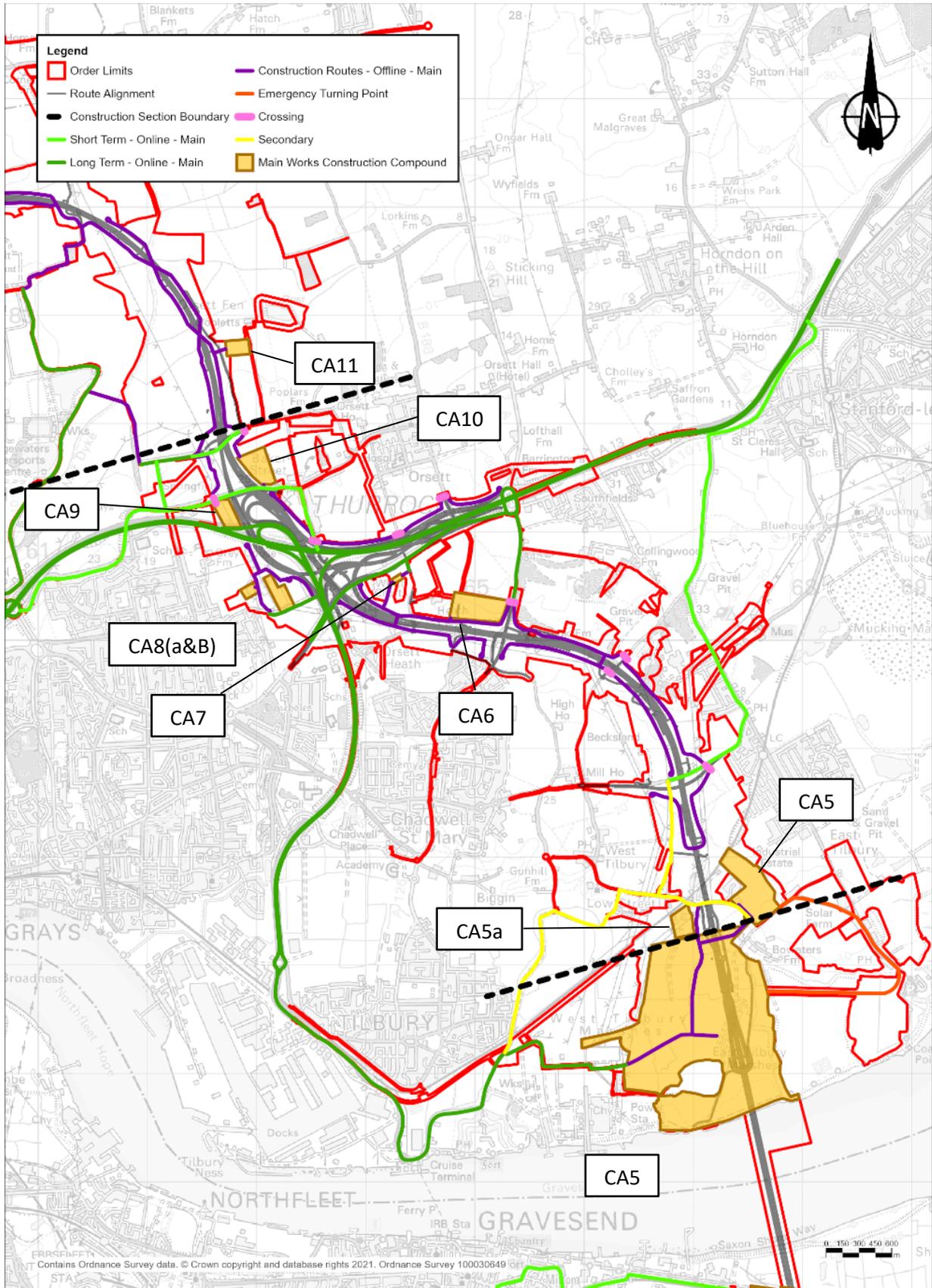
Plate 4.2 Compounds and HGV construction traffic routes (South Portal to North Portal)



- 4.2.6 Plate 4.3 below shows main works compounds:
- a. CA5 – around proposed northern tunnel portal (including the section between the dashes line and tilbury loop line, east of the Project alignment)
 - b. CA5a – between dashed line and tilbury loop line (west of the Project alignment)
 - c. CA6 – south of the A13 and east of the A1089 near Brentwood Road
 - d. CA7 – south of the A13 and east of the A1089 near the A1013
 - e. CA8(a&b) - south of the A13 and west of the A1089
 - f. CA9 – north of the A13 and west of the Project alignment
 - g. CA10 – north of the A13 and east of the Project alignment
 - h. CA11 – north of the A13, east of the Project alignment near Fen Lane

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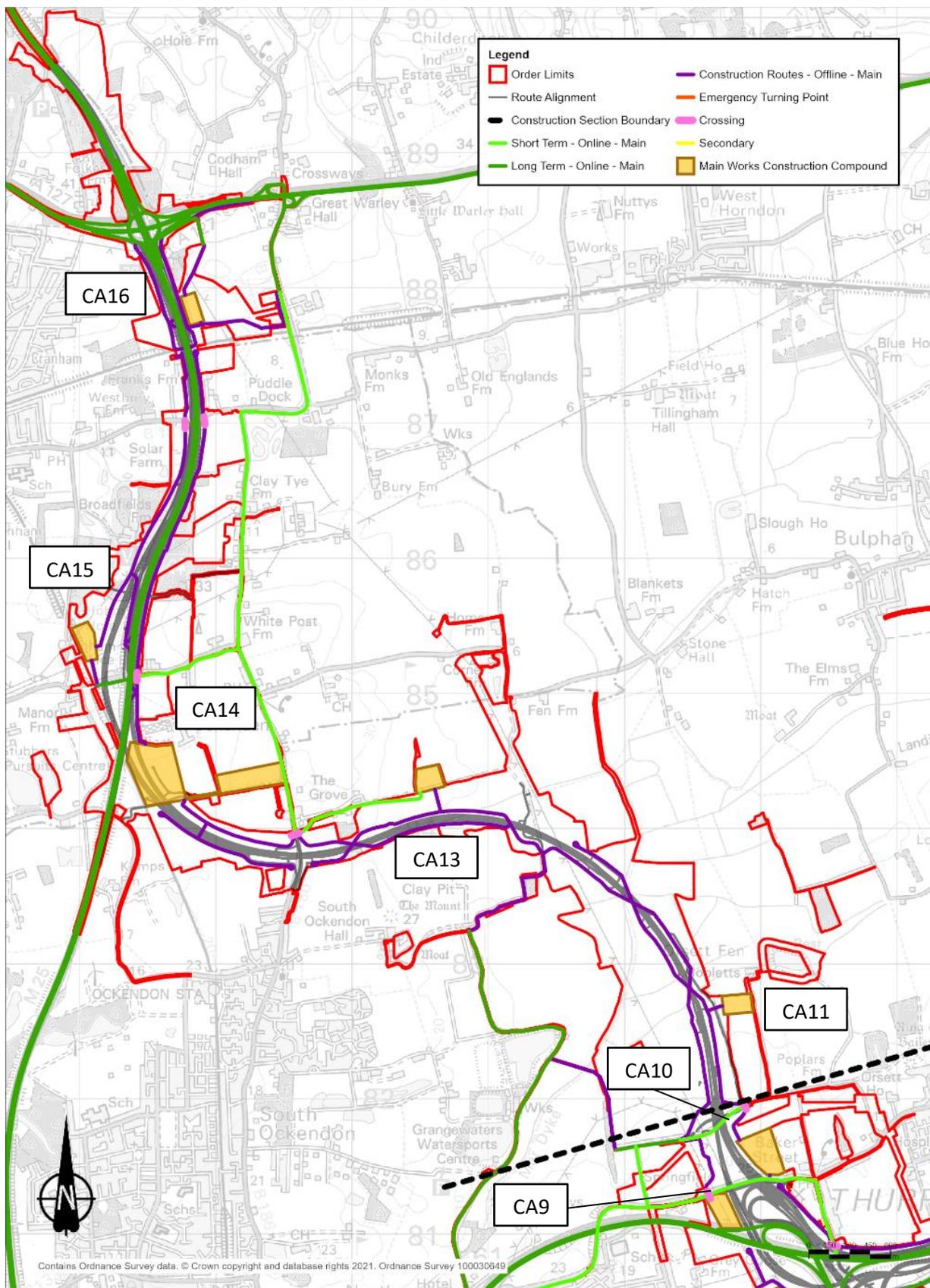
Plate 4.3 Compounds and HGV construction traffic routes (North Portal to A13)



- 4.2.7 Plate 4.4 below shows main works compounds:
- a. CA9 – north of the A13 and west of the Project alignment
 - b. CA10 – north of the A13 and east of the Project alignment
 - c. CA11 – north of the A13, east of the Project alignment near Fen Lane
 - d. CA13 – north of the Project alignment in an open field
 - e. CA14 – just east of the M25 and near Ockendon Road
 - f. CA15 – just west of the M25 and near Ockendon Road
 - g. CA16 – just east of the M25 and near the A127

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Plate 4.4 Compounds and HGV construction traffic routes (A13 to M25)



4.3 Utility logistic hubs

- 4.3.1 In addition to the 18 construction compounds, there would be 16 ULHs to facilitate the delivery of specific utility works. The ULHs would be required for the receiving, storing and distribution of plant and materials required for the completion of specific utility works. Their establishment, use and demobilisation would be aligned with the construction programme. The ULHs would include facilities such as office space, welfare, refuelling, security, vehicle and wheel-wash, and parking.
- 4.3.2 The ULHs would include a materials laydown area appropriate to the size and quantity of the materials that would need to be stored. The ULHs would be in operation to facilitate specific utilities works, and once completed, the ULHs would be demobilised.

4.4 Access routes to construction compounds and ULHs

- 4.4.1 Access routes to each of the 18 main works compounds from the public highway have been developed in consultation with stakeholders, including local authorities and regulatory bodies, and through development of the Project design. The oTMPfC provides an overview of the approach taken by the Project.
- 4.4.2 Ten of the ULHs would primarily use the same access routes as the main works compounds. For the six ULHs where access routes differ, levels of construction traffic movements will be low (further information is provided in the oTMPfC).
- 4.4.3 To minimise the use of the existing road network, haul routes have been proposed within the Order Limits. While these will be established early in the construction programme, some Project-related construction traffic would still need to access compounds via the local road network. The Transport Assessment (REF TBC) sets out the forecast impacts on traffic as a result of the Project. The use of the haul roads as part of the final mile approach is described in Section 6.
- 4.4.4 Plate 4.5 to Plate 4.8 show the additional access routes associated with utility works (in addition to the main works access routes) and the proposed utility logistic hubs (ULH) locations.

Plate 4.5 Compounds and HGV construction traffic routes (A13 to M25)

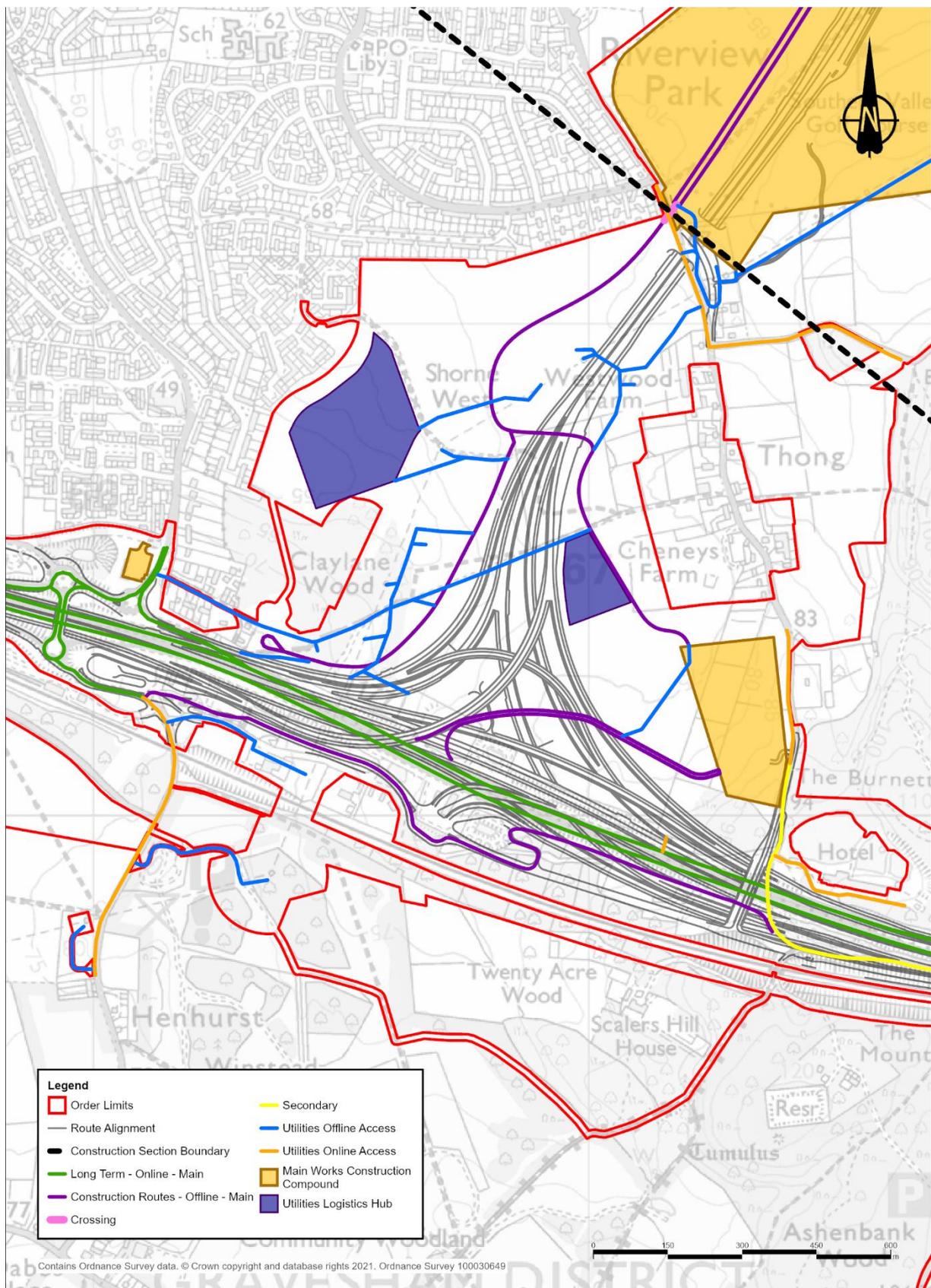


Plate 4.6 Compounds, ULH and HGV construction traffic routes including Utilities (South Portal to North Portal)

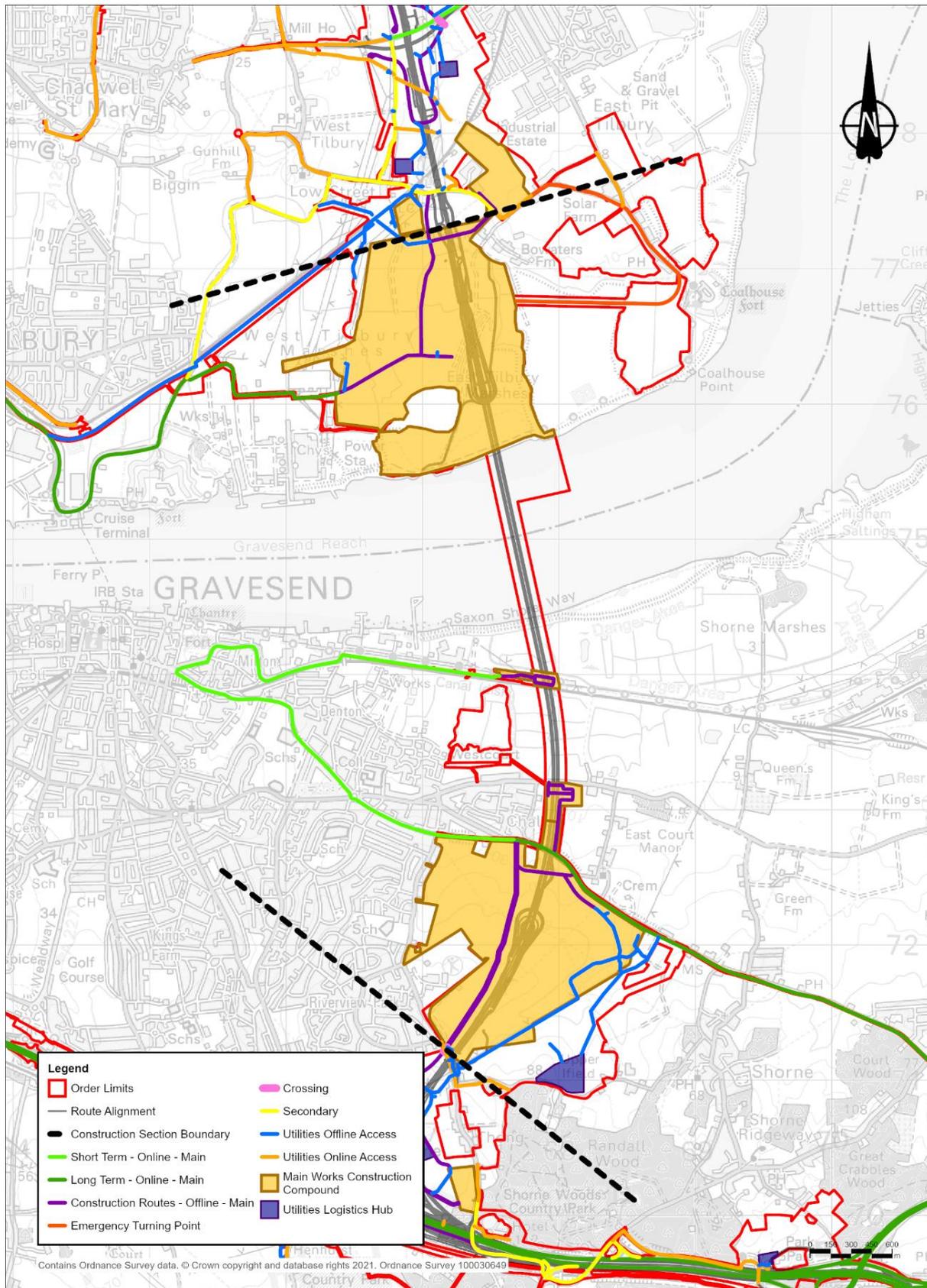


Plate 4.7 Compounds, ULH and HGV construction traffic routes including Utilities (North Portal to A13)

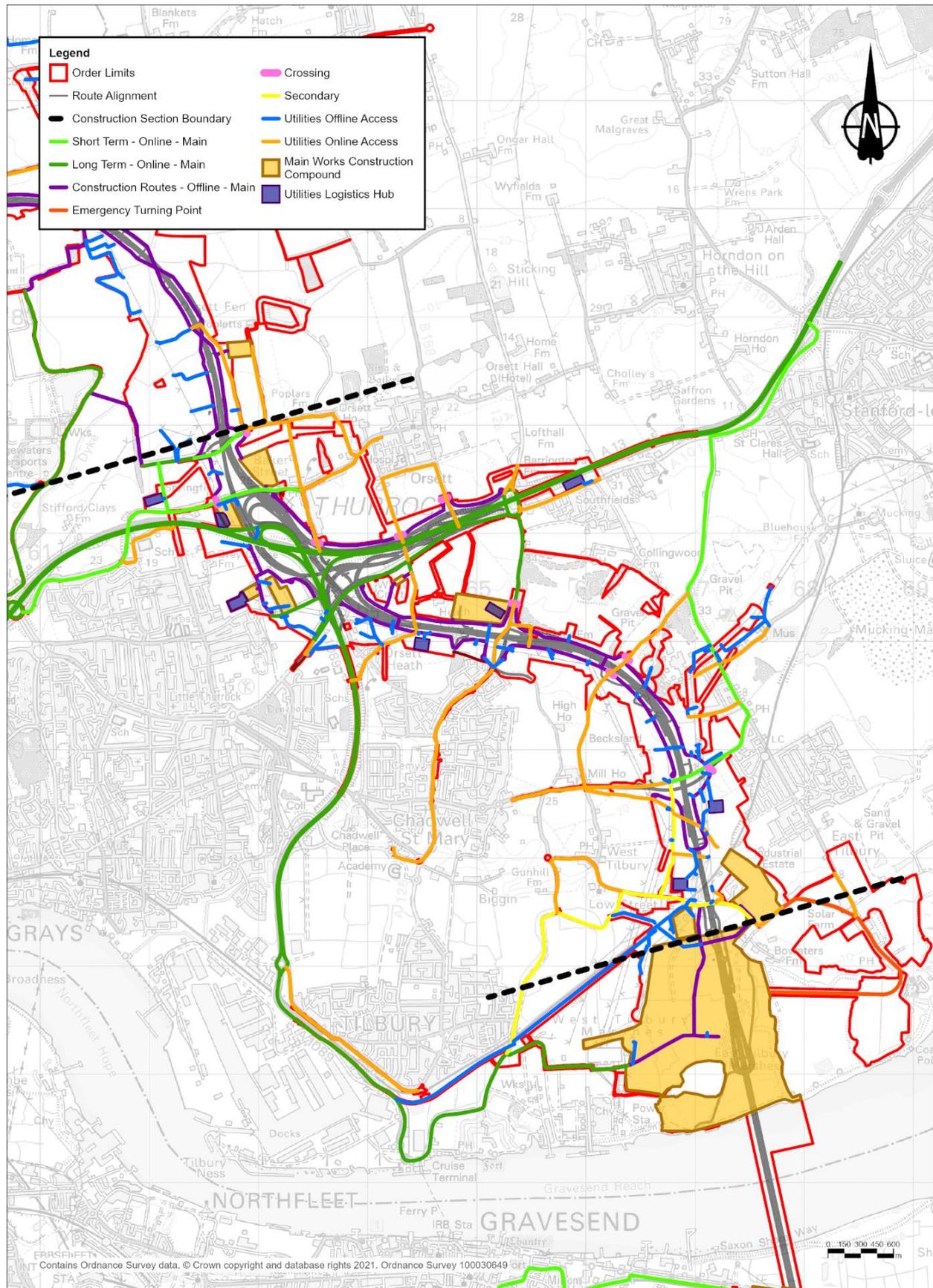
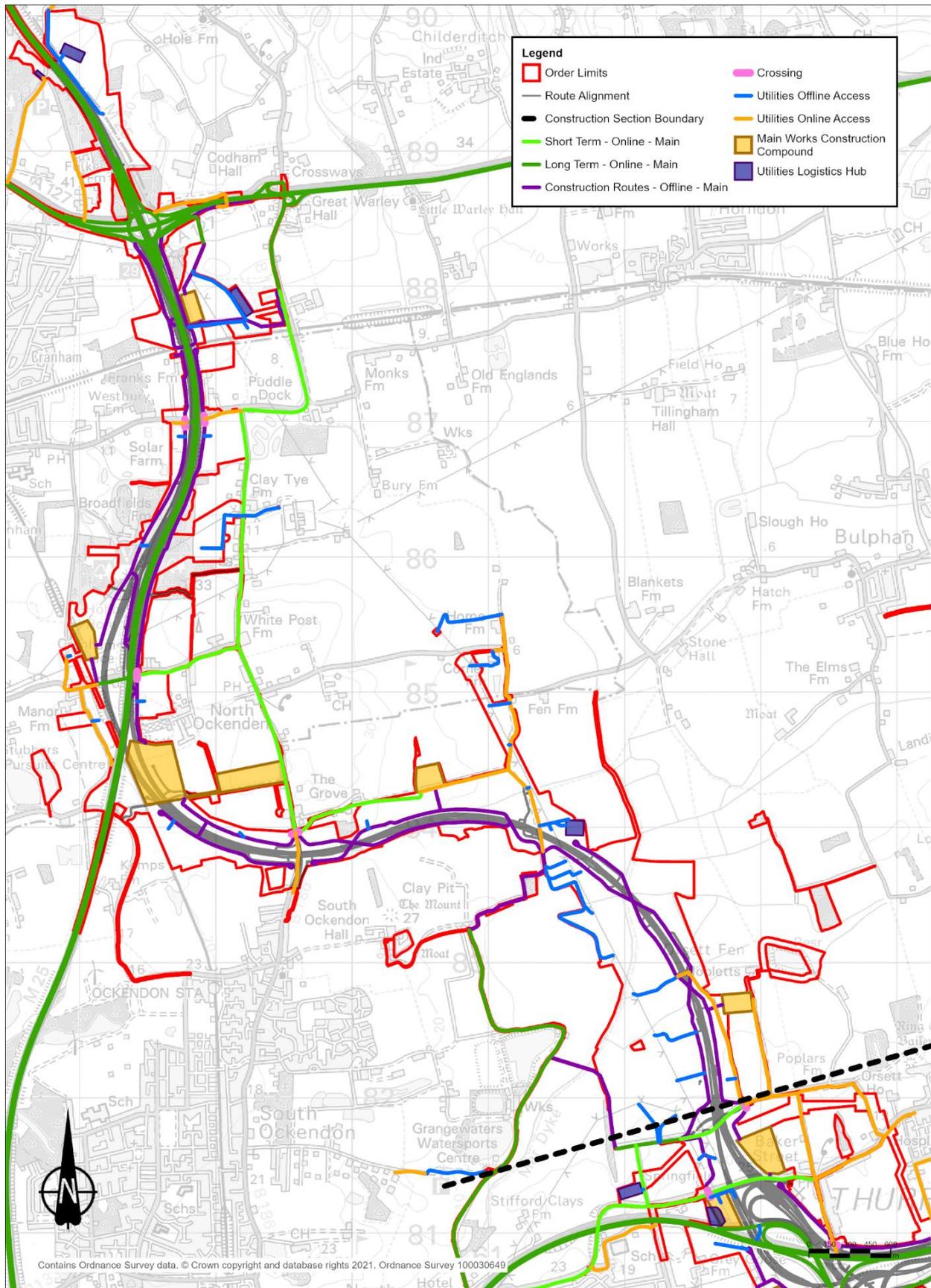


Plate 4.8 Compounds, ULH and HGV construction traffic routes including Utilities (A13 to M25)



5 Materials movements

5.1 Material supply

- 5.1.1 To assess the capability and capacity of suppliers to support the construction of the Project, potential local suppliers were identified and engaged. The purpose of the engagement was to understand the infrastructure in place to deliver the required materials and equipment via river, rail or local road, production capabilities and experience of supplying a major project.
- 5.1.2 The assessment has focused on material supplies that form the majority of Project demand in terms of quantity and frequency of construction deliveries. This included ready-mixed concrete, aggregates (sand, gravel, rock and recycled), cement and asphalt.
- 5.1.3 Kent County Council and Essex County Council have produced aggregate assessments for local supply opportunities.
- 5.1.4 Targeted engagement was also undertaken with suppliers that have numerous sites local to the Order Limits and experience of supplying major projects to better understand availability of supply within the 20km catchment area.
- 5.1.5 The assessment focused on a 20km catchment area, considered to equate to a road journey of up to one hour, which is considered to embody the proximity principle and focus on supply sites and depots most likely to be used in the Project's construction.
- 5.1.6 The sites identified in principle could form part of the appointed Contractors supply source during construction. It would be for the appointed Contractor to agree the procurement of their material supply during construction. The sites identified are listed in Appendix A and categorised by their multimodal delivery capabilities and proximity to the Project.

5.2 Material transportation to the Project sites

Aggregate transportation via rail

- 5.2.1 The majority of rail-borne aggregates used by the construction sector in London and the surrounding area are sourced from one of three areas: the Mendip Hills in Somerset, Leicestershire, or the Peak District.
- 5.2.2 Traffic from the Mendip Hills dominates, travelling along the Great Western route into Greater London at Acton. From this central facility (Acton), trains are forwarded or divided to carry large or smaller loads to their respective destinations
- 5.2.3 By contrast, traffic from Leicestershire and the Peak District tends to run directly to terminals via the Midland Main Line.
- 5.2.4 The review of potential local suppliers to support the delivery of the Project has identified several sites that utilise the existing rail paths to deliver material near to the Project. It would be possible to use rail as part of a multimodal approach to import materials to the Project via an existing rail connection, with onward transport via the road network.

- 5.2.5 Section 7 has provided detail on the limitations to provide a direct rail connection to the Project.

Aggregate transportation via river

- 5.2.6 As discussed in Section 3, there are three operational jetties on the north bank of the River Thames in close proximity to the Order Limits, however all the jetties are fully utilised by existing landowners and business owners and do not have additional capacity for import of materials for the construction of the Project.
- 5.2.7 Both Port of Tilbury London Limited (PoTLL) and Port of Tilbury2 are close to the Project Order Limits. Port of Tilbury2 has a Construction Materials Aggregate Terminal (CMAT) within it, which will receive aggregates by river and distribute onwards via road or rail into London and Essex. This provides an advantageous supply connection for the Project given its close geographical proximity.
- 5.2.8 The Project recognises the opportunity that Port of Tilbury2 presents for reducing vehicle movements by road. As such, the Project and MWCs will engage with aggregate suppliers and the Port of Tilbury2 collaboratively, to proactively seek opportunities to use the Port, and develop a strategy that supports reduction of material movement by road vehicles. This strategy should consider traffic impacts on the Asda roundabout and should also incorporate the principles of the 'final mile' strategy (Section 7.4).

5.3 Waste movement

- 5.3.1 Each construction compound would have a defined waste management area. Contractors would be required to define an area to enable the segregation of wastes to increase recovery. The oSWMP provides high-level principles for the management of waste during construction of the Project. Using the principles set in the oSWMP, a construction phase site waste management plan will be developed by the appointed Contractor during construction (refer to Control Plan extract in Plate 2.1).
- 5.3.2 The oSWMP also includes detail on the types and quantities of waste forecasted to be generated that will require management.
- 5.3.3 The Code of Construction Practice (CoCP) includes mitigation measures to support the reuse and recovery of materials and minimise offsite waste management to reduce the associated number of vehicle movements. Specific waste commitments are made in the REAC and detailed in the Outline Site Waste Management Plan

5.4 Excavated material receiver sites

- 5.4.1 It is important to understand the anticipated volumes of excavated material which will need to be taken offsite, to validate available offsite capacity at third-party receiver sites (Section 6.3 provides further detail on anticipated volumes).
- 5.4.2 A detailed description of the approach and identified receiver sites will be provided in the Excavated Materials Assessment (EMA) (REF TBC) which will be provided in the DCO Application. The EMA will provide a framework to allow the MWC to identify and assess new or alternative receiver sites which were not previously assessed, or which were previously excluded as potential receiver sites. This would be subject to the sites meeting the criteria established in the EMA.

- 5.4.3 By identifying potential receiver sites and demonstrating capacity, the EMA has helped develop assumptions for the management of excavated material, to inform the construction traffic impact assessments.
- 5.4.4 Appendix B provides an overview of the third-party waste facility sites identified to date.

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6 Movements of excavated material

6.1 Introduction

- 6.1.1 An assessment of earthwork quantities has been carried out to establish an illustrative approach to handling excavated material. This will include associated mass haul movements i.e. how is the transportation of excavated material handled between point of excavation to destination for placement, stockpiling and/or management offsite. This assessment has been used as a baseline position to support the traffic and environment assessments.
- 6.1.2 The earthwork assessment includes the following:
- Quantification of excavated material defined as surplus to the needs of the Project
 - Indicative illustration of mass haul movements using the temporary haul roads defined as 'offline', and movements using the road network defined as 'online'
 - A project wide view to the management and handling of excavated material.
- 6.1.3 The ground investigation works have provided information on the physical (geotechnical) and chemical properties of excavated material. It is important to understand the anticipated quantities and geology of the excavated materials to establish appropriate handling and use onsite, or management offsite if surplus to requirements and if hazardous materials are encountered.
- 6.1.4 The mass haul movements shown in the assessment are indicative and likely to change as the Project is developed through detailed design, and as the nature of the ground is fully understood during excavation activities.
- 6.1.5 Detail has been provided within section 6.4 regarding the duration of excavated material mass movements where vehicles need to move via an online route and the process may be obstructive, e.g. a planned road closure is required to facilitate the movement safely and mitigate the impact on the road network. Mass haul movements that are offline along the internal haul road are generally unconstrained and will be carried out in line with the appointed Contractor phasing and programme of works.

6.2 Overview of excavated material volumes

- 6.2.1 The Project would require onsite retention (within the Order Limits) of approximately 11.7 million m³ of excavated materials. The volume of material considered to be unsuitable for reuse, or surplus and requiring management offsite, is estimated to be approximately 1.33 million m³.
- 6.2.2 Table 6.1 provides a further breakdown of the excavated material volumes.

Table 6.1 Volume and type of excavated materials (as dug)

Location	Section A - Kent Roads		
South of the River Thames	Material type	Material is anticipated to be Chalk (as dug), with lesser contributions of made ground and Head deposits.	
	Excavated volume (m ³)	~1,480,000	
	Volume for retention within Order Limits (m ³)	~1,458,000	
	Volume for offsite management (m ³)	Inert	0
Hazardous		~22,000	
Section B (South of River Thames) – Tunnels & Approaches			
South of the River Thames	Material type	Material is anticipated to be Chalk (as dug) with lesser contributions of made ground, Alluvium, River Terrace Deposits and Head deposits.	
	Excavated volume (m ³)	~2,515,000	
	Volume for retention within Order Limits (m ³)	~2,513,000	
	Volume for offsite management (m ³)	Inert	0
Hazardous		~2,000	
Section B (North of River Thames) – Tunnels & Approaches			
North of the River Thames	Material type	Material is anticipated to be Chalk slurry (from tunnel boring machine (TBM) with made ground (landfill), pulverised fuel ash, Peat and Alluvium from the launch ramp and North Portal area.	
	Excavated volume (m ³)	~2,135,000	
	Volume for retention within Order Limits (m ³)	~2,110,000	
	Volume for offsite management (m ³)	Inert	~520,000 * <i>offline transportation to IVL receiver site located within the order limits</i>
Hazardous		~25,000* offsite management (outside of Order Limits)	
Section C – Roads North			
North of the River Thames	Material type	Material is anticipated to be made ground, Alluvium, River Terrace Deposits and Clay	
	Excavated volume (m ³)	~3,195,000	
	Volume for retention within Order Limits (m ³)	~2,710,000	
	Volume for offsite management (m ³)	Inert	~470,000
Hazardous		~15,000	

Section D – Roads North				
North of the River Thames	Material type	Material is anticipated to be made ground, Alluvium, River Terrace Deposits and Clay		
	Excavated volume (m ³)	~2,405,000		
	Volume for retention within Order Limits (m ³)	~1,606,000		
	Volume for offsite management (m ³)	Inert	~793,000	
Hazardous		~6,000		
Summary				
Project Total	Excavated volume (m ³)	~11,730,000		
	Volume for retention within Order Limits (m ³)	~10,397,000		
	Volume for offsite management (m ³)	Inert (management outside of Order Limit)	~1,333,000,	
		Inert (management within the Order Limits)	~520,000	
Hazardous		~70,000		

6.3 Provision for stockpiling

General approach

- 6.3.1 It will be necessary to include provision for stockpiling of excavated materials during construction works, to aid the phasing of construction and the reuse of material across the Project. Where practicable, the phasing of the earthwork activities would promote minimising double handling (handling and placement of excavated material more times than necessary) and movement of material to its permanent destination.
- 6.3.2 Provision has been made within the Order Limits for stockpiles. Within compounds, stockpiles will be managed relative to the site-specific activities. The stockpiling areas will consider sensitive receptors in the layout, along with managing the impact of the following:
- Lighting
 - Access and egress
 - Loading/unloading areas (including hours of operation)
 - Dust
 - Noise
 - Visual impact
 - Rainwater runoff

- 6.3.3 Where reasonably practical, the stockpile locations within the compounds will be positioned to provide mitigation, such as sound or visual barriers, in line with the environmental impact assessment (REF TBC). This mitigation is detailed in the Register of Environmental Actions and Commitments

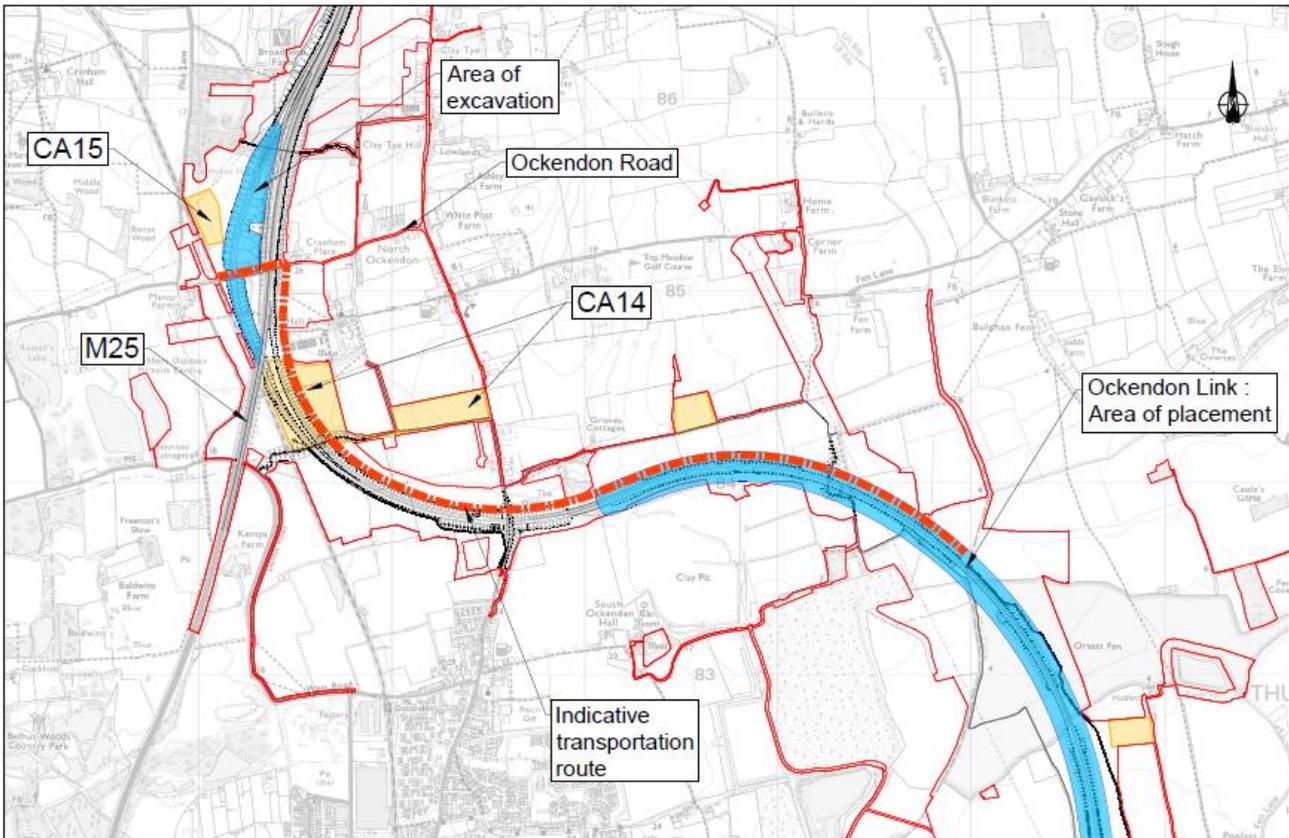
6.4 Offline transportation of excavated material

- 6.4.1 Mass haul movements of excavated material within the worksites would predominately be offline via a constructed internal haul road network.
- 6.4.2 A key principle in the handling of excavated material is to maximise the transportation via offline haul roads to minimise the impact on the online road network, both strategic and local.
- 6.4.3 There would be over 11.7 million m³ of material excavated to be transported across the site for reuse, with a further 1.34 million m³ estimated for management offsite.
- 6.4.4 The following primary worksite locations have been identified where significant offline movements would occur. The locations are presented by each of the key construction areas in terms of the site geography: Roads North; Tunnels; and Kent Roads. For each worksite described, the associated compound has been referenced to provide context to location and access arrangements.

Roads North

To construct the Ockendon Link

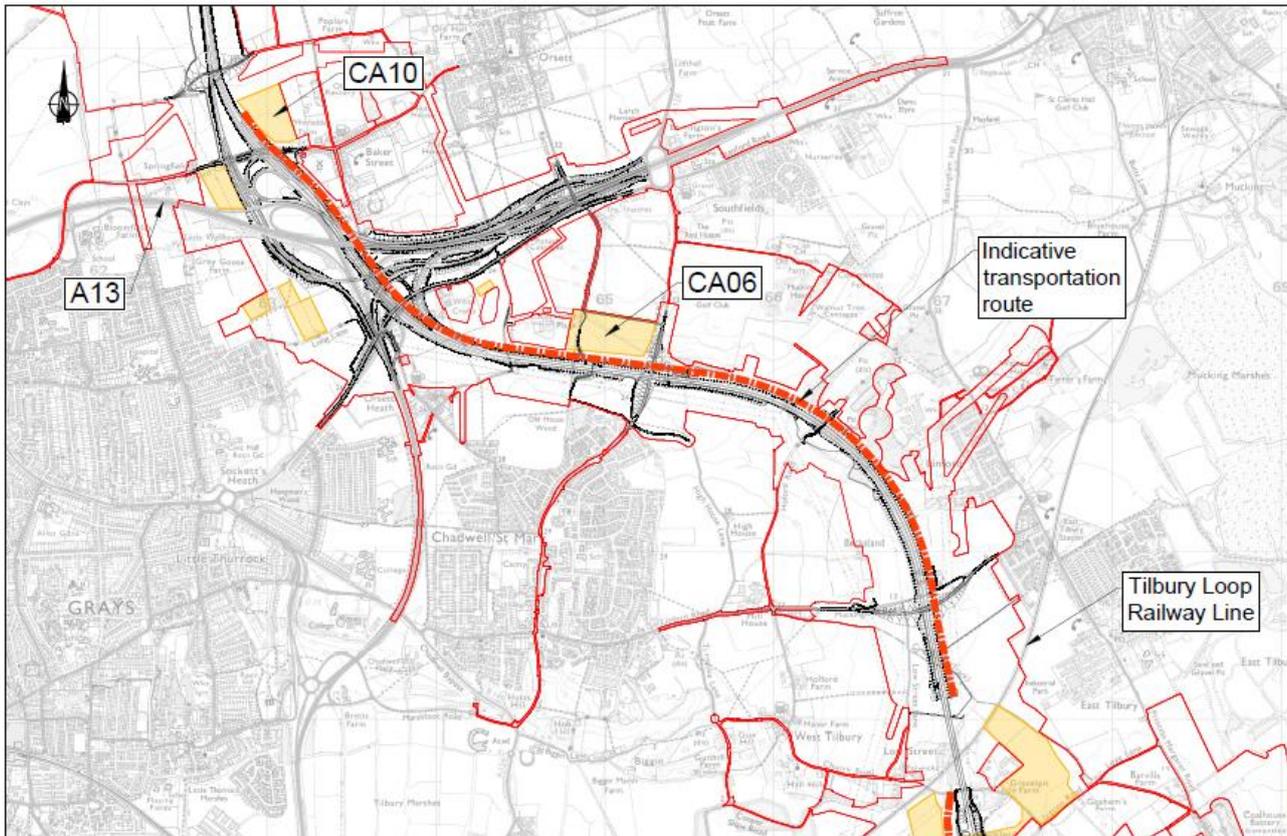
- 6.4.5 Several earthwork operations would be required to form the embankments for the proposed Ockendon Link of the Project route (CA14, CA13 & CA11). The location west of the M25 (CA15) where a deep cutting would be formed to connect the Project road to the M25, has been identified as a source for suitable material to form these embankments in addition to material sourced from the Ockendon Link.
- 6.4.6 The earthwork operation assessment has identified a deficit of approximately 100,00 m³ for suitable material within the Ockendon Link location.
- 6.4.7 The worksites between the location of the material source west of the M25 (point of excavation) and placement will be constrained by the existing M25 alignment to maintain a direct offline route. It is anticipated that there will be over 12,000 construction vehicle movements to transport the excavated material using the road network. To mitigate this online movement, the transportation period will align with the closure of Ockendon Road over a period of up to 20 months. The material will then be transported using earthmoving construction vehicles along Ockendon Road during the closure period. This will provide direct offline access to the haul road for transportation to the work sites associated with the construction of the Ockendon Link, while mitigating any associated construction traffic impacts associated with this mass haul movement on the online road network. The proposed route is shown in Plate 6.1.

Plate 6.1 Ockendon Road offline haul route

South of A13 up to the Tilbury Loop railway

- 6.4.8 The construction of the 4km section of the Project route south of the A13 up to the Tilbury Loop railway line (CA06) will require a significant earthwork operation. This will involve the construction of a series of embankments and false cuttings, to form the Project route and associated crossings over the local road network.
- 6.4.9 The earthwork operation assessment has identified a requirement for approximately 900,000m³ of excavated material to form the embankments and false cuttings, across the 4km section. It is anticipated that the primary source of material used would initially be from the cutting operations along the Project route within this section. Once a route is established under the A13 as part of the Project route, the remaining excavated material required will be sourced from the cutting operations north of the A13 (CA10).
- 6.4.10 The transportation of the 900,000 m³ of excavated material will be via the constructed haul roads using heavy duty construction vehicles. The haul road in this section follows the Project route including under the A13, mitigating the need to use the road network to access north of the A13. The haul road in this section would require a series of road crossings at the point of interface with the local road network. The road crossings will be managed under temporary traffic signals or a similar system. The oTMPfC provides further detail of temporary traffic management measures. This is illustrated in Plate 6.2.

Plate 6.2 Illustration of mass haul movements south of the A13 towards Tilbury Loop Rail line



Tunnels

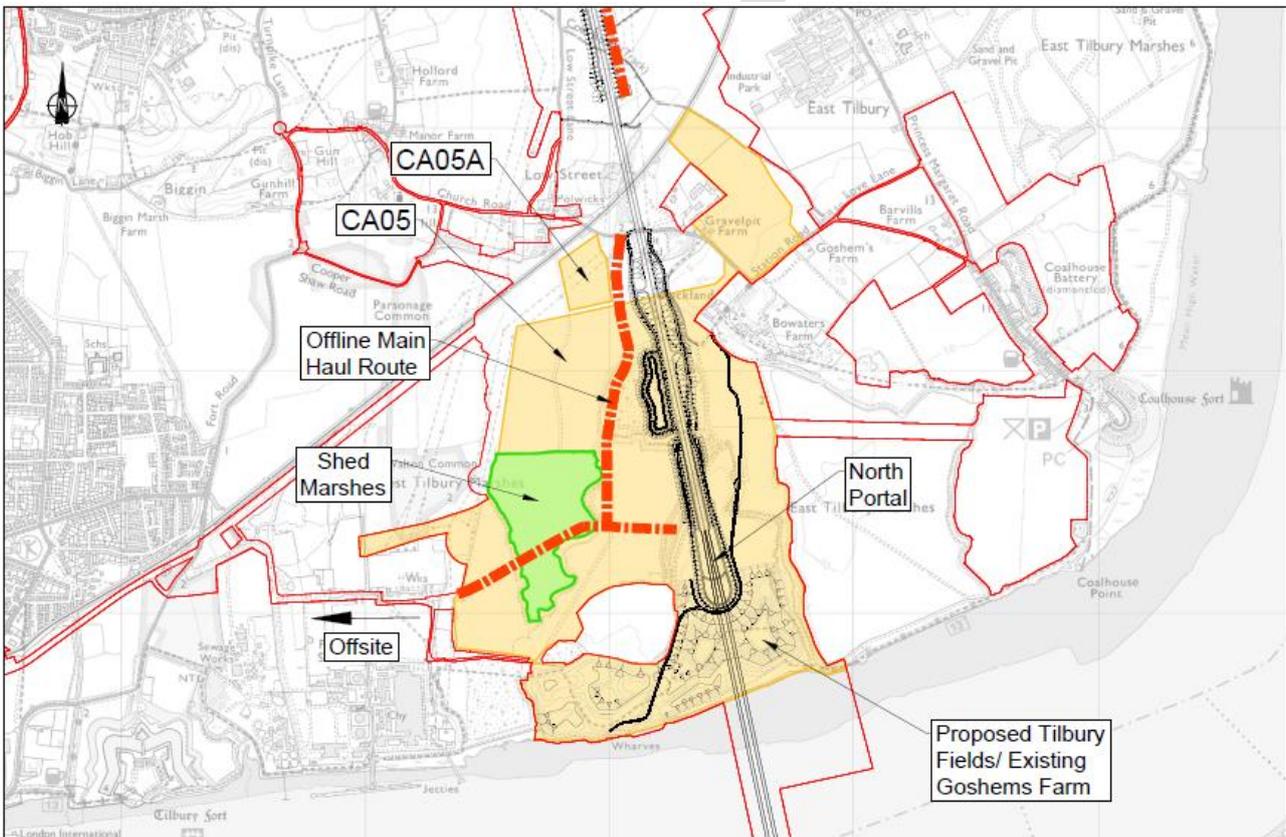
North Portal Site (CA05)

- 6.4.11 The earthwork operation at the North Portal site would involve the handling of approximately 2.1 million m³ of excavated material. This includes the material generated from the two TBMs.
- 6.4.12 The site is situated on and adjacent to Goshems Farm, a historical landfill site located between the North Portal and the River Thames and includes a parcel of land called Shed Marsh. The site is currently managed by Ingrebourne Valley Limited (IVL) as part of a restoration project to raise the land using inert material and restore it back to high quality, arable farmland. IVL has been receiving excavated material from several major infrastructure projects in London, for approximately five years. IVL operates the existing permits associated with these sites.
- 6.4.13 Shed Marsh would be used to temporarily store and manage excavated material generated from the North Portal and tunnelling operations.
- 6.4.14 As part of the proposed Project design the Tilbury Fields landscape feature will be situated on the existing Goshems Farm. The design of Tilbury Fields looks to utilise the excavated material generated from the construction of the tunnel and portal to create a multi-functional space located on the River Thames, and adjacent the Northern Portal. The various materials excavated from the tunnel can be used to create the substrate for the creation of an open mosaic habitat at Tilbury Fields, for the benefit of invertebrates and other fauna. The

designation of Tilbury Fields as a Park will help the regular disturbance of land that would benefit the open mosaic habitat.

- 6.4.15 Approximately 1 million m³ of material arisings from the north portal construction and tunnel boring will be used to develop the landscape feature. A further 550,000m³ will be used to form the embankments and landscaping surrounding the North Portal. It is anticipated the works will occur concurrently with the tunnelling and North Portal construction works as the excavated material becomes available for placement. The remaining surplus approximately 520,000m³ will be retained within the Order Limit and managed by IVL as part of their long-term restoration project.
- 6.4.16 The transportation of all the excavated material (excluding any contaminated material) from the North Portal construction and tunnelling operations will be offline, using heavy duty construction vehicles. Haul roads will be constructed to facilitate the movement of excavated material at the North Portal site.

Plate 6.3 Overview of the North Portal site and Goshems Farm



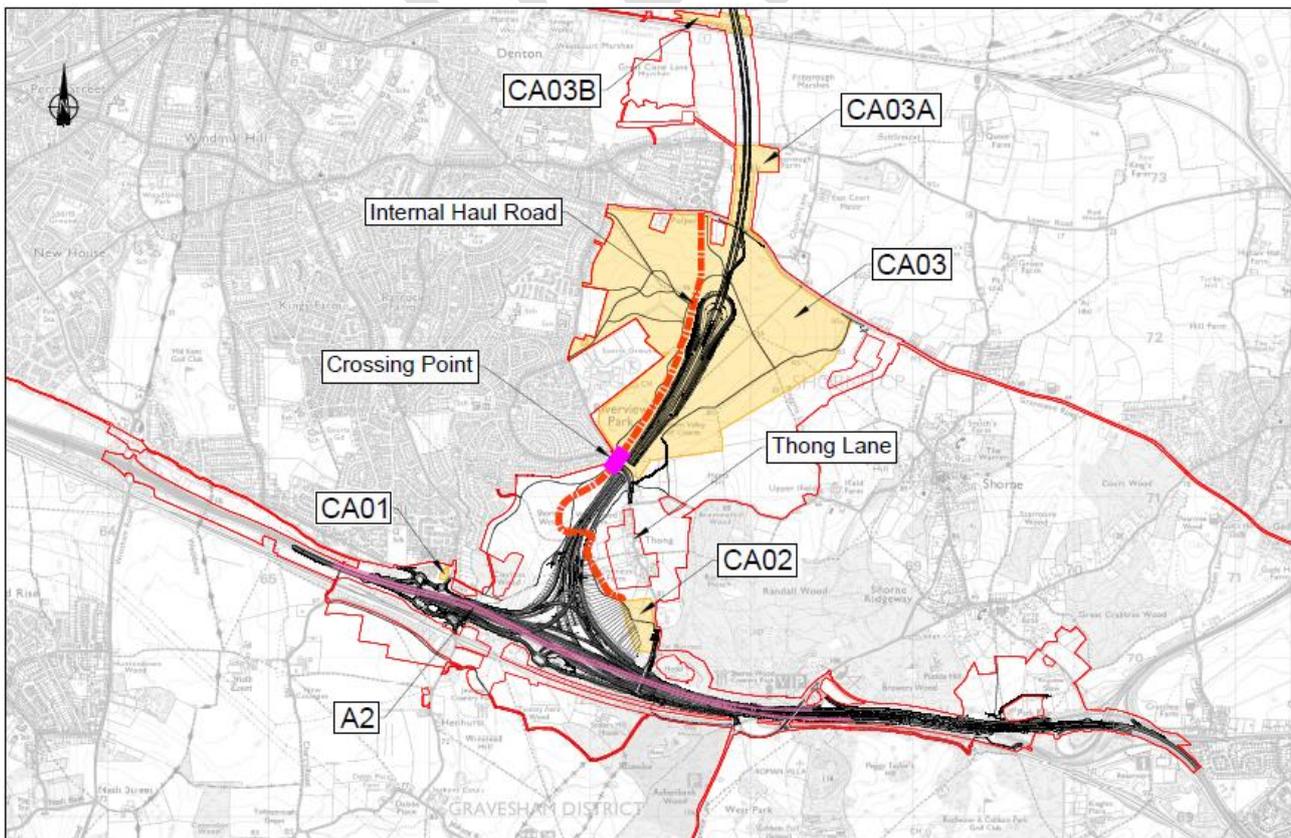
Kent Roads

Between Thong Lane and the A2

- 6.4.17 The construction of the Project route north of the A2 and south of Thong Lane (in the vicinity of CA02) involves a series of deep cuttings and construction of embankments.

- 6.4.18 The earthwork operation would require approximately 1.4 million m³ of excavated material to be handled and placed to form the deep cuttings, embankments and proposed Project landscape contours. The earthwork assessment has identified there is a deficit of 270,000 m³ of excavated material, which will be sourced from the South Portal site (CA03), just north of Thong Lane.
- 6.4.19 The remaining 1.13 million m³ will be sourced from the cutting operations between Thong Lane and the A2.
- 6.4.20 The transportation of the 1.4million m³ of excavated material will be via the constructed haul roads using heavy duty construction vehicles. The haul road in this section follows the Project route and will be modified to suit the phasing of the works in this area.
- 6.4.21 It is anticipated there will be over 15,000 movements associated with transporting the excavated material from the South Portal worksite to south of Thong Lane. This material will be transported along the internal haul road but would need to cross Thong Lane. The road crossing will be managed under temporary traffic signals or a similar system to manage the traffic flows along Thong Lane. In addition, provision has been made within the Order Limits either side of the proposed Project route and associated compounds (CA02 and CA03) for stockpiling of material. Stockpiling will reduce the frequency of vehicle movements and mitigate against construction impacts associated with the construction vehicle movements at the crossing point.

Plate 6.4 Transportation route of excavated material between the South Portal site and south of Thong Lane



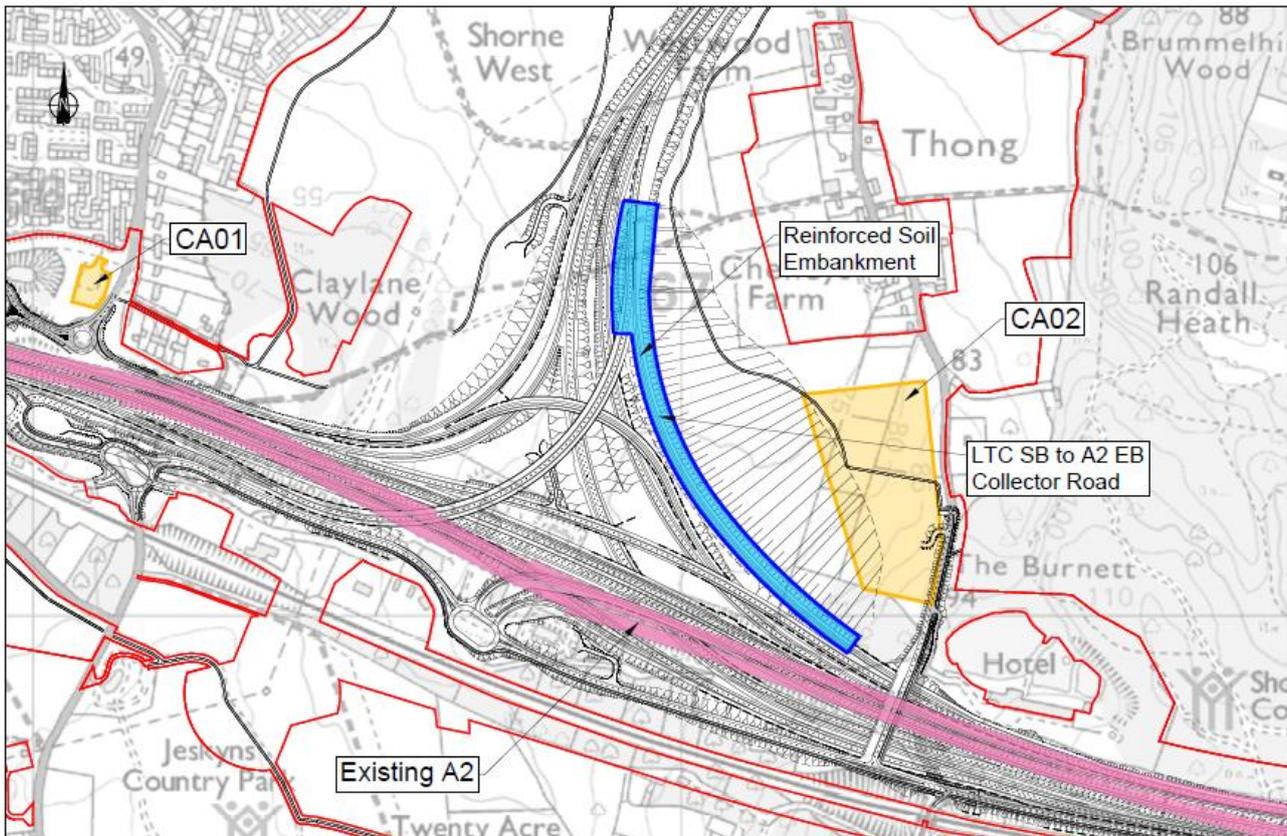
6.5 Online transportation of excavated material

- 6.5.1 There is a Project focus on maximising offline mass haul movements. In most cases, as described in Section 6.4, this has been achieved. In the circumstances described below, where online movements have been specified, this is due to physical constraints such as a railway line or crossing of the SRN. In the case for offsite management of excavated material, this is limited to a road-based approach due to the limitations with the use of rail and river described in Section 7.2.
- 6.5.2 The following locations have been identified where online movements would occur. The locations are presented by each of the key construction areas, i.e. Roads North, Tunnels and Kent Roads. For each worksite described the associated compound has been referenced to provide context to location and access arrangements.

Kent Roads

External importation of reinforced soil – CA02

- 6.5.3 The construction of the reinforced soil embankment to form the Project route southbound to A2 eastbound collector road would require the importation of reinforced soil. The initial ground investigation has indicated the material in this area is unlikely to be suitable to construct the reinforced soil embankments resulting in a requirement to import 360,000m³ of material.
- 6.5.4 The earthwork assessment has identified that the classification of the material required to form the reinforced soil embankments, will need to be imported from an external source i.e. excavated material not generated by the Project. The appointed Contractor would be required to source suitable material and transport it in accordance with the MHP and the temporary traffic management plan.
- 6.5.5 Due to the lack of suitable rail and river connectivity, the material would be transported using the earthmoving construction vehicles via the road network. The location of the worksite is in the vicinity of CA02 and the material would be transported via the A2 and onto the connecting haul road for placement and/or storing. The transportation of this material would require over 40,000 construction vehicle movements over a short period of time (anticipated less than one year). Provision for stockpiling has been made within CA02. This will provide flexibility in the transportation of material over a longer duration (within the anticipated 1-year) at a steady frequency to mitigate against the impacts of high frequency of movements over a short period.

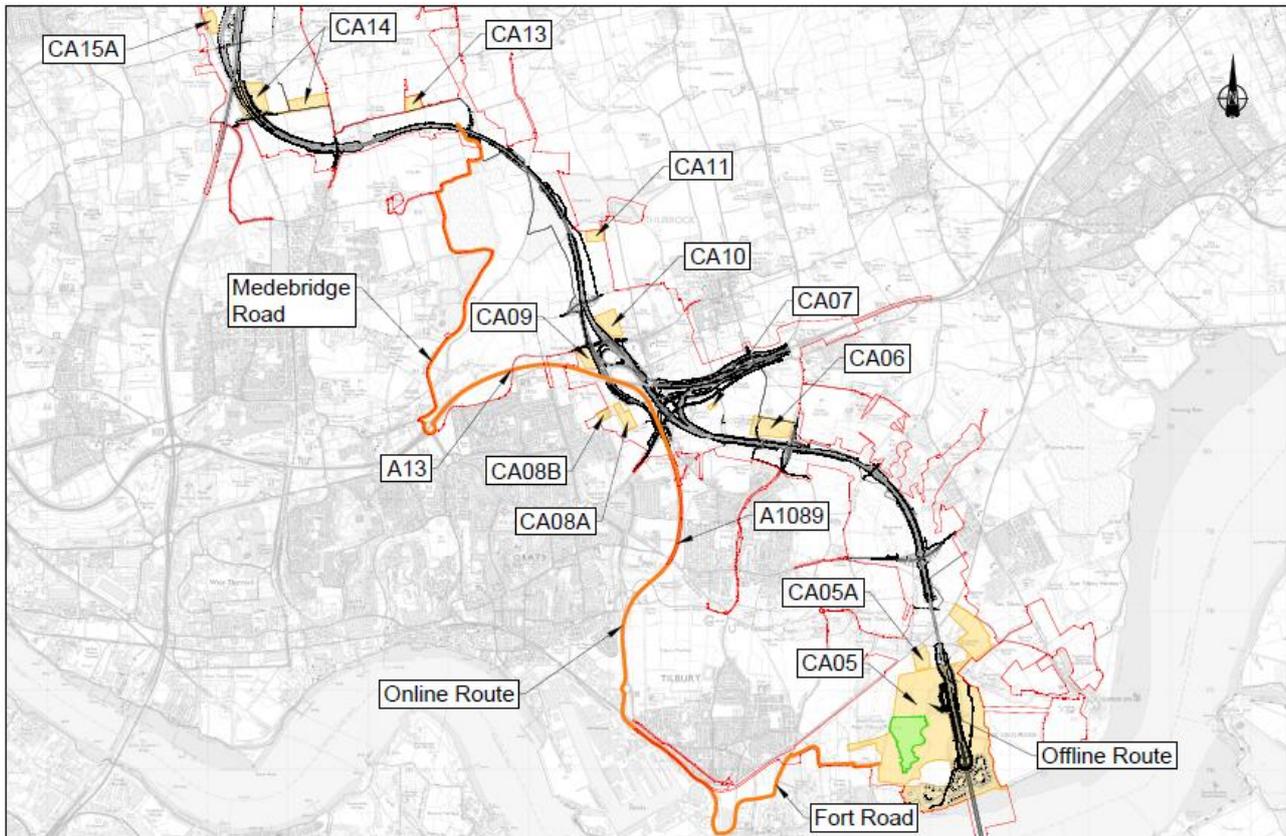
Plate 6.5 Location of reinforced soil embankment

Roads North & Tunnels

The transfer of excavated material between work sites in the vicinity of CA06, CA10 & CA14 to CA05 and CA05a

- 6.5.6 The construction of the Project route and connecting access road at the southern end of the Tilbury viaduct (CA05a) and North Portal approach (CA05) requires the construction of structural embankments. The initial ground investigation has indicated the material in this area is unlikely to be suitable to construct the structural embankments resulting in a requirement to import 310,000m³ of material.
- 6.5.7 The earthwork assessment has anticipated the importation of this material would come from the worksites located north of the Tilbury Loop railway line (CA06) including A13 (CA10) and the M25, where there is a surplus requirement of excavated material.
- 6.5.8 The offline transportation of material between worksites situated further north at the A13 and M25 worksites (CA06, CA10 and CA14) is constrained by the location of the Tilbury Loop railway line. The level crossing at Station Road has limited periods for traffic to cross over the Tilbury Loop railway line. With over 35,000 construction vehicle movements to transport the imported material the capacity for crossing at Station Road is not feasible. As a result, the online route identified would be via the A13, A1089 and Fort Road providing access to the worksite, while avoiding the use of the Station Road level crossing. It is anticipated that the material would be required towards the latter end of the programme. Provision has been made within the associated compounds for stockpiling to enable transportation of material over a longer period at lower frequency of HGV movements.

Plate 6.6 Online route of transportation of excavated material between worksites north and south of the Tilbury Loop railway



6.6 Management of material offsite to receiver sites

- 6.6.1 The earthwork assessment has identified the following quantities of excavated material as surplus to requirements, for management offsite:
- North of the River Thames: 1,309 million m³ (an additional 520,000m³ is managed by IVL but retained within the Order Limits)
 - South of the River Thames: 24,000m³ (of which all is contaminated material)
- 6.6.2 The above quantities include excavated contaminated material as well as inert excavated material.
- 6.6.3 As detailed in Section 5.4, the Excavated Material Assessment (REF TBC) will have a set a criterion to establish suitable receiver sites and waste facility sites. The appointed Contractor will identify suitable sites for transporting excavated material surplus to requirements.
- 6.6.4 The transportation of this material will be via the road network using earthmoving construction vehicles to suitable sites identified by the appointed Contractor. South of the River Thames, there are 3,000 construction vehicle movement and in the north over 155,000 construction vehicle movements associated with the surplus of excavated material.

- 6.6.5 It is anticipated the offsite transportation of the excavated material will be spaced out over the duration of the earthworks programme (approximately four years). In addition, provision has been made within the Order Limits including compounds for stockpiling of material. Doing so would mitigate against the construction impacts associated with the construction vehicle movements.

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7 Transport options for materials movement

7.1 Introduction

- 7.1.1 This section summarises the Project's material transport options and details the final mile approach.
- 7.1.2 There are limited existing direct connections to the Project Order Limits which can be used for the transport of material. A review of the use of road, river, and rail networks has been carried out with a focus on the final mile strategy (the road-based link between the multimodal point and the applicable construction worksite).
- 7.1.3 This has helped identify an approach to reduce and manage the impacts of construction vehicle movements (as set out in the oTMPfC) on the wider transport network and onsite materials management, by getting materials as close to the construction worksites as possible before using the road network.
- 7.1.4 Construction vehicle movements broadly cover the following:
- Hard materials/assets deliveries such as drainage pipes and ducting
 - Aggregate materials such as sand, cement and ballast
 - Abnormal loads for bridge beams and plant
 - Utility plant and materials
 - Waste removal
 - Earthworks movements on site

7.2 Considerations of transport options for material movement

Rail

- 7.2.1 There are no existing railheads within the Order Limits. As such, the feasibility of implementing direct rail connections has been evaluated in terms of environmental impacts, available capacity, construction demand and operations, as detailed below.
- Rail: south of the River Thames**
- 7.2.2 The construction works required to be undertaken south of the River Thames (TBM reception site and A2/M2 connection sites) will produce significant volumes of excess ground materials. The majority of this material will be used to execute project design. The only exception would be contaminated material, which would need to be disposed of offsite in an appropriate facility.
- 7.2.3 Hoo Junction is an operational rail yard 7km away by road. However, it is primarily used by track maintenance fleets and is sited on the busy North Kent railway line, with frequent commuter services which would impact the availability of this rail route (in terms of the timing and ability to dispatch a train). Because

works south of the River Thames (specifically the South Portal site and compound) are not physically adjacent to Hoo Junction, materials or arisings would need to be transported to the rail yard either by road or conveyor.

7.2.4 Movements by road from the South Portal compound to Hoo Junction would create a significant impact on the village of Higham by generating additional traffic through use of HGVs. A conveyor to transport materials to Hoo Junction would have to pass through the Thames Estuary and Marshes Ramsar site. The Ramsar site is of significant ecological importance and as such it is a Special Protection Area (SPA), the tunnel length was extended and southern portal relocated to avoid any construction works there. Therefore, construction of a conveyor through it is not considered an acceptable environmental impact (Para 7.2.32).

7.2.5 The impacts identified above have resulted in a direct rail connection south of the River Thames being considered unviable.

Rail: north of the River Thames

7.2.6 Three of the construction compounds north of the River Thames are located within 1km of existing rail connections: CA05, CA14, and CA15. All other construction compounds north of the River Thames are not considered viable for a rail connection, due to the extensive road transportation on the SRN or local roads (online) that would be required to move materials and supplies to a rail connection.

The North Portal construction area (CA05)

7.2.7 The North Portal construction area (CA05), from where the two TBMs would be launched and driven, is bordered by the existing Tilbury Loop railway line, and construction areas CA14 and CA15 in Thurrock, border the Ockendon branch railway line.

7.2.8 Construction area CA05 does not have direct rail access, even though it is bordered by a railway line. The majority of CA05 comprises landfill (current commercial operational and historic) and floodplain. The only potential site where a railhead or branch line could be created for this compound would be within the Port of Tilbury2 ecological mitigation area.

7.2.9 This is unsuitable given that it would cause Port of Tilbury2 to be in breach of a requirement of its DCOTilbury2. In light of the alternative existing rail facilities available in the immediate vicinity of the North Portal, it is considered disproportionate to construct a new temporary rail spur which would have the effect of dislodging the Port of Tilbury's environmental mitigation. As a result, a direct rail connection is not considered appropriate for material movement on the north side of the River Thames

7.2.10 It is therefore not possible to construct a railhead at the North Portal site (CA05).

Availability of existing rail paths and routes

7.2.11 The existing high volume of rail freight on lines north of the River Thames has limited the availability of train movements and routes for the movement of the Project's materials, arisings or equipment.

Construction areas CA14 and CA15

- 7.2.12 Construction areas CA14 and CA15, while bordered by the Ockendon branch railway line, cannot include a direct rail connection due to physical spatial constraints requirements. These requirements include the construction of 1500m of temporary sidings and maintenance track including an underpass to provide a route under the M25.
- 7.2.13 Further analysis has shown limited train path availability on the rail network in this region. There is currently an average of 12 free minutes per hour in which to start and complete a freight movement, which is insufficient for the Project demand.
- 7.2.14 Taking into consideration the combination of the physical spatial requirements and train path availability, it is not considered appropriate for material movement on the north side of the River Thames.

Rail summary

- 7.2.15 There are no existing direct rail connections to compounds within the Order Limits. Given the geographical and environmental constraints, combined with the associated planning and consenting challenges, it is not considered possible for the Project to construct a new railhead or any new rail lines to provide a direct rail connection.
- 7.2.16 Given the geographical constraints and lack of direct rail connections, rail is not considered a favourable transport option for the movement of materials away from the Project.
- 7.2.17 It would be possible to import bulk aggregates to the Project using a multimodal approach, via an existing rail connection, with onward transport via the road network. Refer to Appendix A, which identifies potential suppliers, including multi-modal transport options.

River

- 7.2.18 The Project Order Limits are directly adjacent to the River Thames. As such, existing river infrastructure in close proximity to the Order Limits has been considered, please refer to section 3.5.1.

Wharves

- 7.2.19 A number of wharves are in close proximity to the Order Limits, however following engagement with relevant stakeholders, including the owners and operators, the Project has been advised that they are all fully utilised by existing landowners and commercial operations. Consequently, they cannot provide a river connection for the Project.

Jetties

- 7.2.20 Two jetties are located in close proximity to the Project's Order Limits on the north bank of the River Thames: The East Tilbury Jetty, and the Ingrebourne Valley Jetty, which are considered below.
- 7.2.21 As outlined in Section 3, following stakeholder engagement, including the jetties owners and users, and full consideration of environmental and navigation

constraints, it has been determined that it will not be feasible for the Project to construct a new jetty (deep or shallow water) in the River Thames.

East Tilbury Jetty

- 7.2.22 The East Tilbury Jetty (also known as the Ferroviai Laing O'Rourke 'FLO' jetty) comprises a pontoon approximately 98m long by 24m wide, connected to land by a double bridge approximately 95m in length with 4.2m wide carriageways. The jetty is tidally constrained, providing mooring facilities for bulk cargo loading and unloading, currently operating a maximum of three 1,500t barges at high tide (therefore six barges in total per day).
- 7.2.23 It would theoretically be possible to use the jetty to deliver bulk aggregates or pre-cast sections to the Project construction compound at the North Portal (CA05) within the tidal window outline above, however the jetty is currently owned by FLO and used by Ingrebourne Valley Ltd (IVL). Its current and proposed future use is to receive waste from other local major projects (Tideway and Silvertown Tunnel in due course) and as such will be operating at full capacity. It is not possible for the Project to use the East Tilbury Jetty as it would cause unacceptable significant negative impact on existing project operations in the London area.

Ingrebourne Valley Jetty

- 7.2.24 This jetty comprises a pontoon approximately 70m long by 15m wide, connected to land by a single bridge approximately 35m in length with a 4.2m wide carriageway. The jetty provides mooring facilities for bulk cargo loading and unloading which is currently operating a maximum of two 1,500t barges at high tide (therefore four barges in total per day). It would be theoretically possible to use the jetty to deliver bulk aggregates or pre-cast sections to the Project construction compound at the North Portal (CA05).
- 7.2.25 The IVL jetty is used and owned by IVL. There are also upcoming projects for which the jetty is earmarked to supply. As such, it is not proposed to use this jetty as it would cause unacceptable negative impact on existing project operations in the London area and any additional demand from the Project would negatively impact on those operations.

Ports

- 7.2.26 In line with the Project approach of considering facilities located within a 20km catchment area (Section 5), approximating to a road journey of up to one hour, there are three ports within close proximity of the Project's Order Limits on the northern side of the River Thames: PoTLL and Port of Tilbury2, both approximately 3.5km to the west, and DP World London Gateway approximately 6.5 km to the east.
- 7.2.27 Both PoTLL and Port of Tilbury2 provide for aggregate supply and have already been used for the delivery of TBMs for other major projects in the London region, such as Thames Tideway. Currently, DP World London Gateway provides a logistics hub, but does not provide bulk aggregate facilities.

PoTLL and Tilbury2

- 7.2.28 The Port of Tilbury and Tilbury2 offer services including high-density container terminals, RoRo (roll-on/roll-off), CMAT, bulk cargo and liquid bulk terminal facilities, deep water mooring quay walls and jetties, and warehouse storage.
- 7.2.29 These facilities are suitable for loading and unloading of heavy cargo. An existing heavy lifting capacity of 140t exists with their available lifting equipment (undertaken by a third-party lifting contractor) for the loading and unloading of the largest TBM components and is therefore suitable in principle for use by the Project.

River summary

- 7.2.30 Of existing river infrastructure facilities, PoTLL and Port of Tilbury2 are well located for material movements for the Project via river. They are located in close proximity to the Order Limits at the North Portal (CA05), where bulk material supplies including aggregates and oversize equipment such as the TBMs can be delivered to support construction operations on the north side of the River Thames. These facilities will also be suitable for transporting tunnel spoil material if needed.
- 7.2.31 It would be feasible for the Project to import materials via existing ports on the north side of the River Thames (e.g. PoTLL and Tilbury2), with onward transport via the road network. Refer to Appendix A for references to using the multimodal transport options.

Conveyors

- 7.2.32 Conveyors have the ability to transport materials between different locations without the use of equivalent vehicle trips. They can operate at higher speed, capacity and over a greater distance than vehicles, per hour.

Conveyor usage south of the River Thames

- 7.2.33 A review was undertaken to assess the feasibility of the use of a conveyor system to transport arisings offsite from construction areas located south of the River Thames, i.e. from CA03 and CA02.
- 7.2.34 One potential conveyor route was identified for the Project construction sites south of the River Thames for the movement of material to and from site: Hoo Junction. This is a railyard approximately 7km away by road, with rail connectivity to the North Kent railway line (noting that this rail yard is primarily used by maintenance fleets – Section 6).
- 7.2.35 The conveyor routes would need to cross the Thames Estuary and Marshes Ramsar (Section 3) and as such, engagement was undertaken with statutory environmental bodies, including the Environment Agency, Natural England and the Royal Society for the Protection of Birds (RSPB).
- 7.2.36 Following engagement, it was considered that the use of conveyors to transport materials across the southern construction areas to a railyard, would cause a negative environmental impact on the Ramsar as a result of intrusive works required to install and operate the conveyor, and associated noise, and is therefore not feasible.

- 7.2.37 It remains possible to use conveyors to move material within the Order Limits between construction work sites south of the River Thames and will be explored as part of the preparation and submission of the Materials Handling Plan to the Secretary of State for approval.

Conveyor usage north of the River Thames

- 7.2.38 North of the River Thames, there is provision for conveyors to be used within the Order Limits to transport materials such as bulk aggregates and also to transfer tunnel arisings to Shed Marsh for IVL to process, once they have reached the tunnel portal.

Conveyor summary

- 7.2.39 It is considered feasible for a MWC to use conveyors to transport materials within the Order Limits on the north and south sides of the River Thames.
- 7.2.40 It is not considered feasible for a MWC to use conveyors to transport material outside of the Order Limits.

7.3 Multimodal transportation summary

- 7.3.1 In order to reduce HGV movements on the SRN and local road network, the MWC will consider the use of multimodal transport of materials.
- 7.3.2 Transport of materials by rail, river and conveyor have been considered, with the following conclusions:
- a. It would be possible to use rail as part of a multimodal approach to import materials to the Project via an existing rail connection, with onward transport via the road network.
 - b. It would be possible to use existing ports on the north side of the River Thames (e.g. PoTLL and Tilbury2) as part of a multimodal approach to material transport, subject to capacity, with onward transport via the road network.
 - c. It is considered feasible for a MWC to use conveyors to transport materials within the Order Limits on the northern and southern sides of the River Thames as part of a multimodal approach to material transport.
- 7.3.3 The Project requires the MWC to consider and implement a multimodal approach to material transport in order to minimise negative impacts and reduce safety risks. The Materials Handling Plan to be submitted to the Secretary of State for approval would include an explanation of how multi-modal solutions have been included and implemented or discounted.

7.4 Final mile strategy

Final mile strategy overview

- 7.4.1 The 'final mile' logistics refer to the last part of the material logistics journey. It is a description of the logistics phase at its most local geographical point to the Project and is applied to materials movements as a best practice approach.

- 7.4.2 Alignment with a final mile approach supports the use of multimodal transport systems to facilitate optimum transportation to reduce impacts as far as reasonably practicable and to control costs. This oMHP has identified suitable transport options, including river, rail and road, and the MWCs would complete further assessments, in accordance with the Control Plan (Section 2) to fully determine the optimum method of transporting materials from source to the Project construction sites.
- 7.4.3 The final mile solution would be implemented by the MWCs in conjunction with the oTMPfC, making full consideration of required mileage and mileage reduction, peak traffic hours conflicts and associated impacts.
- 7.4.4 Construction material suppliers identified within a 20km catchment area of the Project (Section 5) have been recognised as having used a final mile strategy that aligns with the Project. MWCs would be required to identify and appoint a supplier operating under these principles in order to optimise material handling.
- 7.4.5 Delivery to the construction site directly by rail does not appear feasible as the footprint needed for a railhead within the Order Limits that is clear of main lines, is not available when taking into account the site construction requirements.
- 7.4.6 The final mile strategy would see delivery and construction vehicles join the Project alignment via the identified access routes, to then join the internal haul route. A focus has been made to establish connection directly from the SRN where reasonably practicable to lessen the Project's dependency on the local road network.
- 7.4.7 The closest parts of the SRN to the Project are:
- a. M25
 - b. A13
 - c. A2/M2
 - d. A1089
- 7.4.8 The Project will require the Contractors to consult with the highway authority/authorities and adhere to freight and construction traffic routes (outlined in the oTMPfC). This will include a clear understanding of those routes which are not permitted, including any considerations around traffic-sensitive routes/roads and receptors. Refer to the oTMPfC for the principles and mechanism which would be applied and reflected in the TMPfC

8 Summary

8.1 Overview

- 8.1.1 This oMHP is secured via Schedule 2 Requirements of the DCO. It sets out the approach and high-level principles for handling construction materials and waste on the Project. This applies to handling operations both inside and outside the Order Limits. It is relevant to all construction works required for the Project.
- 8.1.2 An MHP will be produced during the construction phase of the Project, which would be expected to be substantially in accordance with this oMHP. The MHP would set out a detailed approach for material movement and handling, taking into account a higher level of detail that will be available at this stage, including design, construction programme, traffic management, environmental management and site waste management requirements and commitments.
- 8.1.3 This oMHP sets out requirements to optimise vehicle logistics, as well as the use of multimodal transportation to reduce impacts. Construction compounds and Utilities Logistic Hubs will be used to optimise vehicle movement for material movements, storage and use.
- 8.1.4 A number of considerations and constraints have been identified with regards to environmental sensitivity and existing infrastructure, which influences the approach the Project can take in terms of optimising transportation for materials handling.
- 8.1.5 The Project has engaged with potential local aggregate suppliers to facilitate the assessment of both capability and capacity to support its construction. This has enabled the OHMP to identify practicable material transport routes for delivery at compounds within the Order Limits.
- 8.1.6 Excavated materials volumes are provided and movements of these materials will be subject to the requirements of the OHMP, both inside the Order Limits (offline) and outside (online). The majority of excavated materials is proposed to be reused within the Project, however for any materials that cannot be reused, receiver sites and associated vehicle movements have been identified.

8.2 Transport Options

- 8.2.1 There are limited existing direct transport connections to the Project Order Limits which can be used for the transport of material. A review of the use of road, river, and rail networks has been carried out with a focus on the final mile strategy (the road-based link between the multimodal point and the applicable construction worksite).
- 8.2.2 This has helped identify an approach to reduce and manage the impacts of construction vehicle movements on the wider transport network and onsite materials management, by getting materials as close to the construction worksites as possible before using the road network.

Rail

- 8.2.3 There are no existing direct rail connections to compounds within the Order Limits. Given the geographical and environmental constraints, combined with the associated planning and consenting challenges, it is not considered possible for the Project to construct a new railhead or any new rail lines to provide a direct rail connection.
- 8.2.4 For the movement of materials away from the Project, rail is not considered a favourable transport option owing to geographical constraints and the lack of existing connections.
- 8.2.5 It would be possible to import bulk aggregates to the Project using a multimodal approach, via an existing rail connection, with onward transport via the road network.

River

- 8.2.6 PoTLL and Port of Tilbury2 are well located for material movements for the Project via river. They are located in close proximity to the Order Limits at the North Portal (CA05), where bulk material supplies including aggregates and oversize equipment such as the TBMs can be delivered to support construction operations on the north side of the River Thames. These facilities will also be suitable for transporting tunnel spoil material if needed.
- 8.2.7 It would be possible to import materials to the Project via existing ports on the north side of the River Thames (e.g. PoTLL and Tilbury2), with onward transport via the road network.

Conveyors

- 8.2.8 The use of conveyors can optimise material movements through speed and volume and reduces vehicle movements.
- 8.2.9 It is considered feasible for a MWC to use conveyors to transport materials within the Order Limits on the north and south sides of the River Thames.
- 8.2.10 It is not considered feasible for a MWC to use conveyors to transport material outside of the Order Limits.

Multimodal

- 8.2.11 In order to reduce HGV movements on the SRN and local road network, the MWC will consider the use of multimodal transport of materials. This will require combining the material transport options identified above to identify the most efficient method, to optimise movements and reduce impacts. The following conclusions have been drawn:
- a. It would be possible to use rail as part of a multimodal approach to import materials to the Project via an existing rail connection, with onward transport via the road network.
 - b. It would be possible to use existing ports on the north side of the River Thames (eg PoTLL and Tilbury2) as part of a multimodal approach to material transport, with onward transport via the road network.

- c. It is considered feasible for a MWC to use conveyors to transport materials within the Order Limits on the northern and southern sides of the River Thames as part of a multimodal approach to material transport.

Final Mile strategy

- 8.2.12 The final mile solution would be implemented by the MWCs in conjunction with the oTMPfC, making full consideration of required mileage and mileage reduction, peak traffic hours conflicts and associated impacts.
- 8.2.13 The focus of the final mile strategy is that delivery and construction vehicles join the Project's internal haul route as quickly as possible from the SRN (where practicable) to reduce the Project's dependency and impact on the local road network.
- 8.2.14 The Project would require the Contractors to consult with the highway authority/authorities and adhere to freight and construction traffic routes (outlined in the oTMPfC). This would include a clear understanding of those routes which are not permitted, including any considerations around traffic-sensitive routes/roads and receptors.
- 8.2.15 The final mile strategy should be applied in combination with the full consideration of transport options and a multimodal approach to material movements.

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Appendices

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Appendix A Identified suppliers and transportation options assessment

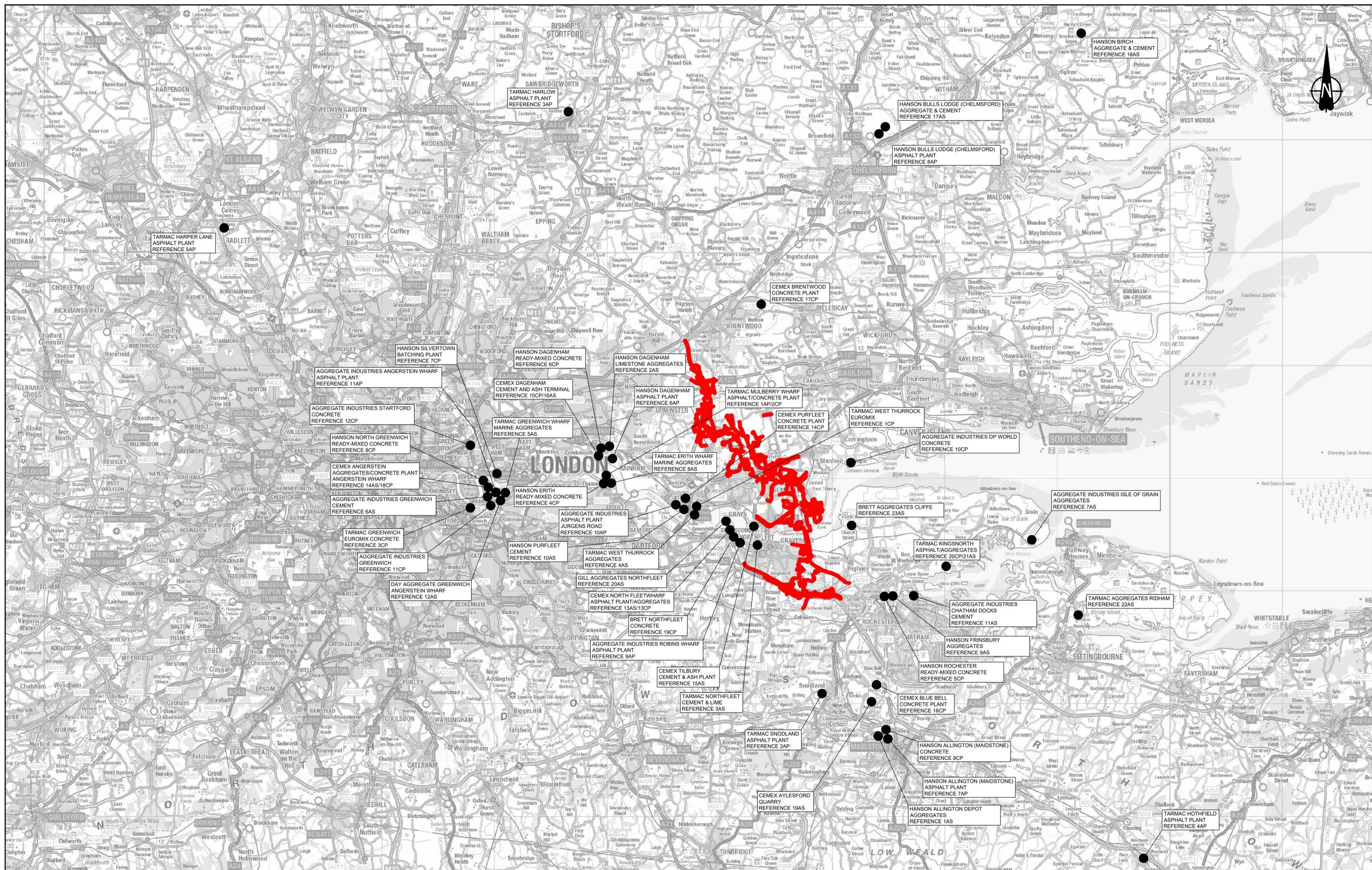
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A.1 Local Overview of Potential Supply Sites for Aggregates, cement ready-mixed concrete and asphalt

A.2 Potential supplier sites (aggregates and cement) identified and categorised by their multimodal delivery capabilities and proximity to the Project via the use of the road network

A.3 Potential supplier sites (ready mixed concrete & asphalt) identified and categorised by their multimodal delivery capabilities and proximity to the Project via the use of the road network

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- NOTES:
- DRAWING TO BE READ IN CONJUNCTION WITH OUTLINE MATERIAL HANDLING PLAN AND ASSOCIATED TABLE SHOWING MULTIMODAL OPTIONS OF POTENTIAL SUPPLY SITES.
 - STUDY BASED ON AN APPROXIMATE 20km CATCHMENT AREA.
 - SUPPLY SITES IDENTIFIED IS NOT EXCLUSIVE.

LEGEND:

- ORDER LIMITS
- IDENTIFIED SUPPLY SITE

Client

LOWER THAMES CROSSING
5th Floor Beaufort House
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London EC3A 7DT

Project **LOWER THAMES CROSSING DEVELOPMENT PHASE**

Drawing title **LOCAL OVERVIEW OF POTENTIAL SUPPLY SITES FOR AGGREGATES, CEMENT, READY-MIXED CONCRETE & ASPHALT**

Status	S2	Fit for Information	Original Size	Revision
Drawn	PEg		A1	P01
Checked	MH		Scale	NTS
Approved	JSH		Date -	24/06/2021
Drawing number	HE540039-CJV-GCL-S3P_ZZZZZZZZ-DR-CW-0009			

P01	S2	24/06/2021	For Information	PEg	MH	JSH
Rev	Status	Rev. Date	Purpose of revision	Drawn	Check'd	Appr'd

Appendix A.2: Potential supplier sites (aggregates and cement) identified and categorised by their multimodal delivery capabilities and proximity to the Project via the use of the road network

Ref	Material	Supplier	Suppliers Delivery Site	Potential Delivery Site for LTC	Distance and average duration between supplier delivery site and LTC (Area A, B South, B North, C & D)					Comments
					A	B South	B North	C	D	
Rail/Road										
1AS	Limestone Aggregate	Hanson	Allington Depot	Hoo Junction	Yes (Delivered to Hoo Junction) 30min (14miles)	Yes (Delivered to Hoo Junction) 30min (14miles)	Crossing of river required 40min (14.5miles)	Crossing of river required 50min (10miles)	Crossing of river required 50min (20miles)	Local roads not suitable for HGV between Hoo Junction and Compound 2 & 3, hence off road solution required i.e. overground conveyor or direct delivery from supplier site "Allington"
2AS	Limestone Aggregate	Hanson	Dagenham	Tilbury (Freight Services)	Crossing of river required 45min (25miles)	Crossing of river required 35min (20miles)	Yes (Delivered to Tilbury) 25min (17miles)	Yes (Direct from Dagenham) 15min (12miles)	Yes (Direct from Dagenham) 15min (10miles)	Situated north of the river
3AS	Cement	Tarmac	Northfleet	Hoo Junction	Yes (Delivered to Hoo Junction) 15min (6miles)	Yes (Delivered to Hoo Junction) 20min (11miles)	Crossing of river required 35min (19.5miles)	Crossing of river required 30min (16miles)	Crossing of river required 35min (20miles)	Local roads not suitable for HGV between Hoo Junction and Compound 2 & 3, hence off road solution required i.e. overground conveyor or direct delivery from supplier site "Northfleet".
4AS	Cement	Tarmac	West Thurrock	Tilbury (Freight Services)	Crossing of river required 25min (14miles)	Crossing of river required 35min (17miles)	Yes (Delivered to Tilbury) 20min (11miles)	Yes (Direct from Thurrock) 12min (6miles)	Yes (Direct from Thurrock) 10min (5miles)	Situated north of the river
5AS	Cement	Tarmac	Greenwich Wharf	Hoo Junction	Yes (Delivered to Hoo Junction) 40min (25miles)	Yes (Delivered to Hoo Junction) 30min (19miles)	Crossing of river required 50min (27miles)	Crossing of river required 22min (40miles)	Crossing of river required 50min (20miles)	Local roads not suitable for HGV between Hoo Junction and Compound 2 & 3, hence off road solution required i.e. overground conveyor or direct delivery from supplier site "Greenwich"
6AS	Cement	AI	Greenwich (Angerstein) Wharf	Hoo Junction	Yes (Delivered to Hoo Junction) 25min (19miles)	Yes (Delivered to Hoo Junction) 35min (24miles)	Crossing of river required 40min (26miles)	Crossing of river required 35min (22miles)	Crossing of river required 30min (19.5miles)	Local roads not suitable for HGV between Hoo Junction and Compound 2 & 3, hence off road solution required i.e. overground conveyor or direct delivery from supplier site "Greenwich"
7AS	Aggregates (Sand Gravel)	AI	Isle of Grain	Hoo Junction	Yes (Delivered to Hoo Junction) 30min (17miles)	Yes (Delivered to Hoo Junction) 25min (14miles)	Crossing of river required 60min (31miles)	Crossing of river required 60min (32miles)	Crossing of river required 65min (30miles)	Local roads not suitable for HGV between Hoo Junction and Compound 2 & 3, hence off road solution required i.e. overground conveyor or direct delivery from supplier site "Isle of Grain".
10CP	Aggregates	AI	DP-London Gateway	Tilbury (Freight Services)	Crossing of river required 35min (22miles)	Crossing of river required 40min (26miles)	Yes (Delivered to Tilbury) 15min (8.5miles)	Yes (Delivered to Tilbury) 20min (12.5miles)	Yes (Delivered to Tilbury) 20min (12.5miles)	Situated north of the river
18AS	Aggregates	Brett Aggregates	Cliffe	Direct to compound/Hoo Junction	Yes 25min (10.5miles)	Yes 20min (8miles)	Crossing of river required 40min (26miles)	Crossing of river required 15min (8.5miles)	Crossing of river required 55min (30miles)	Site situated south of the river. Brett Aggregates planning consent contains restriction on HGV movement using local roads. Rail connectivity via Hoo Junction would require off road solution
River/Road										
4AS	Aggregate	Tarmac	West Thurrock	Delivered to Port of Tilbury	Crossing of river required 25min (14miles)	Crossing of river required 35min (17miles)	Yes (Delivered to Tilbury) 20min (11miles)	Yes (via Road) 12min (5miles)	Yes (Direct via road) 10min (5miles)	Site situated north of the river Thames. Potential river link to Port of Tilbury to reduce road distance for compounds in area B North, C & D. Compounds in area A & B would require delivery
5AS	Cement	Tarmac	Greenwich Wharf	Delivered to Port of Tilbury	Crossing of river required 40min (25miles)	Crossing of river required 30min (19miles)	Yes (Delivered to Tilbury) 30min (27miles)	Yes (via Road) 22min (40miles)	Yes (via Road) 50min (20miles)	Site situated north of the river Thames. Potential river link to Port of Tilbury to reduce road distance for compounds in area B North, C & D. Compounds in area A & B would require delivery
8AS	Aggregates	Tarmac	Erith	Delivered to Port of Tilbury	Yes (via road) 35min (15miles)	Yes (via road) 40min (20miles)	Yes (Delivered to Tilbury) 50min (18miles)	Yes (Delivered to Tilbury) 45min (14miles)	Yes (Delivered to Tilbury) 50min (18miles)	Site situated south of the river Thames. Potential river link to Port of Tilbury to reduce road distance for compounds in area B North, C & D. Compounds in area A & B would require the use
3AS	Cement	Tarmac	Northfleet	Deliver to Port Tilbury & Hoo Junction via rail	Yes (Delivered to Hoo Junction) 15min (6miles)	Yes (Delivered to Hoo Junction) 20min (11miles)	Yes (Delivered to Tilbury) 35min (19.5miles)	Yes (via Road) 30min (16miles)	Yes (via Road) 35min (20miles)	Site situated south of the river Thames. Potential river link to Port of Tilbury to reduce road distance for compounds in area B North, C & D. Compounds in area A & B would require the use
3AS	Limestone Aggregate	Tarmac	Northfleet	Deliver to Port Tilbury & Hoo Junction via rail	Yes (Delivered to Hoo Junction) 15min (6miles)	Yes (Delivered to Hoo Junction) 20min (11miles)	Yes (Delivered to Tilbury) 35min (19.5miles)	Yes (via Road) 30min (16miles)	Yes (via Road) 35min (20miles)	Site situated south of the river Thames. Potential river link to Port of Tilbury to reduce road distance for compounds in area B North, C & D. Compounds in area A & B would require the use
22AS	Aggregates	Tarmac	Ridham	Deliver to Port of Tilbury	Yes (via road) 45min (23miles)	Yes (via road) 40min (20miles)	Yes (Delivered to Tilbury) 35min (19.5miles)	Yes (via Road) 45min (20miles)	Crossing of river required 40min (26miles)	Site situated south of the river Thames. Potential river link to Port of Tilbury to reduce road distance for compounds in area B North, C & D. Compounds in area A & B would require the use
2AS	Aggregate	Hanson	Dagenham Wharf	Delivered to Port of Tilbury	Crossing of river required 45min (25miles)	Crossing of river required 35min (20miles)	Yes (Delivered to Tilbury) 25min (17miles)	Yes (via Road) 15min (12miles)	Yes (via Road) 15min (10miles)	Situated north of the river. Potential river link to Port of Tilbury to reduce road distance for compounds in area B North, C & D. Compounds in area A & B would require delivery via HGV
9AS	Aggregate (Sand/Gravel)	Hanson	Frisbury	Deliver to Port of Tilbury	Yes (via Road) 20min (9miles)	Yes (via Road) 15min (8miles)	Yes (Delivered to Tilbury) 50min (28miles)	Yes (via Road) 50min (22miles)	Yes (via Road) 50min (22miles)	Situated south of the river. Potential river link to Port of Tilbury (longer river route) to reduce road distance and crossing of river for compounds in area B North, C & D. Compounds in area A & B would require
10AS	Cement	Hanson	Purfleet	Delivered to Port of Tilbury	Crossing of river required 25min (12.5miles)	Crossing of river required 25min (18miles)	Yes (Delivered to Tilbury) 20min (10.5miles)	Yes (via Road) 15min (7miles)	Yes (via Road) 20min (9miles)	Site situated south of the river. Potential river link to Port of Tilbury to reduce road distance and crossing of river for compounds in area B North, C & D. Compounds in area A & B would require
6AS	Aggregates	AI	Greenwich (Angerstein) Wharf	Delivered to Port of Tilbury	Crossing of river required 25min (19miles)	Crossing of river required 35min (24miles)	Yes (Delivered to Tilbury) 45min (26miles)	Yes (Delivered to Tilbury) 35min (22miles)	Yes (via Road) 30min (19.5miles)	Site situated south of the river. Potential river link to Port of Tilbury to reduce road distance and crossing of river for compounds in area B North, C & D. Compounds in area A & B would require
6AS	Cement	AI	Greenwich Wharf	Delivered to Port of Tilbury	Crossing of river required 25min (19miles)	Crossing of river required 35min (24miles)	Yes (Delivered to Tilbury) 45min (26miles)	Yes (via Road) 35min (22miles)	Yes (via Road) 30min (19.5miles)	Site situated south of the river. Potential river link to Port of Tilbury to reduce road distance and crossing of river for compounds in area B North, C & D. Compounds in area A & B would require
11AS	Cement	AI	Chatham Docks	Delivered to Port of Tilbury	Yes (via Road) 25min (10miles)	Yes (via Road) 20min (7.5miles)	Yes (Delivered to Tilbury) 50min (30miles)	Crossing of river required 50min (26miles)	Crossing of river required 60min (33miles)	Situated south of the river. Potential river link to Port of Tilbury (longer river route) to reduce road distance and crossing of river for compounds in area B North, C & D. Compounds in area A & B would require
12AS	Aggregates	Day Aggregates	Greenwich (Angerstein) Wharf	Delivered to Port of Tilbury	Yes (via Road) 25min (10miles)	Yes (via Road) 35min (24miles)	Yes (Delivered to Tilbury) 40min (20miles)	Crossing of river required 35min (22miles)	Crossing of river required 30min (19.5miles)	Site situated south of the river. Potential river link to Port of Tilbury to reduce road distance and crossing of river for compounds in area B North, C & D. Compounds in area A & B would require
7AS	Aggregates (Sand Gravel)	AI	Isle of Grain	Delivered to Port of Tilbury	Yes (via Road) 30min (17miles)	Yes (via Road) 25min (14miles)	Yes (Delivered to Tilbury) 60min (31miles)	Crossing of river required 60min (32miles)	Crossing of river required 65min (30miles)	Site situated south of the river. Potential river link to Port of Tilbury to reduce road distance and crossing of river for compounds in area B North, C & D. Compounds in area A & B would require
13AS	Aggregates	CEMEX	Northfleet Wharf	Delivered to Port of Tilbury	Yes (via Road) 25min (8.5miles)	Yes (via Road) 30min (12miles)	Yes (Delivered to Tilbury) 35min (17miles)	Yes (Delivered to Tilbury) 30min (12miles)	Yes (Delivered to Tilbury) 25min (11miles)	Site situated south of the river. Potential river link to Port of Tilbury to reduce road distance and crossing of river for compounds in area B North, C & D. Compounds in area A & B would require
14AS	Aggregates	CEMEX	Angerstein Aggregates Wharf	Delivered to Port of Tilbury	Yes (via Road) 35min (19miles)	Yes (via Road) 35min (24miles)	Yes (Delivered to Tilbury) 45min (26miles)	Crossing of river required 35min (22miles)	Crossing of river required 35min (19.5miles)	Site situated south of the river. Potential river link to Port of Tilbury to reduce road distance and crossing of river for compounds in area B North, C & D. Compounds in area A & B would require
15AS	Cement	CEMEX	Port of Tilbury	Port of Tilbury	Crossing of river required 35min (20miles)	Crossing of river required 40min (25miles)	Yes (via Road) 10min (2.5miles)	Yes (via Road) 10min (3.6miles)	Yes (via Road) 25min (15miles)	Situated north of the river. Port of Tilbury ideal location to minimise road distance for compound in area B North, C & D. Compounds in area A & B South would require crossing of
16AS	Cement	CEMEX	Dagenham Cement and Ash Plant	Delivered to Port of Tilbury	Crossing of river required 45min (20miles)	Crossing of river required 40min (24miles)	Yes (Delivered to Tilbury) 35min (16miles)	Yes (via Road) 30min (12miles)	Yes (via Road) 30min (10miles)	Site situated north of the river. Potential river link to Port of Tilbury to reduce road distance and crossing of river for compounds in area B North, C & D. Compounds in area A & B would require
23AS	Aggregates	Brett Aggregates	Cliffe	Direct to compound/Hoo Junction	Yes 25min (10miles)	Yes 20min (7.7miles)	Yes (Delivered to Tilbury) 55min (30miles)	Crossing of river required 50min (26miles)	Crossing of river required 50min (28miles)	Potential to use supplier jetty to provide river delivery to Port of Tilbury for compounds B North, C & D.
20AS	Aggregates	Gill Aggregates	Northfleet	Delivered to Port of Tilbury	Yes (via Road) 25min (8.5miles)	Yes (via Road) 30min (12miles)	Yes (Delivered to Tilbury) 35min (17miles)	Crossing of river required 30min (12miles)	Crossing of river required 25min (11miles)	Site situated south of the river. Potential river link to Port of Tilbury to reduce road distance and crossing of river for compounds in area B North, C & D. Compounds in area A & B would require
Road										
17AS	Aggregate (Sand/Gravel)	Hanson	Bulls Lodge	Direct to compound	35min (15miles)	55min (40miles)	45min (30miles)	35min (25miles)	30min (23miles)	Road transportation via HGV's using the local and strategic road network
18AS	Aggregate (Sand/Gravel)	Hanson	Birch	Direct to compound	40min (16miles)	75min (55miles)	40min (40miles)	55min (40miles)	55min (30miles)	Road transportation via HGV's using the local and strategic road network
19AS	Aggregates	CEMEX	Aylesford Quarry	Direct to compound	30min (12.5miles)	30min (12.5miles)	70min (31miles)	60min (28miles)	60min (28miles)	Road transportation via HGV's using the local and strategic road network
21AS	Aggregate (Sand/Gravel)	Tarmac	Kingsnorth	Direct to compound	25min (11.5miles)	20min (9miles)	30min (13miles)	40min (12miles)	40min (20miles)	Road transportation via HGV's using the local and strategic road network

Key	Notes
Tier 1	Less than 30min
Tier 2	30min - 45min
Tier 3	45min - 60min
Tier 4	Greater than 60min

1) Duration and distance taken from Google Maps
 2) Temporary traffic management not taken into consideration
 3) Durations stated based on weekday 8am departure, based on data from Google maps
 4) Haul route not considered, distance and duration based on movement between supplier site to compound entrance
 5) Sites greater than 60 min for all compounds not considered. For sites in the limit of 60min journey time this has been categorised as "Tier 4"
 6) Tier based on distance/duration to site not production capacity
 7) Refer to drawing: HES40039-CIV-GCL-53P_ZZZZZZZZZZ-DR-CW-00009 for location of identified sites.

Appendix A.3: Potential supplier sites (ready mixed concrete & asphalt) identified and categorised by their multimodal delivery capabilities and proximity to the Project via the use of the road network

Distance and average duration between supplier delivery site and LTC (Area A ,B South, B North, C & D)													
Ref	Supplier	Suppliers Site	A		B South		B North		C		D		Comments
			Distance	Duration	Distance	Duration	Distance	Duration	Distance	Duration	Distance	Duration	
Concrete													
1CP	Tarmac	West Thurrock (Euromix)	14miles	25min	17miles	35min	11 miles	25min	5miles	12min	5miles	10min	Batching plant located north of the river
2CP	Tarmac	Belvedere (Mulberry)	18.5miles	35min	21 miles	40min	19 miles	45min	14 miles	35min	12miles	35min	Batching plant located south of the river
3CP	Tarmac	Greenwich (Euromix)	25miles	40min	19miles	30min	27miles	50min	22miles	40min	26miles	50min	Batching plant located south of the river
4CP	Hanson	Erith	15miles	35min	19miles	30min	18.5miles	45min	13.5miles	35min	12miles	30min	Batching plant located south of the river
5CP	Hanson	Rochester	7miles	20min	6miles	15min	29miles	60min	24.4miles	50min	22miles	50min	Batching plant located south of the river
6CP	Hanson	Dagenham	25miles	45min	20miles	35min	17miles	25min	12 miles	15min	10miles	15min	Batching plant located north of the river
7CP	Hanson	Silvertown	22miles	45min	25.6miles	50min	23miles	35min	18miles	30min	16.5miles	25min	Batching plant located north of the river
8CP	Hanson	Greenwich	26miles	40min	21miles	35min	23miles	40min	19miles	35min	17miles	35min	Batching plant located south of the river
9CP	Hanson	Allington (Maidstone)	14miles	30min	15miles	30min	34.5miles	60min	30miles	55min	28miles	50min	Batching plant located south of the river
10CP	AI	DP World	22miles	35min	26miles	40min	10miles	20min	6.5miles	15min	12.5miles	20min	Batching plant located north of the river
11CP	AI	Greenwich	19miles	25min	24miles	35min	26miles	45min	22miles	35min	19.5miles	30min	Batching plant located south of the river
12CP	AI	Startford	26miles	45min	23miles	40min	24miles	40min	24miles	30min	17.5 miles	30min	Batching plant located north of the river
13CP	CEMEX	Northfleet Wharf	8.5miles	25min	12miles	30min	17miles	35min	12miles	30min	11 miles	25min	Batching plant located south of the river
14CP	CEMEX	Purfleet	18.5miles	35min	13miles	30min	10miles	20min	5.5miles	12min	5 miles	10min	Batching plant located north of the river
15CP	CEMEX	Dagenham	20miles	45min	24miles	50min	16miles	35min	12miles	30min	10miles	30min	Batching plant located north of the river
16CP	CEMEX	Blue Bell	10miles	20min	11miles	20min	30miles	45min	26miles	35min	25miles	35min	Batching plant located south of the river
17CP	CEMEX	Brentwood	26.5 miles	50min	32miles	55min	16miles	35min	15miles	30min	11.5miles	20min	Batching plant located north of the river
18CP	CEMEX	Angerstein	19miles	25min	24miles	35min	26miles	45min	22miles	35min	19.5miles	35min	Batching plant located south of the river
19CP	Brett	Northfleet	8miles	25min	11.5miles	30min	16.5miles	40min	12miles	35min	10miles	30min	Batching plant located south of the river
20CP	Tarmac	Kingsnorth	10miles	25min	9miles	25min	31miles	55min	26miles	45min	26miles	45min	Batching plant located south of the river
Asphalt													
1AP	Tarmac	Mulberry Wharf	18.5miles	35min	15.5min	30min	19miles	45min	14miles	40min	14miles	40min	Batching plant located south of the river
2AP	Tarmac	Snodland	10miles	20min	11miles	20min	32miles	55min	29miles	45min	28miles	45min	Batching plant located south of the river
3AP	Tarmac	Harlow	36.5miles	45min	40miles	55min	33miles	50min	28miles	40min	21.5miles	30min	Batching plant located north of the river
4AP	Tarmac	Hothfield	34miles	50min	33miles	50min	54miles	90min	49miles	80min	54miles	90min	Batching plant located south of the river
5AP	Tarmac	Harper Lane	50miles	65min	55.5miles	70min	46.5miles	60min	42miles	55min	35 miles	50min	Batching plant located north of the river
6AP	Hanson	Dagenham	20miles	35min	25miles	45min	17miles	25min	12.3 miles	15min	10miles	15min	Batching plant located north of the river
7AP	Hanson	Allington (Maidstone)	15miles	30min	14miles	35min	34.5miles	60min	30miles	55min	28miles	50min	Batching plant located south of the river
8AP	Hanson	Bulls Lodge (Chelmsford)	40miles	55min	45miles	60min	30miles	45min	25miles	40min	24miles	35min	Batching plant located north of the river
9AP	AI	Robins Wharf	6miles	12min	11miles	20min	17miles	45min	13.5miles	35min	10.5miles	30min	Batching plant located south of the river
10AP	AI	Jurgens Road	14miles	20min	19miles	30min	11miles	30min	6.5miles	20min	2.5miles	15min	Batching plant located north of the river
11AP	AI	Angerstein Wharf	19miles	25min	24miles	35min	26miles	45min	22miles	35min	19.5miles	35min	Batching plant located south of the river

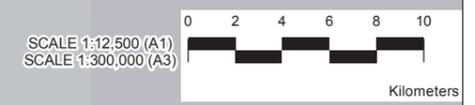
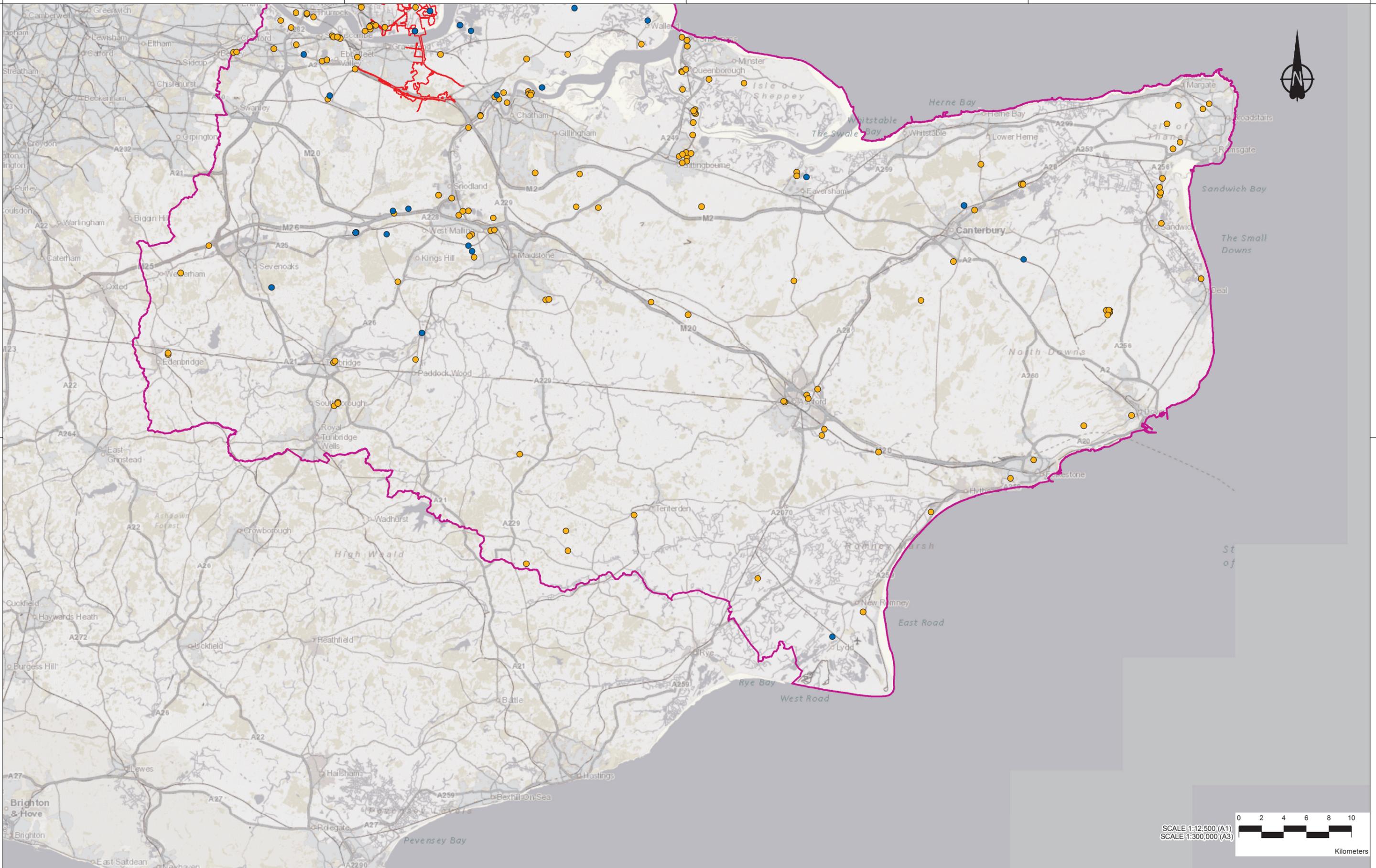
Key			Notes:
Tier 1	Less than 30min		1) Duration and distance taken from Google Maps
Tier 2	30- 45min		2) Temporary traffic management not taken into consideration
Tier 3	45min +		3) Durations stated based on weekday 8am departure, based on data from Google maps
			4) Haul route not considered, distance and duration based on movement between supplier site to compound entrance
			5) Sites greater than 45 min for all compounds not considered. For sites in the limit of 60min journey time this has been categorised as "Tier 3"
			6) Tier based on distance/duration to site not production capacity
			7) Refer to drawing: HE540039-CJV-GCL-S3P_????????-DR-CW-00009 for location of identified sites.

Appendix B Third-party waste facility sites identified to date

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Please find the Third-Party waste facility sites identified to date (3 Figures) below.

DRAFT



1.1	SB	8/10/2020	For Information	RM	SG	BF
Rev	Status	Rev. Date	Purpose of revision	Drawn	Check'd	Appr'd

- LEGEND**
- Order Limits
 - Study Area
 - Active Landfills
 - Waste Treatment and Transfer Facilities

Indicative locations of sites permitted to manage construction wastes, based on Environment Agency (2020c) dataset Environmental Permitting Regulations - Waste Sites

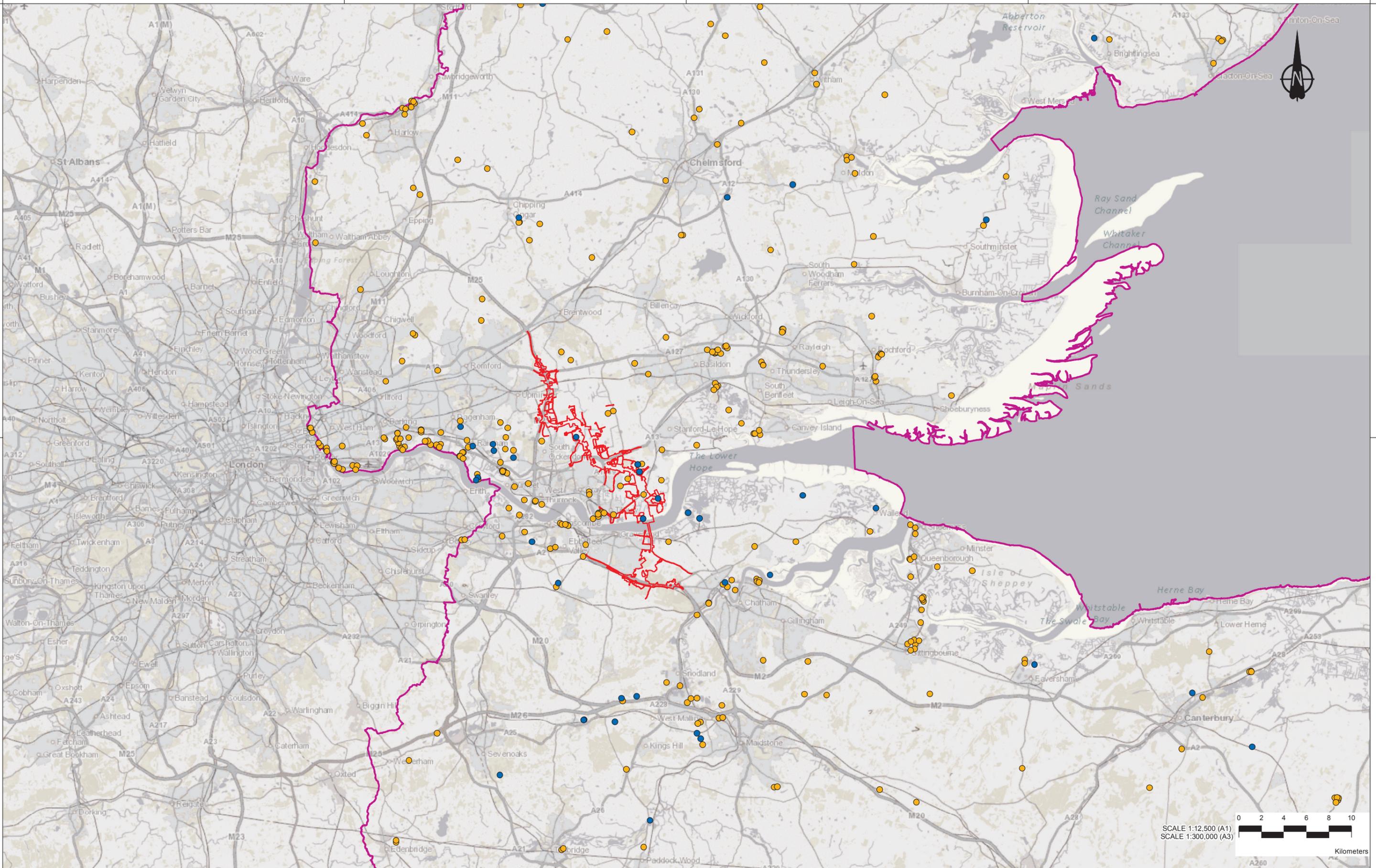


Client **highways england**

Project **LOWER THAMES CROSSING**

5th Floor Beaufort House
15 St Botolph Street
London EC3A 7DT

Status	Environmental Statement	Original Size	Revision
		A3	1.1
Drawing title	Figure 11.1 - Active Landfill and Waste Transfer and Treatment		
Drawing number	HE540039-CJV-EGN-SZP_EGNE00000000-DR-LE-50096		
	Page 1 of 3		



1.1 SB 8/10/2020 For Information RM SG BF

Rev	Status	Rev. Date	Purpose of revision	Drawn	Check'd	Apprv'd

MXD Location: Z:\Environment\Environmental Statement\11. Materials\HE540039-CJV-EGN-SZP_EGNE0000000-DR-LE-50096 - Active Landfill and Waste Transfer and Treatment.mxd

- LEGEND**
- Order Limits
 - Study Area
 - Active Landfills
 - Waste Treatment and Transfer Facilities

Indicative locations of sites permitted to manage construction wastes, based on Environment Agency (2020c) dataset Environmental Permitting Regulations - Waste Sites

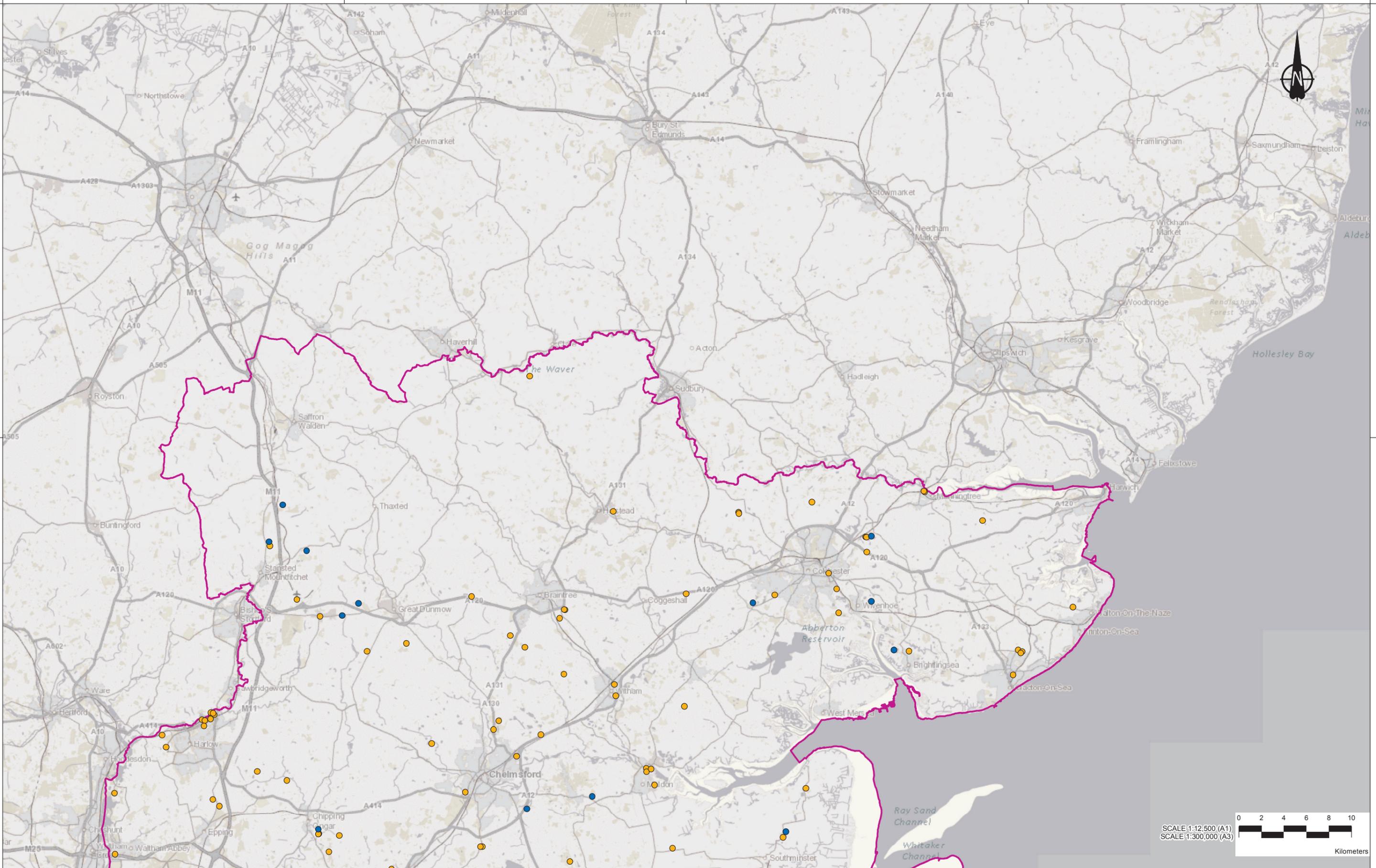


Client **highways england**

Project **LOWER THAMES CROSSING**

5th Floor Beaufort House
15 St Botolph Street
London EC3A 7DT

Status		Original Size	Revision
Environmental Statement		A3	1.1
Drawing title			
Figure 11.1 - Active Landfill and Waste Transfer and Treatment			
Page 2 of 3			
Drawing number			
HE540039-CJV-EGN-SZP_EGNE0000000-DR-LE-50096			



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1.1	SB	8/10/2020	For Information	RM	SG	BF
Rev	Status	Rev. Date	Purpose of revision	Drawn	Check'd	Appr'd

MXD Location: Z:\Environment\Environmental Statement\11. Materials\HE540039-CJV-EGN-SZP_EGNE00000000-DR-LE-50096 - Active Landfill and Waste Transfer and Treatment.mxd

LEGEND

- Order Limits
- Study Area
- Active Landfills
- Waste Treatment and Transfer Facilities

Indicative locations of sites permitted to manage construction wastes, based on Environment Agency (2020c) dataset Environmental Permitting Regulations - Waste Sites



Client

 Project
LOWER THAMES CROSSING
 5th Floor Beaufort House
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 London EC3A 7DT

Status	Environmental Statement		Original Size	Revision
Drawing title	Figure 11.1 - Active Landfill and Waste Transfer and Treatment		A3	1.1
Drawing number			HE540039-CJV-EGN-SZP_EGNE00000000-DR-LE-50096	
		Page 3 of 3		

Lower Thames Crossing

Code of Construction Practice First Iteration of Environmental Management Plan

DATE: June 2021

VERSION: 0.2

Lower Thames Crossing

Code of Construction Practice

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Covering Note

This document is a draft of one of a series of Control Documents that will form part of our planned DCO application. Following this consultation we will carefully consider your feedback as we finalise the documents for our planned submission of the DCO application for the Lower Thames Crossing later this year.

The Code of Construction Practice (CoCP) provides a framework to manage construction and operational activities. Its objectives are to ensure that environmental mitigation commitments are met and necessary consents and licences are obtained.

The REAC identifies all good practice and essential mitigation from our ongoing environmental assessments to be carried out during the operation of the new road.

The following contains a draft copy of these documents to provide an example of how mitigation and commitments would be secured within the DCO application when it is submitted.

These documents reflect the changes to the design described in this consultation. Updates may be made to this document to reflect feedback received from stakeholders ahead of submitting the document as part of the DCO application.

We submitted a version of the Code of Construction Practice with our DCO application in October 2020. Many of the controls set out in this document were developed in response to the assessments we completed prior to that submission. These assessments are being updated for our resubmission, and our approach to environmental assessment, the identified environmental impacts and proposed mitigation are set out in this consultation within the Operations update, Construction update and the Ward impact summaries. In a number of places, this document refers to other documents within our proposed DCO application that set out assessments that led to the inclusion of controls.

As this is a draft of the application document, we have left these references in place with a (REF TBC) as a demonstration of how the finalised document will provide context of why a control is required. Our resubmitted DCO application will include all of the referenced documents to provide a clear link between the assessments and the controls. Following our withdrawal of our application we are continuing to develop our assessments, and we have included this document in the consultation to demonstrate how the controls will be secured in the DCO, and to seek feedback on our approach.

1 Introduction and background to the project

1.1 Background

- 1.1.1 The proposed A122 Lower Thames Crossing (the Project) is a new road that would provide a connection between the A2 and M2 in Kent, east of Gravesend, crossing under the River Thames through two bored tunnels, before joining the M25 south of junction 29.
- 1.1.2 The Project is a Nationally Significant Infrastructure Project (NSIP) under the Planning Act 2008. Therefore, an application for development consent has been submitted to the Planning Inspectorate. This Code of Construction Practice (CoCP) is part of a suite of documents which accompanies the application. A full description of the DCO Application Documents is provided within the 'Introduction to the Application' (REF TBC) which also accompanies the application.

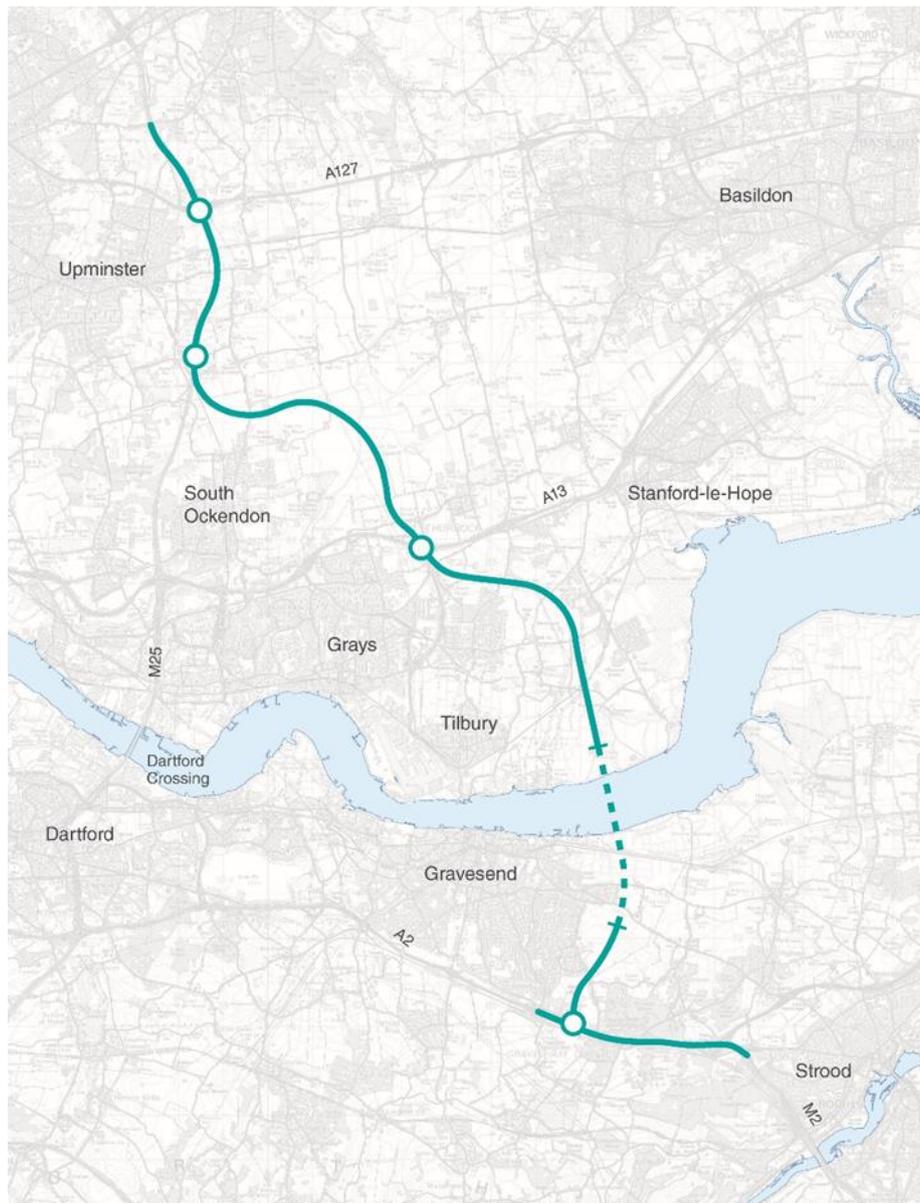
1.2 Description of the Project

- 1.2.1 The A122 Lower Thames Crossing (the Project) would provide a connection between the A2 and M2 in Kent, east of Gravesend, crossing under the River Thames through a tunnel, before joining the M25 south of junction 29. The Project route is presented in Plate 1.1.
- 1.2.2 The A122 road would be approximately 23km long, 4.25km of which would be in tunnel. On the south side of the River Thames, the Project route would link the tunnel to the A2 and M2. On the north side, it would link to the A13 and junction 29 of the M25. The tunnel entrances would be located to the east of the village of Chalk on the south of the River Thames and to the west of East Tilbury on the north side.
- 1.2.3 Junctions are proposed at the following locations:
- a. New junction with the A2 to the south-east of Gravesend
- Modified junction with the A13/A1089 in Thurrock
- New junction with the M25 between junctions 29 and 30
- 1.2.4 To align with NPSNN policy and to help the Project meet the Scheme Objectives, it is proposed that road user charges would be levied. Vehicles would be charged for using the new tunnel.
- 1.2.5 The Project route would be three lanes in both directions, except for:
- a. link roads
- stretches of the carriageway through junctions
- the southbound carriageway from the M25 to the junction with the A13/A1089, which would be two lanes
- 1.2.6 In common with other A-roads, the A122 would operate with no hard shoulder but would feature a 1m hard strip on either side of the carriageway. It would also feature technology including stopped vehicle and incident detection, lane control, variable speed limits and electronic signage and signalling. Our A122

road design outside of the tunnel includes emergency areas spaced at intervals between 800 metres and 1.6km (less than one mile). The tunnel would include a range of enhanced systems and response measures instead of emergency areas.

- 1.2.7 The A122 would be classified as an 'all-purpose trunk road' with green signs. For the benefit of safety, walkers, cyclists, horse-riders and slow-moving vehicles would be prohibited from using it.
- 1.2.8 The Project would include adjustment to a number of side roads. There would also be changes to a number of public rights of way, used by walkers, cyclists and horse riders. Construction of the Project would also require the installation and diversion of a number of utilities, including gas pipelines, overhead power lines and underground electricity cables, as well as water supplies and telecommunications assets and associated infrastructure.
- 1.2.9 The Project has been developed to avoid or minimise significant effects on the environment. Some of the measures adopted include landscaping, noise mitigation, green bridges, floodplain compensation, new areas of ecological habitat and two new parks.

Plate 1.1 Project route



- 1.2.10 A more detailed project description is provided in Chapter 2: Project Description in the Environmental Statement (ES) (REF TBC).
- 1.2.11 It is anticipated that construction activity is likely to commence in 2023/24 after the DCO has been granted. Construction will take approximately six years, and the new road and tunnel are planned to open in 2029.

1.3 Scheme Objectives

- 1.3.1 Highways England's Sustainable Development Strategy sets out Highways England's approach and priorities to sustainable development. The strategy has particular regard for the following factors:
- Financial** – supporting national and local economic growth and regeneration

- b. **Human** – protecting and improving the safety of road users and road workers
- c. **Natural** – protecting, managing and enhancing the environment
- d. **Social** – seeking to improve the well-being of road users and communities affected by the network
- e. **Manufactured** – ensuring efficiency and value for money

1.3.2 The Scheme Objectives developed specifically for the Project and agreed with the Department for Transport (DfT) are as follows:

- a. to support sustainable local development and regional economic growth in the medium to long term
- b. to be affordable to government and users
- c. to achieve value for money
- d. to minimise adverse impacts on health and the environment
- e. to relieve the congested Dartford Crossing and approach roads, and improve their performance by providing free-flowing, north-south capacity
- f. to improve resilience of the Thames crossings and the major road network
- g. to improve safety

1.4 Purpose and objectives of the document

1.4.1 This CoCP forms part of the DCO application. Together with the Register of Environmental Actions and Commitments (REAC) in Section 7, this document sets out a framework for how the mitigation and management of environmental effects will be delivered and maintained. As explained further below, the document has been produced in accordance with the Design Manual for Roads and Bridges (LA120). The CoCP is the “first iteration” of the Environmental Management Plan.

1.4.2 The s CoCP and REAC are proposed to be appendices to the ES. Following the grant of the DCO, the CoCP and REAC will provide control over site activities. As explained further in Section 2.56 of this document, the Environmental Management Plan (Second Iteration) (EMP2) must be substantially in accordance with this CoCP and must reflect the mitigation measures set out in the REAC. No part of the authorised development can commence until the EMP2 has been approved by the Secretary of State (SoS) for that part. There is an exception to this for certain specified pre-commencement activities, as set out in the DCO and the pre-commencement section of this document (Chapter 3).

1.4.3 Highways England, being the party in whom the powers of the DCO are vested, is responsible for the delivery of the Project. Highways England is responsible for all the works, which includes overseeing and assuring the Contractors.

- 1.4.4 The Contractors, including those carrying out the utilities works, will comply with applicable environmental legislation at the time of construction, together with any additional environmental controls required under the DCO, including those relevant commitments set out in this CoCP and REAC. The requirement for the Contractors to comply with these measures will be embedded within their contract for the Project.
- 1.4.5 The purpose and objectives of this CoCP are to provide clear and concise information which states how the mitigation and management of environmental effects will be delivered and maintained during the construction and operational phases of the Project.
- 1.4.6 An Environmental Impact Assessment (EIA) is being undertaken for the Project, and an Environmental Statement (REF TBC) is being prepared in accordance with the Infrastructure Planning (Environmental Impact Assessment) Regulations 2017 ('the EIA Regulations'). The ES reports the findings of the EIA, which will determine the likely significant environmental effects of the construction and operation of the Project. The EIA process has iteratively informed the design development of the Project and the ES will set out the proposed mitigation measures that are needed to avoid, reduce or remediate potential impacts of the Project on the environment.
- 1.4.7 The CoCP and REAC will be provided to Contractors and will be binding upon them. The REAC brings together into one document the good practice and essential mitigation commitments relied on in the ES (REF TBC) and other DCO Application Documents.
- 1.4.8 In this context, good practice means standard and appropriate approaches and actions commonly used on infrastructure development projects to avoid or reduce environmental impacts, typically applicable across the whole Project. Essential mitigation means any additional Project-specific measures needed to avoid, reduce or offset potential impacts that could otherwise result in effects considered significant in the context of the EIA Regulations. These are in addition to the embedded mitigation measures and design controls that form part of the Project design, which are secured by the Design Principles, and the Environmental Masterplan (Figure 2.4, (REF TBC)).
- 1.4.9 Additionally, the CoCP and the REAC contains commitments developed in consultation with relevant stakeholders.
- 1.4.10 The Project is committed to avoiding, reducing or compensating for, as far as reasonably practicable, the adverse effects of the construction and operational activities of the Project upon people, businesses and the natural and historic environment.
- 1.4.11 The latest standard for Environmental Management Plans on Highways England projects, Design Manual for Roads and Bridges LA 120 (Highways England, 2020) applies to the first, second and third iterations of the EMP. Table 1.1 shows how these named environmental management plan documents relate to one another through the Project stages.

Table 1.1 Document relationships through the Project stages

Project stage	Common terminology for plans	Highways England, Design Manual for Roads and Bridges (DMRB) LA 120	Description	Terminology used in this document
Design	Code of Construction Practice (CoCP) or Outline Environmental Management Plan (OEMP)	First iteration of EMP	Produced during the design stage for the preferred route option.	CoCP
Construction	Construction Environmental Management Plan (CEMP)	Second iteration of EMP	Refined during the construction stage for the consented Project, in advance of construction.	EMP2
End of construction	Handover Environmental Management Plan (HEMP)	Third iteration of EMP	Building on the construction EMP refined at the end of the construction stage to support future management and operation.	EMP3

1.4.12 This document should be read in conjunction with DMRB LA 120 – Environmental Management Plans (Highways England, 2020), and the 'Highways England Strategic Road Network Concept of Operations' (Highways England, 2015) which covers Highways England's ten main operating principles of operation.

1.5 Structure of the CoCP

1.5.1 Chapters 1-6 provide a general overview and approach to the management of environmental impacts from the construction of the Project.

Chapter 1: Introduction

Chapter 2: General environmental management principles

Chapter 3: Pre-commencement

Chapter 4: Construction

Chapter 5: Communication and community liaison

Chapter 6: General construction and site management

- 1.5.2 These are followed by Chapter 7, the REAC. The REAC presents the good practice and essential mitigation commitments identified in the ES by environmental topic (or 'factor', as defined in DMRB LA 104 Environmental Assessment and Monitoring (Highways England, 2020)) as follows:
- a. Air quality
 - b. Cultural heritage
 - c. Landscape
 - d. Terrestrial biodiversity
 - e. Marine biodiversity
 - f. Geology and soils
 - g. Material assets and waste
 - h. Noise and vibration
 - i. Population and human health
 - j. Road drainage and the water environment
 - k. Climate
- 1.5.3 Additionally, the REAC contains mitigation measures identified in the Habitats Regulations Assessment Stage 1 & 2 (REF TBC) and Appendix 14.7: Water Framework Directive (REF TBC).

2 General environmental management principles

2.1 Procedures for the approval of EMP2

- 2.1.1 Requirement 4 in Schedule 2 (Part 1) of the DCO states that no part of the authorised development (the Project) is to commence until an EMP2 in accordance with this CoCP has been submitted to and approved in writing by the SoS following consultation with the relevant planning authority to the extent that it relates to the matters relevant to its function. There is an exception to this for certain specified pre-commencement activities, as set out in article 2 of the DCO.
- 2.1.2 Schedule 2 (Part 2) of the DCO identifies the formal procedure in relation to obtaining approvals from the SoS for those requirements in Schedule 2 (Part 1) of the DCO that require this approval. The requirements identify where consultation is required in advance of submission to the SoS, and also where consents, agreements and approvals are required from a body or individual other than the SoS, e.g. from the local planning authority.
- 2.1.3 Where the DCO Schedule 2 requirement identifies that consultation is required, the Contractor will provide a draft submission of the material to the identified consultee in advance of the submission. Consultees will be asked to provide comments in writing on the draft document unless otherwise agreed with the consultees. Any feedback received shall be considered in finalising documentation. Representations received from consultees will be provided to the SoS.

2.2 Environmental management systems

- 2.2.1 Highways England is developing and will operate an Environmental Management System (EMS) aligned to and capable of certification to ISO 14001:2015. The EMS will be part of the Integrated Management System (IMS). The Lower Thames Crossing EMS will describe the Project process to assure the delivery of the commitments in the REAC during the delivery of the programme. The Contractors will develop an EMS relevant to their scope of works on the Project.
- 2.2.2 The Contractors' EMSs will be approved by a UKAS accredited certification body to ISO14001:2015. It will establish procedures setting out, including:
- a. All relevant environmental aspects of the work and how they will be managed.
 - b. Staff competence and awareness requirements and how these are achieved and maintained.
 - c. The approach to be implemented in the EMP2 (as defined in paragraph 1.4 above) to plan and monitor compliance with environmental legislation and environmental controls imposed in the DCO including, for the avoidance of doubt, the measures set out in this document and the REAC.

- d. The measures to be taken to address change or non-compliance.
- e. Engagement and consultation with local authorities, other statutory bodies and the local communities.

- 2.2.3 The Contractors' EMSs shall cover the Project activities of all their Sub-Contractors and hauliers. The Contractors will also be required to coordinate with other Main Works Contractors and relevant parties that may affect their works. This will be documented in their EMSs, as appropriate.
- 2.2.4 The Contractors will hold certifications for safety (ISO 45001:2018), environment (ISO 14001:2015), quality (ISO 9001:2015) and these will include procedures for responding to emergency events. Contractors will be required to comply with the law applicable at the time, along with any additional environmental controls imposed in the DCO. For that reason, the statutory requirements are not separately listed within this CoCP.
- 2.2.5 CEEQUAL is an evidence-based sustainability assessment, rating and awards scheme for civil engineering, infrastructure, landscaping and public realm projects. The Contractor will achieve a CEEQUAL 'Very Good' standard by completion of their works and support Highways England in achieving a Project standard of 'Excellent'.

2.3 Environmental management plans

- 2.3.1 The Contractors responsible for the delivery of construction will each be required to develop an EMP2 (as defined in paragraph 1.4 above) specific to their work and in consultation with relevant stakeholders as listed in Table 2.1. The EMP2(s) will be prepared in accordance with this CoCP and will be specific to the location and scope of that part of the works to which the EMP2 relates. The EMP2 will include the implementation of appropriate industry-standard practice and control measures for environmental impacts during the relevant works. As a minimum, in accordance with Requirement 4 of Part 1 of Schedule 2 of the DCO, the EMP2 will be compliant with ISO 14001, be substantially in accordance with this CoCP and reflect the mitigation measures set out in the REAC. The EMP2 will be reviewed regularly and revised as necessary.

Table 2.1 Relevant stakeholders

	Local Planning Authority	Local Highway Authority	Other Body
Brentwood Borough Council	X		
Environment Agency			X
Essex County Council		X	
Gravesham Borough Council	X		
Historic England			X
Kent County Council		X	

	Local Planning Authority	Local Highway Authority	Other Body
London Borough of Havering	X	X	
Medway Council	X	X	
Natural England			X
Thurrock Council	X	X	
Transport for London		X	

- 2.3.2 The EMP2s, developed by the Contractors will set out their procedures for monitoring compliance with the mitigation measures set out in this document and the REAC. The EMP2s will include Contractor roles and responsibilities, together with appropriate control measures, training and briefing procedures, risk assessments, stakeholder engagement and monitoring systems to be employed.
- 2.3.3 The Contractors will produce Site Waste Management Plans, Materials Management Plans (which will be substantially in accordance with the outline Site Waste Management Plan and the Materials Handling Plan respectively) and Noise and Vibration Plans. These plans will form part of the EMP2. There will be additional topic management plans developed for environmental subjects that require further measures and controls to be implemented during the construction phase, and this will include air quality, ecology, soils, contaminated land, substances hazardous to health and pollution prevention controls. Traffic Management Plans will be developed to be substantially in accordance with the Outline Traffic Management Plan for Construction.
- 2.3.4 Once accepted by Highways England, the Contractors' EMP2s and topic management plans will (following the consultation mentioned in section 2.1 above) be submitted to the SoS for approval as per Schedule 2 Part 2 of the Order after consultation with the relevant local authorities and Natural England.
- 2.3.5 During the final stages of the construction phase, the Contractors will each prepare an EMP3 in consultation with relevant stakeholders (on matters relevant to their respective functions only) as listed in Table 2.1, and subject to agreement by Highways England. The information contained within the EMP3 serves to inform the approach to environmental management during the Project's operational phase to be implemented by Highways England. The EMP3 will build on the EMP2 and LEMP and will provide the relevant information on existing and future environmental commitments and objectives that will need to be honoured and ongoing actions and risks that will need to be managed. It will include as-built information and other details in a form that can be utilised by the organisation responsible for long-term operational management. The EMP3 must be developed and completed by the end of the construction, commissioning and handover stage of any part of the authorised development.
- 2.3.6 The, outline Landscape and Ecology Management Plan (oLEMP) outlines the proposed management of the landscape and ecological elements of the the Project. The Design Manual for Roads and Bridges (DMRB) standards GM701 series 3000 and GS 801 Series 3000 establish the general maintenance and

inspection requirements for motorways and all-purpose trunk roads. The oLEMP focuses on the management requirements for the land parcels that perform specific landscape and ecological mitigation functions for the Project. It details the management, regimes, maintenance expectation and monitoring requirements for each of those land parcel typologies. It should be read in conjunction with the Environmental Masterplan (Figure 2.4, (REF TBC)).

- 2.3.7 A final version of the LEMP for the relevant part of the Project will be created by the Contractors for implementation during the establishment period and after the establishment period. The LEMP will be substantially in accordance with this outline LEMP, including the habitat management requirements, targets and prescriptions set out in it. Once accepted by Highways England, the Contractors' LEMP will (following the consultation mentioned in section 2.1 above) be submitted to the SoS for approval as per Schedule 2 of the Order after consultation with the relevant local authorities and Natural England where relevant. As ecological and landscape matters are controlled (including in the operational phase) via the LEMP, they will not form part of the EMP3.

2.4 Considerate Constructors

- 2.4.1 In addition to a comprehensive EMS and EMP2 the Contractors shall sign up to and adhere to the Considerate Constructors Scheme (CCS).
- 2.4.2 The CCS is a national scheme that promotes good practice on construction sites through its codes of considerate practice; these commit registered sites to be considerate and good neighbours, as well as being respectful, environmentally conscious, responsible and accountable.

2.5 Employment and Skills

- 2.5.1 Targets will be set by Highways England in relation to numbers of apprentices, workless job starts (these are new job starts, sustained for at least 12 weeks, where the candidate was previously workless prior to being employed), graduates and traineeships, work placements and training for local residents (individuals supported to attain accredited or non-accredited training relevant to the delivery of the works at no cost to the individual). Employment and Skills Plans will be prepared by Contractors prior to the commencement of their works, setting out how they will contribute to meeting these targets. The Contractor will submit the Employment and Skills Plan will to the Project Skills and Employment Working Group and approved by Highways England.
- 2.5.2 The Project Skills and Employment Working Group will be responsible for ensuring that opportunities are maximised throughout the delivery phase in response to changing local needs and priorities. It will be a key consultee as the Project Employment and Skills Plans are updated on annual basis.
- 2.5.3 The Project Skills and Employment Working Group includes Project representatives and representatives from each local authority.

2.6 Enforcement and control procedures

- 2.6.1 This CoCP is proposed to be a certified document under Schedule 16 of the DCO. Requirement 4 of Schedule 2 (Part 1) of the DCO state that, '*No part of the authorised development is to commence until a EMP (Second Iteration), substantially in accordance with the Code of Construction Practice, for that part has been submitted to an approved in writing by the Secretary of State...*' and '*the EMP (Second Iteration) must ... reflect the mitigation measures set out in the REAC...*'. Requirement 4 further states that, '*The construction of the authorised development must be carried out in accordance with an approved EMP (Second Iteration)*'.
- 2.6.2 As such, Highways England, and Contractors involved with the construction of the Project will be required to comply with the provisions of this CoCP and EMP2. Highways England and Contractors involved with the operation of the Project will be required to comply with the provisions of the EMP3. To ensure that Contractors comply with this CoCP, EMP2 and EMP3, they will be incorporated into their contracts and Highways England will take appropriate action to ensure compliance with those contracts.
- 2.6.3 The Contractors and Highways England will clearly define the roles and responsibilities of key personnel. These will be defined within the EMP2s during the construction phase and the EMP3s during the operational phase. These definitions will need to be submitted for acceptance by Highways England.
- 2.6.4 The EMP2 will set out the arrangements and responsibilities for implementing, monitoring, auditing and enforcing the environmental mitigation set out in this CoCP and REAC.
- 2.6.5 The EMP2 will include details of a monitoring and audit programme to be delivered by the Contractors to confirm compliance with EMP2.
- 2.6.6 Highways England or their representatives will carry out site inspections and audits to verify the Contractors' compliance with EMP2. On request, relevant planning authorities, the Environment Agency and Natural England, will be given access to the results of the site inspections and audits, along with the opportunity to attend and observe Highways England site inspections and audits.
- 2.6.7 Plate 2.1 sets out where the various approvals required, sit within the DCO.

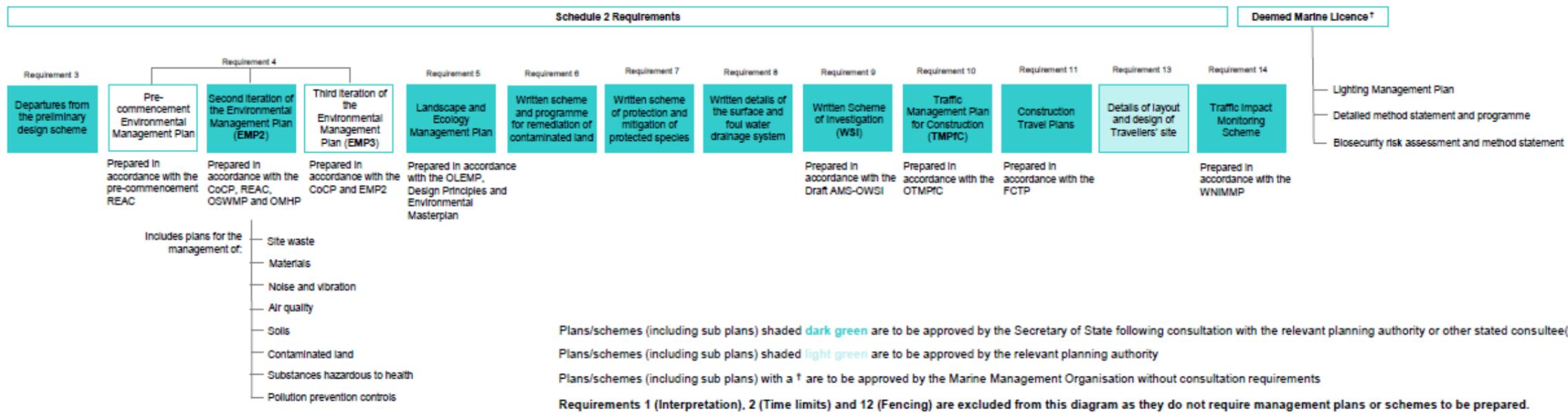
Plate 2.1 Management and Mitigation Plan

Contractors' Environmental Management System

Certified DCO application documents listed in Schedule 16 (e.g. Book of Plans, Environmental Statement, etc.)

- Control documents that provide commitments which are submitted as part of DCO application
- Register of Environmental Actions and Commitments (REAC)
 - Design Principles
 - Environmental Masterplan
 - Code of Construction Practice (CoCP)
 - Outline Site Waste Management Plan (OSWMP)
 - Outline Materials Handling Plan (OMHP)
 - Outline Traffic Management Plan for Construction (OTMPTC)
 - Framework Construction Travel Plan (FCTP)
 - Outline Landscape and Ecology Management Plan (OLEMP)
 - Draft Archaeological Mitigation Strategy – Outline Written Scheme of Investigation (Draft AMS–OWSI)
 - Wider Network Impacts Management and Monitoring Strategy (WNIMMP)

Relationship between management plans and detailed design frameworks and the Schedule 2 Requirements + Deemed Marine Licence (post DCO grant)



Other commitments made outside the Development Consent Order including through additional permits and consents, contractual arrangements and Highways England policies.

3 Pre-commencement

3.1 Pre-commencement activities

- 3.1.1 Pre-commencement is the phase between a DCO being granted and commencement of construction. Article 2 of the draft DCO (REF TBC) is proposed to provide a definition of commencement, but for ease of reference this has been included in Schedule 2 of the DCO. The effect of this definition is that the activities excluded are taken outside the scope of commencement meaning they can be carried out prior to the discharge of the requirements contained in Schedule 2 of the DCO and the approvals required therein.
- 3.1.2 The pre-commencement activities have been identified as activities which may be carried out early in the construction programme and which would have negligible or relatively minor environmental impacts. An analysis of the REAC was carried out, identifying mitigation measures which are relevant and are proposed to apply to these activities. These controls will be in place on the date the DCO comes into force in order to provide comfort that appropriate environmental controls apply to activities which can be carried out prior to the discharge of requirements under the DCO (as per Requirement 4(1) of Schedule 2 to the DCO).
- 3.1.3 The only activities that can take place during “pre-commencement” and their locations are listed in Table 3.1.
- 3.1.4 These activities shall be undertaken in accordance with industry good practice and relevant commitments in the REAC (see
- 3.1.5 Table 3.2 below). Ecology activities will also require protected species licences thereby adding an additional layer of control.

Table 3.1 Pre-commencement activities and locations

Activity	Location
Archaeological investigations as set out in the outline WSI.	Sitewide
Preparation of ecological receiving site for reptiles.	Sitewide
Preparation of ecological receiving site for Great Crested Newts.	Sitewide
Translocation of protected species	Sitewide
Installation of bat boxes and hibernaculum	Sitewide
Installation of dormouse boxes	Sitewide
Installation of artificial badger setts	Sitewide
Installation of bird boxes	Sitewide
Closure of badger setts	Sitewide
Installation of ecological exclusion fencing	Sitewide

Activity	Location
Environmental surveys and monitoring e.g. noise	Sitewide
Investigations for the purpose of assessing and monitoring ground conditions and levels	Sitewide
Erection of temporary means of enclosure	Sitewide
Receipt and erection of plant and equipment	Advance compound areas at CA02 (A2 compound), CA03 (Southern tunnel entrance compound), CA05 (Northern tunnel entrance compound), CA06 (Brentwood Road compound), CA10 (Stifford Clays Road compound East), CA14 (M25 compound) (Book of Plans, (REF TBC))
Diversion and laying of underground apparatus (except and excluded utilities work)	Services to compounds CA02 (A2 compound), CA03 (Southern tunnel entrance compound), CA05 (Northern tunnel entrance compound), CA06 (Brentwood Road compound), CA10 (Stifford Clays Road compound East), CA14 (M25 compound) (Book of Plans, (REF TBC))
Vegetation clearance for ecological mitigation	Sitewide
Temporary display of site notices or information	Sitewide

3.1.6 The REAC has been reviewed to identify environmental commitments relevant to the pre-commencement activities in Table 3.1. These primarily serve to provide for:

- a. Pre-condition surveys
- b. Measures for the protection of ecology, trees and agriculture
- c. Section 61 controls over noise
- d. A measure to protect ongoing site remediation work at a former petrol station near an access point to Compound CA02 (A2 compound)

3.1.7

3.1.8 Table 3.2 lists the commitments in the REAC identified to be relevant to pre-commencement activities.

3.1.9 The commitments in

- 3.1.10 Table 3.2 shall be implemented when carrying out the pre-commencement activities identified in Table 3.1.
- 3.1.11 REAC reference numbers in
- 3.1.12 Table 3.2 correspond to reference numbers and commitments in the REAC in Chapter 7 of this document. The detail of these commitments applicable to the pre-commencement activities is presented in Table 7.2

Table 3.2 REAC commitment references relevant to pre-commencement activities

Topic	REAC Ref No.
Geology and Soils	GS002, GS015, GS030
Landscape	LV028, LV030, LV031, LV033
Noise and vibration	NV002, NV004, NV005, NV007
Terrestrial Biodiversity	TB002, TB003, TB004, TB005, TB006, TB008, TB009, TB010, TB011, TB012, TB013, TB014, TB015, TB016, TB017, TB018, TB020

4 Construction

4.1 Construction of the Project

- 4.1.1 The delivery of the Project has been split into several tranches of contracts in order to best serve the Project's requirements and programme. Highways England's contracting approach is outlined below, along with a brief description of each contract's purpose:
- a. **Tunnels and Approaches Package:** This contract is a design and build contract that will deliver the crossing under the River Thames and the approach ramp on the North side and approach in cutting on the South side. This contract will include the diversion and protection of existing utilities.
 - b. **Roads North of the Thames Contract:** This contract is a design and build contract that will deliver the Project from the proposed Tilbury Viaduct (which commences just south of the Tilbury Loop line) up to the M25. This contract will include the diversion and protection of existing utilities.
 - c. **Kent Roads Contract:** This contract is a design and build contract that will deliver the Project from approximately 100m north of Thong Lane (over the Lower Thames Crossing) to the M2/A2/Lower Thames Crossing junction. This contract will include the diversion and protection of existing utilities.

4.2 Project team roles and responsibilities

- 4.2.1 Highways England is responsible for the delivery of the Project and its implementation (unless the benefit of the Order is transferred under the terms of the Development Consent Order (REF TBC)). However, Highways England will appoint contractors and agents to implement the Project, including a Project Manager/Director as well as additional specialist consultants to supervise, monitor or check the Contractors' environmental procedures. These bodies will take on day-to-day responsibility for managing the commitments in this document.
- 4.2.2 The responsibility of the contractors and agents will be clearly identified within relevant documents and site files, but will be in accordance with the table below. It is anticipated that prior to the commencement of each main phase of the construction programme, individuals will be identified to fulfil the relevant roles
- 4.2.3 Highways England will appoint a suitably qualified and experienced Environmental Manager who will be responsible for monitoring and assuring compliance of the Project's works with all environmental commitments set out in this CoCP, other Project documentation and relevant environmental legislation.
- 4.2.4 A management structure that includes an organisational chart encompassing all staff responsible for environmental work will be included within all EMP2s. This will set out the respective roles and responsibilities with regard to the environment and identify the nominated Contractor Construction Environmental Manager. The envisaged key roles and responsibilities are set out in Table 4.1.

- 4.2.5 The Contractor Construction Environmental Manager will be supported by other specialists as necessary (including noise and vibration, air quality, geo-environmental, landscape, ecological, arboricultural and archaeological specialists).

Table 4.1 Envisaged roles and responsibilities for the Project construction phase

Role	Main environmental responsibility
Highways England Project Director	To collate and provide Project information to prospective Contractors. Overseeing implementation of the whole Project and the individuals undertaking specific roles and duties. To be accountable for delivery of contract requirements and the Environmental Management System for the Project.
Highways England Environmental Manager	<p>General responsibilities for the Highways England Environmental Manager include:</p> <ul style="list-style-type: none"> • Monitoring and assuring compliance of the Project's works with all environmental commitments set out in this CoCP, other Project documentation and relevant environmental legislation. • Develop and maintain a Project Environmental Management System (EMS) compliant with ISO 14001:2015. • Integrate with the Quality and Health, Safety, Security and Welfare (HSSW) team for a joint assurance focus. • Support and incorporate the digital strategy. • Own environmental audit and inspection programme based on risk and opportunities including undertaking assurance activities. • Co-ordinate a joint up approach to environmental management and continual improvement across the Project, including Contractors. • Monitor environmental complaints and their investigation and resolution. • Report on Contractors' environmental performance. • Support development of scope of works to incorporate environmental management requirements suitable for delivery and integration of potential works interfaces. • Lead on developing appropriate and effective environmental processes to ensure compliance and stimulate high environmental performance. • To consider project legacy and in all decision making in the same way as cost, risk and time. • Encourage innovative thinking and Contractors' initiatives which deliver and improve the Projects legacy benefits. • To hold HSSW as a key project value and to participate in the creation, development and implementation of HSSW strategies by the project leadership team.
Highways England Traffic Manager	<p>General responsibilities for the Highways England Traffic Manager include:</p> <ul style="list-style-type: none"> • Ensure that any traffic management required by the project is planned, delivered, and managed collaboratively. Ensuring that the commitments of the TMP to are adhered to, with a specific focus on: • Planning & Delivery • Network Occupancy

Role	Main environmental responsibility
	<ul style="list-style-type: none"> • Delivering Safely • Operations • Ensure that standards and best practices are applied in the planning and delivery of Traffic Management • Establish and chair the Traffic Management Forums ensuring that all affected stakeholders are invited to attend • Attend Traffic Management Clinic's and other third party established traffic management meetings (i.e. Kent Corridor Coordination Group) • Review feedback from Local Highway Authorities in terms of planned traffic management as well as the performance of key traffic management phases • Receive data from the main works contractors as to the performance of traffic management in terms of the impact on the strategic road network and local authority roads • Represent the Traffic Management Forum at the Joint Operations Forum to report on traffic management performance and to escalate issues of concern raised by stakeholders • Review the performance of incident management that occurs within the designated "Works Zone" as set out in a TMP and any relevant DLOAs • Act as the interface between the Community Liaison Team and Travel Plan Liaison Group • Generally, oversee the performance of the wider LTC construction network in terms of the coordination, planning and delivery of traffic management on the SRN and Local Road Network
Contractor Project Director	Responsible for management of the delivery of the construction phase related to their works package/contract. Has overall responsibility for the environmental performance of the Construction phase related to their works package/contract. Regularly communicates with Highways England and the relevant statutory environmental bodies on all environmental matters as they arise. Implements the measures set out in the CoCP and REAC.
Contractor Construction Environmental Manager	<p>General responsibilities for the Construction Environmental Manager include:</p> <ul style="list-style-type: none"> • Ongoing liaison with the Contractor's site management team and general site workforce. • Ensuring compliance with environmental legislation, consents, objectives, targets and other environmental commitments, including those arising from the ES. • Maintenance of the environmental documentation and ensuring compliance with ISO 14001:2015 including updates. • Management and coordination of environmental specialists and monitoring compliance of construction activities in line with the Environmental Management Plans and the relevant environmental legislation/ licences. • Acting as the focal point for all environmental matters onsite. • Liaising with the local authority archaeology advisors as well as statutory bodies such as Historic England.

Role	Main environmental responsibility
	<ul style="list-style-type: none"> • Liaising with the local authorities and statutory bodies. • Liaising with Highways England Operations Division. • Reviewing and developing the Environmental Management Plans throughout the duration of the construction phase. • Liaising with the statutory environmental bodies/ consultees. • Accompanying statutory environmental bodies/consultees on site visits. • Compiling applications for unexpected authorisations where required. • Leading investigations into environmental incidents. • Identification of key environmental concerns onsite as the construction phase develops. • Assisting with the delivery of environmental training to the workforce. • Assisting in the review of method statements. • Assessing and checking ongoing monitoring and survey results and updating relevant databases or management plans with any new information. • Identifying cost savings and best practice activities.
Contractor Environmental Clerk of Works	<p>General responsibilities for the Contractor Environmental Clerk of Works include:</p> <ul style="list-style-type: none"> • Providing daily updates to the Environmental Manager on site progress, compliance, issues, problems, successes. • Ongoing liaison with the Contractor's site management team and general site workforce. • Supporting the Project team in delivering the environmental components of the works during the construction phase. • Delivering environmental training to the workforce. • Recording the progress of the environmental works. • Monitoring and supervising construction activities in relation to environmental aspects. • Walkover of activities on the site and ongoing monitoring of the works area to ensure compliance with key environmental legislation and Environmental Management Plans. • Assisting in the review of method statements. • Identification of key environmental concerns onsite as the construction phase develops. • Instruction and confirmation of key requirements of each section to site personnel as the job progresses. • Monitoring and updating Environmental Manager on the progress of pre-construction surveys. • Assisting in monthly formal audits with Environmental Manager. • Assessing and checking survey results and updating databases and Environmental Management Plans with new information. • Identification of cost savings and best practice activities. • Immediate reporting of incidents to the Safety, Health and Environment department.

Role	Main environmental responsibility
	<ul style="list-style-type: none"> • Supporting the Environmental Manager in liaison with the statutory environmental bodies/consultees. • Accompanying statutory environmental bodies/consultees on site visits.
Environmental Specialists	<p>The Environmental Manager and Clerk of Works will require ongoing support from several specialists including but not limited to archaeologists, landscape designers, ecologists, geotechnical engineers and hydrogeologists.</p> <p>Specialists would be responsible for undertaking activities such as pre-construction surveys, watching briefs and advising on specific issues as and when they arise throughout the construction phase e.g. choice of materials and methodology.</p>
Contractor Consents Manager	<p>General responsibilities for the Contractor Consents Manager include:</p> <ul style="list-style-type: none"> • Preparing, implementing, maintaining and updating the Consents Management Plan and Consents Register(s). • Providing the main point of contact for all consents matters and co-operates with Highways England in all matters relating to Consents Applications, notifications and compliance. • Facilitating the provision of drawings and other design or Project information required for the preparation and submission of Consent Application(s). • Managing and monitoring the status of all Consents requirements such that the works or any part of the works for which Consents are required are not commenced until Consent is granted, notification given, and relevant conditions are complied with. • Monitoring compliance with Consents throughout the works to ensure the Consents are complied with and discharged. • Liaising with third-parties, Stakeholders and Highways England including arranging and attending liaison meetings or telephone calls as necessary as well as attending regular or standing meetings (or in both cases arranging for a deputy to attend, as agreed with Highways England from time to time). • Maintaining, managing and updating the Consents Registering and minuting all meetings and calls. • Notifying Highways England as soon as reasonably practicable of a breach of Consent(s) or a potential breach or dispute with a third party, or any situation where the Contractors consider that the third party is not facilitating the smooth progress of Consents.

4.3 Interface management of construction works

4.3.1 It is anticipated that the construction works will be split into three packages across the Project (as described in 4.1.1) to enable appropriate management . Some of these packages will proceed concurrently with ongoing construction activities in either the same or different locations under the control of other Contractors.

4.3.2 Therefore, activities by other Contractors will require coordination to manage this interface efficiently and maximise opportunities for reducing the overall

impact on the surrounding communities and environment. Contractors will work with Highways England in managing these interfaces. The outline Traffic Management Plan for Construction (oTMPfC) includes the appointment of a Highways England Traffic Manager for the entire Project network, their role would include the oversight of the various programmes so as to minimise the impacts on stakeholders

- 4.3.3 To facilitate this interface, Highways England will establish and chair a Joint Operations Forum (JOF), attended by senior representatives from the Contractors. The forum will meet regularly to discuss the interface between the Contractors areas of influence. There will be two-way communication between the JOF the Project's community liaison team and Traffic Manager, to ensure relevant information is shared, and when required lead on matters requiring action Section 5 provides more information on the Project's community liaison arrangements.
- 4.3.4 The JOF will be required to coordinate several activities as well as the potential interaction with other schemes and external stakeholders. Some of the key coordination responsibilities will include the following as appropriate:
- a. Coordination of delivery to ensure mitigation and management of environmental effects will be delivered and maintained. This shall include the coordination and implementation of ecological mitigation.
 - b. Emergency response – maintaining communication and holding meetings with emergency services and other key stakeholders and ensuring that emergency response plans employed by the Contractors are coordinated (see also Section 6.9 and Section 6.10).
 - c. Coordination of construction phasing and logistics – working collaboratively to ensure that all Contractors' construction programmes are aligned.
 - d. Traffic management – in conjunction with the Traffic Management Forum as detailed in the oTMPfC, working collaboratively to ensure appropriate planning and coordination of traffic management measures required for the Project construction works packages, and other schemes, have taken place to avoid potential conflicts and minimise disruption to road users.
 - e. Access to the sites – communication and collaboration in respect of logistics planning including arrangements for site access and abnormal loads with highway authorities and emergency services.
 - f. Construction workforce – monitoring the impact of the workforce on the community in its travel to and from work and its use of temporary accommodation.
 - g. Interface with other schemes – maintaining communication between the works on the Project and those of other relevant schemes in the area to help minimise the disruption on local communities.

- h. Construction (Design & Management) Regulations 2015 (CDM) – Coordination and communication between Principal Designers and Principal Contractors to ensure discussion activities take place between the Contractors to deliver a consistent approach across the Project, reduce risk, share lessons learnt and agree commonality through design. Legal obligation to ensure there is cooperation and communication between Principal Contractors and Principal Designers.
- i. To ensure construction phasing plans have been made available to the relevant Local Authorities for information, prior to works commencing in that phase.

4.4 Consents and permissions

- 4.4.1 A number of consents will be sought within the DCO and in addition, there will be further permission and consenting requirements. The Project's approach to consents and permissions is detailed within the Consents and Agreements Position Statement (REF TBC).
- 4.4.2 The intent of the Planning Act 2008 and Government policy is to enable development and construction-related consents to be included within the DCO. Therefore, where possible and practicable, additional consents have been included within the DCO. This would minimise the need for any further approvals before the works covered by the DCO can commence, as most of the consents required for construction would be in place at the point at which the DCO is granted.
- 4.4.3 The Project has been, and will continue to be, developed based on strong collaboration between its stakeholders, and any additional consents and agreements will be secured at relevant stages of the Project's development as necessary.
- 4.4.4 A summary of those consents and permissions that may be required and are not provided for in the DCO is listed in Table 4.2. Further information can be found in the Consents and Agreements Position Statement (REF TBC).

Table 4.2 Consents and permits that may be required

Issue	Consent/licence/agreement and legislation	Consenting authority	Requirement
Installation operation/plant operation/solvent emissions activities	Regulation 12 of the Environmental Permit under the Environmental Permitting (England and Wales) Regulations 2016 (as amended)	Environment Agency	<p>Multiple permits are likely to be required for construction activities, e.g. storage and treatment activities such as materials crushing, concrete / bitumen plants, remediation plant, transfer stations, short-term (less than three years) material storage.</p> <p>Locations where such permits would be required are construction compounds. During construction, construction compounds would be located along the Project route. Larger compounds would be required at the North and South Portals to allow for tunnelling operations and materials management.</p>
Water abstraction and impoundment	Water Abstraction: Licence under sections 24 and 25 of the Water Resources Act 1991 (restrictions on abstraction and impounding; restrictions on impounding)	Environment Agency	<p>Permits are likely to be required for construction activities, e.g. water abstraction for concrete processing; impoundment requiring changes to existing assets.</p> <p>Locations where such permits would be required are construction compounds. During construction, construction compounds would be located along the Project route. Larger compounds would be required at the North and South Portals to allow for tunnelling operations and materials management.</p>
Environmental permit (water discharge and/or groundwater activity)	Regulation 12 of the Environmental Permitting (England and Wales) Regulations 2016 (as amended)	Environment Agency	Permits will be required for dewatering, discharges to surface or groundwater from construction and operational activities.

Issue	Consent/licence/agreement and legislation	Consenting authority	Requirement
			<p>At the Northern Portal construction compound, a permit will be required for dewatering and discharge of groundwater, as well as for discharging surface water runoff due to the large surface area of the compound. At the South Portal, a permit will be required for discharge of surface water runoff from the construction compound due to its large surface area.</p> <p>Additional permits may be required for discharge of foul water to the sewage network under consent of the relevant utilities company. '</p>
European Protected Species licensing	Conservation of Habitats and Species Regulations 2017	Natural England	Required for the translocation of species in the Order Limits prior to the commencement of construction.
Water Voles	Schedule 5 of the Wildlife and Countryside Act (as amended)	Natural England	Required for the translocation of species in the order limits prior to the commencement of construction.
Badger licence	Protection of Badgers Act 1992 (section 10(1)(d))	Natural England	Badger setts have been identified within the Order Limits and it may be necessary to undertake the closure and removal of confirmed badger setts during the scheme construction. This consent is therefore likely to be required prior to commencement of construction activities.
Noise, vibration and environmental impact of construction works	Section 61 consent under the Control of Pollution Act 1974	Local authority	For construction works and associated operations to approve mitigation approach for potential disruption and impacts
Self-Service Marine Licence	Marine and Coastal Access Act 2009	Marine Management Organisation	For works that may be undertaken in the River Thames, or on the foreshore, that are not addressed through provisions made in the Deemed Marine Licence,

Issue	Consent/licence/agreement and legislation	Consenting authority	Requirement
			a Self-Service Marine Licence would be required in addition to the Deemed Marine Licence. Such works would include: reprofiling, moving material, specific construction activities, maintenance, dredging, and the deposit or removal of any substance or object.
Crane Oversail Licence	Highway Act 1980 (section 177 and 178)	Local authority	For construction works such as structural elements of the road scheme (e.g. bridges)
Mobile phone masts	Town and Country Planning Act 1990	Local authority	To increase the capacity of mobile networks at work sites.
Temporary use of common land during the construction period	Section 38 Commons Act 2006	Local authority	Highways England is proceeding on the basis that a separate consent under section 38 of the commons Act 2006 will be required for the proposed temporary use of, and construction activities on, parts of Tilbury Green and Walton Common.
Temporary hoarding and scaffolding over existing roads	Highways Act 1980 Sections 169(1), 172(1), and 173	Local authority	Setting up compounds adjacent to roads. Demolition, repairs or protective works to buildings adjacent to roads.

4.5 Environmental asset data and as-built drawings

- 4.5.1 The environmental features of the Project are shown on the Environmental Constraints Plans (REF TBC).
- 4.5.2 Surveys for the following species have been undertaken to inform the ES and subsequent delivery and management of mitigation measures identified in the REAC to control environmental effects:
- a. Bats
 - b. Otters
 - c. Dormice
 - d. Great crested newts
 - e. Water voles

- f. Common reptiles (grass snake, adder, common lizard, slow worm)
- g. Breeding birds
- h. Wintering and 'on passage' wetland bird surveys
- i. Barn owls (targeted surveys)
- j. Invertebrates (terrestrial, aquatic and benthic – including tentacled lagoon worm)
- k. Badgers
- l. Species listed in accordance with the requirements of 6 (specifically harvest mice and brown hares)
- m. Marine mammals and eels (incidental observations only)

4.5.3 Species' surveys for the above have been carried out and will be presented as part of our DCO application.

4.5.4 Cultural heritage surveys were undertaken to inform the ES, including:

- a. Cultural heritage desk-based surveys
- b. Geophysical surveys
- c. Archaeological trial trenching
- d. Historic buildings assessment

4.5.5 Cultural heritage surveys have been carried out and will be presented in our DCO application. Environmental asset data and as-built drawings would be required for the operation of the Lower Thames Crossing.

4.5.6 The submission arrangements for providing as-built drawings and environmental asset data to Highways England are:

- a. The Contractor issues an electronic copy of all as-built drawings and environmental asset data to Highways England in a format agreed by Highways England and compiles and maintains a register of the date and contents of the drawings and data submitted.
- b. Arrangement for the provision of information to the subsequent asset owner stakeholders, including local authorities detailed in Highways England DMRB GG182 Major Schemes: Enabling handover into operation and maintenance (Highways England 2020).

4.6 Protection of existing infrastructure and buildings

4.6.1 Powers related to the protection of existing infrastructure and buildings are included in the DCO.

- 4.6.2 The Contractors will take measures, including the carrying out of surveys, investigations, obtaining consents and agreements, to protect existing buildings and infrastructure in consultation with the appropriate statutory undertakers and stakeholders. The Contractors will undertake the design and implementation of any repairs, strengthening, modifications (temporary or permanent) required.

5 Communication and community engagement

5.1 Communication and community engagement

5.1.1 Highways England will develop a Communications and Engagement Strategy (CES) that outlines the objectives and processes for engagement and communications with all stakeholders. The Contractors will each develop a Communications and Engagement Plan (CEP) in support of the CES that will ensure that stakeholders are informed of the works activities and to maintain good relationships with other parties.

5.2 Communications and Engagement Plan

5.2.1 The Contractors' CEP will be submitted to Highways England for review and will include:

- a. The Contractors' processes and procedures that demonstrate how they will meet the requirements of scope of works and Highways England's CES.
- b. How the Contractor will distribute communications to stakeholders, local authorities, local residents and communities.
- c. How any communication specific commitments within in the DCO will be discharged.
- d. The roles, responsibilities and contact information for the Contractor's staff involved in delivering the CEP.
- e. A programme of initial communication activities with stakeholders and communities.
- f. Key messages, communication channels and target audiences.
- g. Reporting metrics to be used to monitor and report on communications performance.

5.2.2 The CEP will be submitted for acceptance by Highways England, following consultation with the local planning authorities. The CEP will be provided to the relevant local authority before the authorised development is commenced. Experienced community relations personnel/community liaison officers will implement the plan, provide appropriate information and provide support to the Contractors to resolve community issues.

5.2.3 Communication with local authorities, including parish councillors and the Project's 'neighbours', will be undertaken throughout the construction phase, through Community Liaison Groups and Traffic Management Forum (as detailed in the oTMPfC). The Contractors will engage with the local community, particularly focusing on those who may be impacted by construction, including local residents, businesses, landowners and the specific needs of protected groups (as defined in the Equality Act 2010).

- 5.2.4 The Project will provide information and feedback and respond to stakeholders and affected communities regarding upcoming construction activities.
- 5.2.5 The CEP will provide a detailed programme of community engagement, setting out how relevant planning authorities, communities, stakeholders and affected parties will be engaged with throughout the construction period. It will specify stakeholders, communities and affected parties (such as schools, places of worship, businesses and environmental organisations) and for each group, identify the proposed methods and likely timing of consultation for each key stage of work. Such methods may cover, but are not limited to, community drop-in sessions, one-on-one meetings with key stakeholders as relevant, newsletters and leaflet drops (explaining forthcoming works).
- 5.2.6 Other information to be described within the CEP includes:
- a. Details of the enquiries and complaints procedure including information on the helpline and email addresses available for stakeholders to contact Highways England directly.
 - b. Details of how the needs of vulnerable groups will be met in terms of use of accessible media and appropriate formats for the visually impaired.
 - c. A detailed programme of community involvement through volunteering and educational activity (including Science Technology Engineering and Maths (STEM) programmes with local schools, colleges, and apprenticeship opportunities).
 - d. In consultation with the relevant local authorities the Project will establish and maintain Community Liaison Groups (CLGs) in those communities likely to be most impacted by construction activities. The CEP will identify in which communities it will be appropriate to establish a CLG, in advance of construction commencing. The CEP will set out the process by which CLGs will be established and administered together with an initial schedule of planned meetings according to key work stages. CLGs will meet regularly before and during the construction period.

Community helpline, enquiries and complaints procedure

- 5.2.7 The Highways England Customer Contact Centre will be used to deal with enquiries and complaints from the public. This consists of a phone line, email and website contact facility. The information line is staffed by Highways England 24 hours a day, seven days a week. The relevant contact number, email and website addresses for the Highways England Customer Contact Centre will be displayed on signs around the construction site in locations easily accessible to the public. The Highways England Customer Contact Centre will provide a response to enquiries and complaints within 10 working days.

- 5.2.8 The procedure, which is already in place as a standard Highways England process, will:
- a. Log enquiries and complaints in a register.
 - b. Deal with enquiries and complaints appropriately, recognising that they may be due to the effect of construction works on people, their properties and other interests.
 - c. Direct the enquiry or complaint to the correct person for review and appropriate action if the person recording it cannot do so.
 - d. Take appropriate action and respond to enquiries or complaints.
 - e. Outline the process for Highways England to review enquiries and complaints regularly to assess the adequacy, efficiency and effectiveness of the enquiries and complaints system and procedure, and the measures being taken to respond to any enquiries or complaints, and close out on resolution.
 - f. Identify clusters of enquiries and complaints by location and topic for further consideration by Highways England.
- 5.2.9 The extent of the action taken will depend on the nature of the enquiry or complaint. All complaints will be investigated to establish the cause of the complaint and whether the works or issue complained about comply with the Project's environmental requirements and other relevant requirements such as legislation, standards and codes of practice.

Community Liaison Groups

- 5.2.10 The proposed CLGs will be open to attendance from the local community. Attendance and membership will be publicised in the local areas using traditional and digital media. Where possible, local community leaders will be identified so that they are involved in the process of agreeing how community engagement will be undertaken in their area.
- 5.2.11 The scope of the CLGs will be to ensure that local residents are appropriately informed and therefore prepared for forthcoming changes and construction activities.
- 5.2.12 Terms of Reference, such as frequency of meetings, for the CLGs will be developed with the participants and agreed in advance of construction commencing. It is anticipated that the Terms of Reference will then evolve as the Project progresses.
- 5.2.13 The Local Community Leaders of the CLGs will be invited to the Traffic Management Forum.

5.3 Notice of work

- 5.3.1 Contractors will notify occupiers of nearby properties in advance of works taking place, if there is a possibility of them being impacted, taking account of the type and duration of the activity. This notification will be undertaken in accordance with the CEP (see 5.2). Such notices would be in addition to notices required under the temporary possession articles of the Development Consent Order.
- 5.3.2 At least two weeks before such works are carried out, the Contractors will distribute information sheets relating to the programmed activities. The information sheets will detail the expected disruptions and measures being taken to avoid, minimise or mitigate the adverse impacts of these works. There may be circumstances where for example, emergency works need to be carried out and notification may not meet the timeframe.

6 General construction site management

6.1 Construction logistics

- 6.1.1 The Contractors will produce Construction Logistics Plans and will be required to implement directly and through their Sub-Contractors and suppliers, the following standards:
- a. Construction Logistics Community Safety (CLOCS) – A national standard of planning the supply routing and management of sites to reduce risk to vulnerable road users.
 - b. Freight Operator Recognition Scheme (FORS) (Silver or above) – A national standard of managing vehicle fleets and driver training to reduce risk to vulnerable road users.
 - c. Driving for Better Business – A national standard of reducing risk to professional drivers.
- 6.1.2 The Contractors will inform Highways England what their strategy is for implementing FORS silver or above. Abnormal loads and transport movements from a European origin will be exempt.
- 6.1.3 All Contractors will have and maintain CLOCS champions throughout the programme.
- 6.1.4 The Contractors will investigate the use of multimodal transport including use of the river Thames via port facilities adjacent to the Project Order limits – this point is expanded upon in the outline Materials Handling Plan. Contractors will be required to consider the impact of any multimodal transport options on the wider road network and environment, and demonstrate the decision process used to select transport options.
- 6.1.5 Contractors will be encouraged to optimise the use of autonomous plant and equipment and a modernised fleet.

6.2 Traffic management

- 6.2.1 An outline Traffic Management Plan for Construction (oTMPfc) has been produced to provide outline concepts and principles that will be applied for the design and management of construction traffic management and transport logistics for the Project. This outline document provides a framework for discussion purposes with relevant authorities.
- 6.2.2 As required by Requirement 10 of Part 1 of Schedule 2 of the DCO, the Contractors will be required to produce Traffic Management Plans for construction before commencing works. The Traffic Management Plans must be substantially in accordance with the outline traffic management plan for construction. Traffic management for construction will be dealt with via that document. The Traffic Management Plans will focus on:
- a. Strategic road network traffic management including lane closures speed control and temporary road closures and diversions.

- b. Local road network, including temporary contraflows, road closures, diversions both on-line and off-line and weekend closures.
- c. Traffic management within the worksite, such as traffic routes and workforce pedestrian management, strategic and local road networks due to the different highway authorities.
- d. Management of construction traffic impacts on other road users, including both motorised and non-motorised road users.

6.3 Journey planning

- 6.3.1 A Framework Construction Travel Plan (FCTP) has been produced to provide a framework with regards to the implementation of travel planning for the movement of personnel to and from the construction areas and compounds during the construction phase of the Project. The key aim of the FCTP is to minimise adverse local disruption or traffic impacts on the highway network from worker and visitor travel to and from construction areas and compounds, by reducing the number of single-occupancy vehicle trips and encouraging the uptake of sustainable and active modes of travel.
- 6.3.2 The FCTP sets out guidance for developing Site-Specific Travel Plans (SSTPs) for each construction compound, or compounds where these are closely located with similar levels of accessibility. This includes the Utility Logistic Hubs (ULH) required for Statutory Undertakers to carry out the utility-specific works.
- 6.3.3 The SSTPs will be developed by the contractors as set out in the Requirements and produced following the latest guidance and best practice. The SSTPs will be subject to review (and approval) by the SoS, in consultation with relevant local planning authorities.
- 6.3.4 The FCTP and future SSTPs are designed to incorporate the flexibility needed to respond and adapt to changing conditions over the duration of the Project, and will require a continuous monitoring and review process. Regular employee travel surveys will be undertaken at each site, reviewing targets and indicators as necessary.
- 6.3.5 The SSTPs will adhere to the following principles which provide options to promote sustainable transport:
 - a. Walking and using sustainable forms of transport at sites shall be supported where travel can be completed in a lit highway environment, with footways for pedestrians.
 - b. Parking will be controlled at each compound to ensure demand does not exceed supply.
 - c. Shuttle buses will operate from existing transport hubs on both sides of the Thames. These hubs are currently envisaged as Gravesend (Bus, HS1, National Rail), Grays (Bus, National Rail) and Upminster (Bus, National Rail, London Underground, London Overground). Buses are likely to provide routes to each compound and inter-compound connectivity and will be for Project workforce only.

- 6.3.6 Each SSTP will contain the following:
- a. An assessment of the existing accessibility of the compound
 - b. The sustainable transport principles, as encapsulated above
 - c. Targets for the SSTP, which will be SMART (specific, measurable, attainable, realistic and time-bound)
 - d. Measures, which are targeted to the location to enable the targets to be achieved
 - e. Details of the management of the SSTP, including the appointment of a Travel Plan Coordinator
 - f. Details of a clear monitoring programme which will establish the effectiveness of the SSTP measures against the targets set
 - g. An action plan which provides a programme for the delivery of the measures, setting this out in a clear way

6.4 Working hours

- 6.4.1 The working hours at the worksites will depend on the construction activities. Table 6.1 classifies the normal working hours that will be applied.

Table 6.1 Normal working hours

Classification	Description
Standard working hours 07:00 to 19:00 weekdays 07:00 to 16:00 Saturday Plus, up to one hour before and after for mobilisation (start-up and close down) procedures. Additional repair and maintenance periods (if required): 08:00 to 17:00 Sundays	Mobilisation Period: Daily start-up and close down procedures will include but not be limited to: deliveries, workforce movement to place of work, unloading, site briefings, inspections, refuelling, maintenance and general preparation and housekeeping works. Activities will not include operation of plant or machinery and will be limited to activities that do not cause a significant noise and vibration impact, and disturbance to local residents, schools or businesses. Repair and maintenance activities will comprise general mechanical maintenance to construction machinery and plant such as cranes, excavators, compressors, grouting equipment and dewatering pumps, or as agreed under the Section 61 consent/notice (unless appealed to the Secretary of State).
Tunnelling, below ground shaft works and portals 00:00 to 24:00 Monday - Sunday	At the portals most surface activities will be completed within the standard working hours. However, certain activities will require extended working hours (see Earthworks (extended), below) including major concrete pours, piling/diaphragm wall works, and base slab grouting. For the tunnelling and associated construction activities, the underground work will be undertaken on a continuous 24-hours, seven days a week basis.

Classification	Description
	<p>Underground excavation of the portal structure and the required hoisting and support operations will be undertaken on a 24-hours, seven days a week basis.</p> <p>Additionally, the following will be in operation on a 24-hours, seven days a week basis:</p> <ul style="list-style-type: none"> • Key support activities, such as dewatering and surveying, excavated material handling, slurry treatment plant, pumps, maintenance workshops, general material (tunnel lining segments etc.) supply to tunnelling operations (including cross passages), ventilation fans, cranes, compressors and site security are required for safeguarding the works and will be in operation and maintained on a continuous 24-hours, seven days a week basis. • Onsite factory casting of the tunnel segments and other concrete elements. • Works to distribute tunnel-arising spoil within the confines of CA5 / Northern tunnel entrance, using a conveyor from the separation plant to the initial stockpile on Shed Marsh and from here it will be distributed and spread using standard earthmoving equipment. • Collection (via the Port's private road) of aggregates from the neighbouring Port of Tilbury.
Earthworks (extended) 07:00 to 22:00 Monday to Saturday	Covering, filling and cutting activities, placement of excavated material, including but not limited to onsite bulk movement of materials, excavations and compaction of fill.
Security 00:00 to 24:00 Monday - Sunday	Security personnel and monitoring will be operational on a continuous 24-hours, seven days a week basis.

Anticipated additional working hours

- 6.4.2 In some circumstances, the Contractors will need to undertake work under additional working hours as defined in Table 6.2 below.
- 6.4.3 These works may include those within the existing highway and railway boundaries during night-time, weekends and/or bank holidays. These works would be undertaken at these times for reasons of safety or operational necessity and may involve consecutive nights over weekends.
- 6.4.4 Examples of activities within the existing highway boundaries that may be required during additional working hours include surface tie-ins, installation of signage, technology, implementation of traffic management and road resurfacing.
- 6.4.5 Examples of activities within the existing railway boundaries that may be required during additional working hours include rail cant/roll survey, under-track crossing installation, surface monitoring equipment installation and track maintenance during tunnel boring machine (TBM) crossing.
- 6.4.6 Activities outside normal working hours that could give rise to disturbance will be kept to a reasonably practicable minimum.

Table 6.2 Additional working hours

Classification	Description
Extended working hours 19:00 to 22:00 weekdays	These are intermittent and are required to cover certain construction activities that require more than the standard working hours to be completed. These include, but are not limited to, major concrete pours, and piling/diaphragm wall works.
Overnight working hours 22:00-07:00	Include resurfacing works, tie-in works, bridge beam lifts etc.
Bank Holidays	Online works for highways. Utilities works when services are being cut off.
Specific worksites	<p>Construction works of the tunnel ramps may have to be extended between 19:00 and 22:00 Monday to Friday. Should Port of Tilbury be used to provide materials to the site, vehicles may be used on a 24-hours, seven days a week basis for collections and delivery along Substation Road.</p> <p>Table 6.3 identifies the utilities construction activities and locations which may be undertaken on a 24-hours, seven days a week basis.</p> <p>Table 6.4 identifies the Kent Roads highways construction activities and locations which may be undertaken on a 24-hours, seven days a week basis.</p> <p>Table 6.5 identifies the Roads North of the Thames highways construction activities and locations which may be undertaken on a 24-hours, seven days a week basis.</p>
Out of hours / Possession working	<p>It will be necessary to undertake a number of activities outside of normal working hours. These are required for:</p> <ul style="list-style-type: none"> • Utilisation of periods of low traffic flows for items such as abnormal loads/construction plant delivery, working within the existing highway or footpath boundary, works affecting operation of railways. • Utilisation of periods with low demand or flows for utility diversions. • Ensuring minimum disruption to third parties who may have ongoing operations during the day.
Short notice working	<p>On a major project such as this, there is a potential need for works to be completed or undertaken at short notice, to secure and make safe construction operations.</p> <p>Where a piece of work needs to be undertaken at short notice, the Section 61 dispensation or variation mechanism for these works will be used. Where possible, the dispensation or variation will be sought 48 hours in advance of the works.</p>

Classification	Description
Tidal river working	<p>Certain activities such as surveying, additional GI or supply, construction and removal of temporary works such as discharges must be undertaken according to tidal cycles and may therefore take place any time within a 24 hour period.</p> <p>Supply and construction of permanent works such as discharges must also be undertaken according to tidal cycles and may therefore take place any time within a 24 hour period.</p>

Table 6.3 24/7 construction working locations - Utilities

Proposed 24/7 construction working utilities locations	Feature Crossing
Trenchless installation of the A2 for 2No water pipelines	A2
Trenchless installation of Thong Lane for a gas pipeline	Thong Lane
Erection and removal of OHL equipment	Network Rail Asset
Erection and removal of OHL equipment	A2
Installation of a tunnel as a conduit for a gas pipeline	LTC
Installation of a tunnel as a conduit for a gas pipeline	LTC
Installation of a tunnel as a conduit for a gas pipeline	LTC
Trenchless installation of Thong Lane for a gas pipeline	Thong Lane
Trenchless installation of Thong Lane for a gas pipeline	Thong Lane
Trenchless installation of the London, Tilbury & Southend Line for 2No water pipelines	Network Rail Asset
Trenchless installation of the London, Tilbury & Southend Line for 4No water pipelines	Network Rail Asset
Erection and removal of OHL equipment	Network Rail Asset
Removal of OHL equipment and trenchless installation of the London, Tilbury & Southend Line for electricity networks	Network Rail Asset
Trenchless installation of the London, Tilbury & Southend Line for 2No water pipelines	Network Rail Asset
Estimated 5No. trenchless installations under the A1089 for provision of utilities	A1089
Erection and removal of OHL equipment	A1089
Installation of a tunnel as a conduit for a gas pipeline	A13
Estimated 3No. Trenchless installations under the A13 for provision of utilities	A13
Erection and removal of OHL equipment	A13

Proposed 24/7 construction working utilities locations	Feature Crossing
Estimated 4No. Trenchless installations under the A13 for provision of utilities	A13
Trenchless installation of the A13 for 2No water pipelines	A13
Trenchless installation of the London, Tilbury & Southend Line for installation of electricity networks	Network Rail Asset
Trenchless installation of the London, Tilbury & Southend Line for installation of electricity networks	Network Rail Asset
Trenchless installation of the London, Tilbury & Southend Line for 2No water pipelines	Network Rail Asset
Removal of OHL equipment	M25
Trenchless installation of the M25 for installation of electricity networks	M25
Trenchless installation of the M25 for 2No water pipelines	M25
Estimated 7No. trenchless installations under the M25 for provision of utilities	M25
Trenchless installation of the M25 for gas pipeline	M25
Trenchless installation of the M25 for installation of electricity networks	M25
Trenchless installation of the M25 for installation of electricity networks	M25
Estimated 5No. Trenchless installation of the A127 & M25 for gas pipeline	A127 & M25
Estimated 2No. Trenchless installation of the M25 J29 gyratory	M25 J29
Trenchless installation of the M25 for installation of electricity networks	M25
Trenchless installation of the M25 for gas pipeline	M25

Table 6.4 24 Hour construction working locations - Kent Roads

Activity	Structure ID/Proposed 24/7 construction working highway locations	Location
Bridge Construction	BRN0000019 - LTC southbound to A2 westbound Viaduct	A2
Bridge Construction	BRN0000002 - Thong Lane Over M2 Overbridge - Lifting of bridge beams and tie in of bridge to existing thong lane (north of A2).	A2
Bridge Demolition	BRE0025747 - Existing Thong Lane Over M2 Overbridge	A2
Bridge Demolition	Brewers Rd Existing Bridge Demolition	A2
Bridge Construction	BRN0000001 - Brewers Road Bridge (Lifting of beams)	A2
Highway Tie in works	Thong Lane tie in works	Thong Lane over LTC

Activity	Structure ID/Proposed 24/7 construction working highway locations	Location
Highway Tie In Works	Gravesend East Junction Slips & Marling Cross Widening Works & Henhurst Road	Gravesend East Junction Slips
Highway Tie In Works	A2 tie in works - eastbound tie in	A2
Highway Tie In Works	A2 tie in works - westbound tie in	A2
Highway Tie In Works	A2 tie in works to Brewers Road	A2
Highway Tie In Works	A2 Surfacing works	A2

Table 6.5 24 Hour construction working locations - Roads North of the Thames

Activity	Structure ID/Proposed 24/7 construction working highway locations	Location
Bridge Construction	BRN0000025 - Tilbury Viaduct	Tilbury Loop Rail Line
Bridge Construction	BRN0000042 - A1013 Over the A1089	A1089
Bridge Demolition	BRE0012830 - Existing Bridge Demolition	A1089
Bridge Construction	BRN0000046 - A13WB to LTC northbound viaduct	A1089
Box Jack	BRN0000048 - A13 Over the LTC	LTC Underpasses A13
Box Jack	BRN0000049 - A13 over LTC northbound Slips	LTC Underpasses A13
Bridge Demolition	BRE0000N20 - Existing Rectory Road	Rectory Road over A13
Bridge Construction	BRN0000053 - Proposed Rectory Road Bridge	Rectory Road over A13
Highway Tie In Works	A13 westbound on slip tie in works	A13
Highway Tie In Works	A13 eastbound off slip tie in works	A13
Highway Surfacing	A13 Surfacing works	A13
Highway Technology Installations	A13 Gantry Installations	A13
Highway Tie In Works	A1013 tie in works & surfacing	A13
Highway Tie In Works	A1089 tie in works & surfacing	A1089
Highway Tie In Works	Local road tie in works Green Lane	Green Lane
Highway Tie In Works	Local road tie in works Stifford Clays Rd	Stifford Clays Rd
Highway Tie In Works	Local road tie in works Muckingford Rd	Muckingford Rd

Activity	Structure ID/Proposed 24/7 construction working highway locations	Location
Highway Tie In Works	Local road tie in works Brentwood Rd	Brentwood Rd
Box Jack	BRN0000081 - M25/LTC Junction	LTC Underpasses M25
Bridge Construction	BRN0000082 - Footpath over Upminster Railway	Upminster Railway, East of M25
Bridge Construction	BRN0000088 - Footbridge over the M25	M25
Bridge Construction	BRN0000087 - LTC northbound Collector over Shoeburyness Railway	Shoeburyness Railway/M25
Bridge Construction	BRE0013562 - Works related to BRN0000087	Shoeburyness Railway/M25
Bridge Construction	BRE0013567 -Cobham Hall Viaduct	M25 J29
Bridge Construction	BRN0000089 - Footbridge over A127	A127
Highway Tie In Works	B186 North Road Tie in works/BRN0000073	North Road - B186 Interface LTC
Highway Technology Installations	M25 Gantry Installations	M25
Highway Tie In Works	M25 Widening /Tie in works	M25 General tie-in works, BRN0000084, BRE0013562, BRE0013568, BRN0000086 BRE0013569, BRE0013570 & Various retaining walls

- 6.4.7 Some works, such as utility works, earthworks and ecological works are dependent on agreed outages, weather conditions and seasonal variation. In these circumstances, it may be necessary for the Contractor to seek an extension to the normal working hours. If this is required, consent will be sought from the local authority prior to commencement of the works
- 6.4.8 When working close to live railways, to ensure the safety of construction personnel and railway operations, some activities may be required to be undertaken during closures, known as possessions, of the railway lines.
- 6.4.9 For all works required to be undertaken by the Contractor, an application will be made by the Contractor to the relevant local authority prior to undertaking the works under Section 61 of the Control of Pollution Act 1974 unless appealed. Any variations to the normal working and additional working hours required will be agreed with the relevant local authority and Highways England.

- 6.4.10 In the case of work required in response to an emergency, or overrunning works that if not completed will be unsafe or harmful to the works, staff, public or local environment, the relevant local authority will be informed as soon as reasonably practicable of the reasons for and likely duration of the works.
- 6.4.11 Abnormal loads or those that require a police escort may be delivered outside standard working hours subject to the requirements and approval of the relevant authorities, e.g. delivery of tunnel boring machines, heavy lift crane/equipment, prefabricated bridge beams or heavy plant.

6.5 Construction site layout and good housekeeping

- 6.5.1 The Contractors will plan for construction sites to be organised, having due regard for nearby residential, commercial, environmental and other sensitive receptors, to reduce the likelihood of an environmental incident or nuisance occurring.
- 6.5.2 In addition to the measures in the REAC, the following principles will be implemented subject to local constraints:
- a. Electricity will be used to power up fixed plant and facilities (depending on feasibility and availability of adequate electrical supply).
 - b. Noise-generating activities will be sited away from noise-sensitive receptors where practicable and screened if necessary and practicable to reduce the noise impact.
 - c. Traditional warning alarms for plant will be avoided in favour of less obtrusive alternatives such as white noise alarms or absolute segregation/exclusion, subject to availability and meeting particular safety requirements.
 - d. Use of loudspeakers or loudhailer devices will be avoided except in emergencies.
 - e. Storage facilities, temporary offices, fixed plant, machinery and equipment will be positioned to reduce as far as practicable the environmental impacts, having due regard to the constraints of each site.
 - f. Site accommodation will be located to avoid overlooking residential properties, containing and limiting visual intrusion of construction sites, as far as reasonably practicable.
 - g. Depending on local restrictions, wheel washing facilities will be located at a suitable location within the site so as to prevent mud from being tracked onto nearby roads and, the provision s road sweeping.
 - h. There will be effective preventative pest and vermin control and prompt treatment of any pest and vermin infestation, including arrangements for disposing of food waste or other attractive material. If infestation occurs the Contractors will take immediate action to eliminate the infestation and prevent further occurrence.
 - i. Open fires will be prohibited as part of overall prevention of fire on sites.

- j. General 'good housekeeping' arrangements will ensure the sites are safe, clean and tidy.
- k. Adequate welfare facilities will be provided for all working personnel and visitors.
- l. Smoking areas will be provided at site offices and worksites, equipped with containers for smoking wastes, and located away from site entrances and residential areas.
- m. There will be management of staff congregating outside the sites prior to commencing or leaving work.
- n. Sustainable use of resources on sites, e.g. energy and water, will be encouraged.
- o. The use of sustainable materials will be encouraged and the use of plastics and harmful substances minimised.

6.6 Construction compound

6.6.1 The construction compounds will provide the following typical core facilities, as appropriate, with the type and number of facilities relevant to the number of personnel utilising the compound and associated nearby construction activities:

- a. Appropriate water management
- b. Materials and aggregates storage
- c. Loading and unloading area
- d. Parking for vehicles and bicycles
- e. Plant management
- f. Project offices
- g. Recycling facilities
- h. Refuelling
- i. Security control
- j. Vehicle/wheel wash
- k. Welfare facilities

6.6.2 Construction compounds including below ground construction, viaduct launch sites and tunnels will receive and support specialist plant and equipment, and this will be sited within the compound and specific worksite as required.

- 6.6.3 Project offices, welfare facilities, sleeping accommodation and workshops will be constructed from a mix of single and modular units. Styles and calculations for the number of potential units are to be based on 12m x 3m x 3m units, stacked to minimise surface area taken up at ground level. This includes sleeping accommodation.
- 6.6.4 The Project anticipates units being stacked up to an equivalent maximum height of five units (circa 15m), with potential for viewing areas at the top of some.
- 6.6.5 Site layouts for construction compounds will be made available to the relevant local authority for information, prior to works commencing in that phase.

Sleeping accommodation

- 6.6.6 The size of tunnel indicates that specialist resources will be supporting construction and therefore, temporary sleeping accommodation could be required. The Project currently assumes a provision of temporary sleeping accommodation for up to 480 personnel. All sleeping accommodation will be provided within the CA05 Northern tunnel entrance compound. The locations within CA05 Northern tunnel entrance compound of these accommodation units will be confirmed once the Contractors have been appointed.
- 6.6.7 Access to accommodation and welfare facilities within the compounds will be managed by 24/7 security allowing the movement of workers but ensuring construction vehicle movements are not occurring outside of working hours.
- 6.6.8 Highways England would employ measures to reduce the impact on the local accommodation market and associated social services. Highways England and its contractors would implement travel plans to encourage sustainable travel from home. Highways England would also help workers to find accommodation and is considering an accommodation helpdesk to align need with supply, therefore benefiting local accommodation providers and the local economy.

6.7 Worksite security

- 6.7.1 Construction worksites will be under the control of the Contractors, who have a statutory duty to prevent unauthorised access. The Contractors will carry out site-specific assessments of the security and trespass risk at each site and implement appropriate control measures.
- 6.7.2 The following measures will be used where appropriate by the Contractors to prevent unauthorised access to sites:
- a. Use of high perimeter fencing or hoarding for site security and public safety, as determined by site-specific security risk assessments.
 - b. Maintenance of PRowS assessed in the ES (REF TBC), where reasonably practicable, or provision of an appropriate alternative where feasible.
 - c. Installation of secure gates and security provision outside of working hours.
 - d. Security lighting around the site and site perimeters.
 - e. Adequate competent and accredited security guards and patrols.

- f. CCTV, infrared surveillance and alarm systems where required. The location and direction of view of security cameras or blocking software to prevent intrusion into residential properties will be considered.
- g. Securing of site equipment and materials, such as fuel storage containers, outside working hours.
- h. Immobilising of plant.
- i. Securing of ladders and scaffolding to prevent unauthorised access to restricted areas and neighbouring properties.

Site fencing and hoarding

- 6.7.3 Site-specific security risk assessments carried out by the Contractors will determine the type of perimeter fencing or hoarding to be installed. This will be compliant with DCO Schedule 2, Part 1, Requirement 12 which references the Manual of Contracts Documents for Highways Works (MCHW). The form of fencing and hoarding will be fit for purpose, taking into consideration the location, construction activities and surrounding landscape. The Contractors will be responsible for obtaining hoarding licences for hoarding or fencing on the highway.
- 6.7.4 Locations for ecological and acoustic fencing requirements are identified on the Environmental Masterplan (Figure 2.4, (REF TBC)).
- 6.7.5 The Contractors will be responsible for maintaining all their perimeter fencing and hoarding.
- 6.7.6 Highways England requires the Contractors to ensure that hoarding and other materials used are appropriate to the location and activities within the compound/worksites affecting noise level at the boundary.
- 6.7.7 Fencing may be used in areas of low security risk to reduce visual impact on the environment and aid security patrol management of the area. The Contractors may use Heras fencing as an interim measure to secure a site or adapted site boundary prior to installing permanent hoarding, or likewise when demobilising from an area.
- 6.7.8 Hoarding will be erected to the boundary of higher-risk activity sites or where visual screening is required. Hoarding will typically be 2.4m high but could be higher in the highest security risk areas.
- 6.7.9 The following measures will be applied when installing and maintaining the site perimeter fencing or hoarding, as appropriate:
 - a. Use of appropriate fencing or hoarding, which ensures the site is identifiable as a Highways England site, taking into consideration the outcomes of security risk assessment, construction activity and existing landscape.
 - b. Where possible sustainable materials may be used for such equipment and solid wooden hoardings are to be attached to all highway-facing boundaries, including footways, bridleways and byways.

- c. Hoardings may be topped with anti-climb measures based on the risk assessment.
- d. Hoardings to be of a type or design and managed so posterage and graffiti is minimised.
- e. Providing information boards with key contact details such as Highways England Customer Contact Centre number, enquiries and complaints procedure, out of hours contact details and information on the works.
- f. Displaying notices on site boundaries to warn of hazards onsite such as deep excavations, construction access and movements.
- g. Be sensitive to visual intrusion impacts.
- h. Will not create hazardous zones for vulnerable users.

6.8 Site lighting

- 6.8.1 Site lighting and signage will be provided by the Contractors to ensure the safety and security of the construction sites. It will be at the appropriate luminance required to provide safe working conditions. Where needed and appropriate, lighting to site boundaries will be provided, and illumination will be sufficient to provide a safe route for the passing public. Precautions will be taken to avoid shadows cast by the site hoarding on surrounding footpaths, roads and amenity areas. Where appropriate, lighting will be activated by motion sensors to prevent unnecessary usage.
- 6.8.2 Site Lighting will comply with the Institute of Lighting Professionals Guidance Notes for the Reduction of Obtrusive Light GN01/20 (2020) and the provisions of BS 5489-1, Code of Practice for the Design of Road Lighting (BSI, 2020), where applicable.
- 6.8.3 Lighting will also be designed, positioned and directed to prevent or minimise light disturbance to nearby residents, ecological receptors, as well as motorists and rail and marine operations. This provision will apply particularly to sites where night working or security lighting will be required.
- 6.8.4 Low energy fittings shall be used unless otherwise accepted by Highways England. Any site-specific lighting controls will be described in Contractors' EMP2s.

6.9 Emergency preparedness

- 6.9.1 The Contractors will hold certifications for safety (ISO 45001:2018), environment (ISO 14001:2015), quality (ISO 9001:2015) and these will include procedures for responding to emergency events. The Contractors will ensure that emergency preparedness procedures for each worksite are developed. The procedures will be standardised as far as practicable across the various worksites and will be appropriate to the anticipated hazards and specific layouts. The emergency procedures will be produced in consultation with the emergency services, Kent Resilience Forum and Essex Resilience Forum and other relevant stakeholders. For works on the existing railway and highway

networks, as well as the tunnelling works, they will be produced in accordance with established industry procedures. Further guidance is contained within Site Clearance Capability – A guide for effective local planning, response and recovery (Department for Communities and Local Government, 2016).

- 6.9.2 Emergency Preparedness Procedures will be reviewed quarterly or to reflect changes in procedure, whichever is sooner.
- 6.9.3 The Contractors will ensure that the requirements of the relevant fire authority will be followed for the provision of site access points. The accesses may vary over time and will be updated as required and should also be suitable for emergency services. This is particularly important in relation to the tunnel construction. Emergency radio channels are to be reserved and be compatible with those used by Fire and Rescue services.
- 6.9.4 Aspects that will be covered as part of the environmental incident and emergency preparedness procedures will include:
- a. Notification procedures for emergency services in the event of an incident.
 - b. Procedures in the event of the discovery of unexploded ordnance (UXO).
 - c. Flood emergency response procedures.
 - d. Requirement to run emergency rescue drill from an underground location(s) including collaborative planning and participation by relevant rescue authorities.
 - e. Emergency spill response procedures to be developed in consultation with the Environment Agency and to take into account any specific requirements on incident response planning related to the worksite.
 - f. The emergency phone number and method of notifying the relevant local authority, statutory bodies, contact numbers for Highways England and the Contractors' staff.
 - g. Management and communication of diversion/alternative routes during unplanned events/emergencies.

Emergency access

- 6.9.5 The Contractors will ensure that the requirements of the emergency services will be followed for the provision of site access points. The accesses may vary over time and will be updated as required and communicated to the services. Specific helicopter landing provision will be at the North Portal close to hyperbaric facilities.

Fire prevention and control

- 6.9.6 The Contractors will ensure that all construction sites and associated accommodation and welfare facilities will have in place appropriate plans and management controls with the aim of preventing fire.

- 6.9.7 Fire plans and controls will be developed in consultation with the local emergency services and local authority.

6.10 Environmental incident control

- 6.10.1 Contractors will develop and implement appropriate measures to control the risk of environmental incidents such as pollution events, and contravention of ecological and archaeological legislation due to construction activities, materials and extreme weather events. This will be included in Contractors' EMP2s or Environmental Incident Control Plans as most appropriate in line with the nature and scope of works.
- 6.10.2 It will recognise the risk of pollution from construction activities and present proactive management practices to ensure that any foreseeable pollution incidents, such as diesel spillage, are prevented if possible or minimised, controlled, reported to relevant parties and remediated.
- 6.10.3 Emergency procedures will be produced in consultation with the emergency services, the Environment Agency and Highway Authorities, and will be produced in accordance with established industry procedures and will include drills, exercises and scenarios.
- 6.10.4 In the event of an incident arising, Highways England will work with the Contractors, relevant statutory body and landowners to ensure that appropriate corrective and preventative action is taken.
- 6.10.5 If any emergency works are undertaken within, or with the potential to impact, a Site of Special Scientific Interest, the works will be undertaken in a way which minimises the amount of harm and Natural England will be notified as soon as practicable; further guidance is available at the Natural England, Site of Special Scientific Interest: public bodies responsibilities website.
- 6.10.6 The Contractors will put in place arrangements to investigate and provide reports on any potential or actual significant environmental incidents.
- 6.10.7 The following measures shall be adopted by Contractors to manage the risk of pollution incidents:
- a. Run emergency response drills to simulate major environmental incident.
 - b. Provide maps showing the locations, together with address and contact details, of local emergency services facilities such as police stations, fire authorities, medical facilities and other relevant authorities.
 - c. Ensure that site drainage plans and flood risk plans (as appropriate) are available onsite and kept up to date.
 - d. Statement of appropriate information will be held onsite and provided immediately in the event of any incident such as a spillage or release of potentially hazardous materials.
 - e. Ensure that pollution shut-off valves are used in compounds with positive drainage systems.

- f. Ensure the appropriate number, location and type of pollution response kits are defined for each worksite and located on worksite plans/maps.
- g. Ensure personnel are competent in the use of pollution response kit and emergency response techniques. Ensure the level and evidence of competency is documented.
- h. Include an environmental training section within EMP2s.
- i. Ensure personnel have an awareness and understanding of the relevant plans relating to pollution response and emergency response techniques.
- j. Ensure that clear protocols and communication channels are implemented so that any spillages are dealt with as soon as they are identified. Include an escalation process for escalating an incident to emergency services and from site staff response to an Incident Response Team (or equivalent).
- k. Provide contact details for the relevant authorities, such as the Environment Agency, and the persons responsible on the construction site and within the Contractors' organisation, for pollution incident response.
- l. Provide contacts for a competent spill-response company which can be contacted at short notice for an immediate response, 24 hours, seven days a week.
- m. Give notification of pollution incidents, to relevant statutory bodies, environmental regulatory bodies, local authorities and local water and sewerage providers, where required.
- n. Notification of appropriate emergency services, authorities and personnel on the construction site.

Extreme weather events

- 6.10.8 The Contractors will pay due consideration to the impacts of potential extreme weather events and related conditions during construction. The Contractors will use a short to medium-range weather forecasting service from an approved meteorological data and weather forecast provider as well as flooding information from the Environment Agency and tidal information from the Port of London Authority to inform short to medium-term programme management, environmental controls and impact mitigation measures.
- 6.10.9 The Contractors will ensure that the measures within this CoCP are implemented and will, as appropriate, consider additional measures to ensure the resilience of the proposed mitigation of impacts during extreme weather events is robust. As appropriate, method statements will also consider extreme weather events where risks have been identified.

Induction, training and briefing procedures for staff

- 6.10.10 The Contractors' EMP2s will cover competence of personnel in pollution prevention and awareness of emergency response techniques and procedures in accordance with ISO 14001:2015.
- 6.10.11 There will be a Project induction facility where everyone will receive a common induction which will include environmental risks and commitments from across the Project.
- 6.10.12 In addition, each Main Works Contractor will be responsible for delivering a site-specific induction which will include site-specific environmental risks.
- 6.10.13 Each member of staff undertaking a task in the programme will receive a specific task briefing before starting work on that task, which will include any relevant environmental risks and mitigation.
- 6.10.14 Competence of individuals for every task will be assessed by a member of the project team with relevant experience.
- 6.10.15 There will be a training facility focusing on key risk aspects of the Project, which will reinforce site-specific training.

6.11 Unexploded ordnance

- 6.11.1 The Contractors will carry out pre-construction risk assessments to determine the possibility of finding unexploded ordnance within the construction area. An emergency response procedure will be prepared and implemented by the Contractors to respond to the discovery of unexploded ordnance. This will include notifications to the relevant local authorities and emergency services.
- 6.11.2 The Contractors will comply with the recommendations of the Unexploded Ordnance (UXO) Report (REF TBC).

6.12 Clearance and reinstatement of sites on completion

- 6.12.1 Sites will be reinstated, in accordance with article 35 (temporary possession) of the DCO and in line with the Requirements in Schedule 2, Part 1 of the DCO.

6.13 Operation

- 6.13.1 By the end of the construction, commissioning and handover stage of any part of the Project, the Contractors will develop the third iteration of the EMP (EMP3). EMP3 will comply with the latest Highways England standard (currently DMRB LA 120 (Highways England, 2020)).
- 6.13.2 EMP3 will detail maintenance and monitoring activities throughout the operational phase having regard for the specific mitigation measures identified within the REAC as well as Highways England and Local Authority's and Local Highway Authority's operating procedures.
- 6.13.3 During the implementation of the EMP2 the ongoing management commitments will be developed.

7 Register of environmental actions and commitments

7.1 Introduction

- 7.1.1 The Register of Environmental Actions and Commitments (REAC) consolidates the mitigation commitments arising from the environmental impact assessment process for convenient reference. The REAC identifies the good practice and essential mitigation commitments that underpin our environmental assessments. These commitments would be legally secured through Requirement 4 of Schedule 2 to the Development Consent Order (DCO).
- 7.1.2 The REAC contains environmental commitments that would be implemented during the construction and operational phases of the A122 Lower Thames Crossing (the Project) if the DCO is granted. The commitments listed in the REAC would be incorporated in the environmental management plans produced for construction and handover stages of the Project in accordance with Requirement 4 of Schedule 2 to the DCO.
- 7.1.3 In this context, good practice means standard approaches and actions commonly used on infrastructure development projects to avoid or reduce environmental impacts, typically applicable across the whole Project. Essential mitigation means any additional Project-specific measures needed to avoid, reduce or offset potential impacts that could otherwise result in effects considered significant in the context of the Infrastructure Planning (Environmental Impact Assessment) Regulations 2017 (EIA Regulations). These are in addition to the embedded mitigation measures that form part of the Project design, which are secured by the Design Principles and the Environmental Masterplan (REF TBC).

7.2 Guide to the REAC table

- 7.2.1 The REAC is presented in a table format with headings setting out:
- a unique identifier to facilitate cross-reference with the ES and other DCO documentation
 - a name for the commitment
 - details of the commitment including a clear and specific description of the action, the objective of any essential mitigation and any relevant commitments relating to monitoring
 - the achievement criteria which define successful implementation of the action
 - identification of the party responsible for the action
 - whether the commitment relates to the construction or operational stage of the Project
 - how the commitment is secured in the DCO, e.g. through a Requirement

- 7.2.2 Where the achievement criteria are self-explanatory, the phrase 'implementation of commitment actions' is used. As with all commitment items in the REAC, the procedures to implement these measures will be developed during detailed design or handover and documented in the environmental management plans produced in accordance with Requirement 4 of Schedule 2 to the DCO.
- 7.2.3 Table 7.1 is for the pre-commencement REAC table as described in Chapter 3.
- 7.2.4 Table 7.2 is the full REAC table.

7.3 REAC table

Table 7.1 Pre-Commencement REAC Table

Topic	REAC ref no.	Issue	Commitment	Achievement criteria	Party responsible	Stage	Securing mechanism in DCO
Geology and Soils	GS002	Pre-construction surveys	Prior to any construction compound area being prepared, a pre-condition survey would be undertaken to determine the current land quality across the compound area. A repeat survey would be done after the compounds have been removed to confirm that the area has been returned to its previous condition where reasonably practicable or in line with landowner agreements.	Completion of surveys	Contractor	Construction	EMP2 - Requirement 4
Geology and Soils	GS015	Soil management	The Contractor would have in place an agricultural liaison officer or named deputy who shall be contactable by telephone 24 hours a day, seven days a week during construction activities on agricultural land.	Implementation of commitment actions	Contractor	Construction	EMP2 - Requirement 4
Geology and Soils	GS030	Temporary road location	A temporary access road is proposed across the former Esso petrol station on the northside of the A2/M2 junction. This is to provide access to construction the A2 compound. The former petrol station is identified in ES as a high-risk site due to contamination. However, prior to construction of the access road, the Environment Agency would be consulted on the alignment of the road to ensure that potential disturbance of residual contamination present in this area is avoided so as not to disturb any ongoing remediation works in this area.	Highways England to agree temporary road alignment in consultation with the Environment Agency	Contractor	Construction	EMP2 - Requirement 4
Landscape	LV028	Protection of retained vegetation	An Arboricultural Method Statement and Tree Protection Plan would be prepared in accordance with BS 5837:2012 identifying measures for the protection of retained vegetation prior to the commencement of site clearance works. These measures would be complied with during construction and all works to trees and vegetation removal would be implemented under the supervision of the Environmental Clerk of Works.	Implementation of measures for the protection of retained vegetation and avoidance of harm to retained vegetation.	Contractor	Construction	EMP2 - Requirement 4
Landscape	LV030	Veteran and ancient tree fencing	In accordance with standing advice prepared by Natural England and the Forestry Commission (2018), the following measures would be developed to protect veteran trees, ancient trees and ancient woodland identified on the Environmental Masterplan: 1. Screening barriers would be provided to protect retained ancient trees, ancient woodland and veteran trees from dust and pollution from nearby works. Locations of barriers will be defined in accordance with the requirements set out in REAC item LV028. 2. A buffer zone would be defined to avoid impact on root zones. These would be as follows: - For veteran trees, the buffer would be a minimum of 15 times the diameter of the tree trunk or five metres beyond the canopy, whichever is the greater - For ancient trees and ancient woodland, a separation distance of 15m from the canopy of the ancient trees/woodland edge would be maintained between the proposed construction activity and the asset.	Clearly defined approach to deliver successful establishment of vegetation as set out in the Environmental Masterplan	Contractor	Construction	EMP2 - Requirement 4

Topic	REAC ref no.	Issue	Commitment	Achievement criteria	Party responsible	Stage	Securing mechanism in DCO
			These measures would be followed by the Contractor unless specifically agreed by Highways England, following the advice of a qualified arboriculturist, and following non-invasive root investigations which have determined that a smaller buffer would be appropriate to the tree or woodland.				
Landscape	LV031	Relocating lost veteran trees	Where removal of dead wood or veteran trees is required, the intact hulks of felled veteran trees would be relocated in close proximity to a nearby veteran tree, woodland or parkland area in accordance with standing advice prepared by Natural England and the Forestry Commission (2018). Dead wood would be placed within the woodland within which is located, in log piles and left to decompose naturally. This would provide opportunity for invertebrates and fungi resident within the tree to relocate. The location for the placement of the hulk will be identified following liaison with the relevant local planning authorities and be supervised by a qualified arboriculturist.	Relocation of intact tree hulks in accordance with NE and FE guidance	Contractor	Construction	EMP2 - Requirement 4
Landscape	LV033	Long Lane compound A. Bunds	Where reasonably practicable, stockpiles formed from material excavated on site would be sited along the eastern boundaries of Long Lane Compound A, as material becomes available. This is to reduce visual impacts for the caravan site off Gammon Fields, and its subsequent relocation site immediately to the west.	Highways England acceptance of the location of stockpiles within construction compounds.	Contractor	Construction	EMP2 - Requirement 4
Noise and vibration	NV002	Noise and Vibration Plan	A Noise and Vibration Management Plan (NVMP) or equivalent would be prepared for each part of the construction works subject to Section 61 control for consideration by the relevant planning authority.	Approval of NVMP or equivalent by the SoS in consultation with local planning authority	Contractor	Construction	EMP2 - Requirement 4
Noise and vibration	NV004	Section 61 Consents	Where appropriate, consents would be obtained from the relevant local authorities under Section 61 of the Control of Pollution Act 1974 (which may include noise and vibration limits where relevant) for the proposed construction works.	Compliance with the terms of Section 61 consents	Contractor	Construction	EMP2 - Requirement 4
Noise and vibration	NV005	Baseline noise levels	Pre-construction baseline noise levels would be submitted to the relevant planning authority to establish a pre-construction baseline for monitoring compliance with construction noise limits.	Acceptance by the EHO for relevant planning authorities on baseline levels to	Contractor	Construction	EMP2 - Requirement 4

Topic	REAC ref no.	Issue	Commitment	Achievement criteria	Party responsible	Stage	Securing mechanism in DCO
				inform Section 61 consents			
Noise and vibration	NV007	Best Practicable Means	<p>Best Practicable Means as defined under Section 72 of the Control of Pollution Act 1974 would be employed during the construction phase to reduce noise nuisance. These would include measures such as:</p> <ul style="list-style-type: none"> - installing and maintaining hoarding around the construction areas likely to generate noise - keeping site access routes in good condition with condition assessments on site to inspect for defects such as potholes - turning off plant machinery when not in use - maintaining all vehicles and mobile plant such that loose body fittings or exhausts do not rattle or vibrate - using silenced equipment where available, in particular silenced power generators and pumps - no music or radios would be played for entertainment purposes outdoors on-site - plan site layout to ensure that reversing is kept to a reasonably practicable minimum. Reversing manoeuvres, that are required would be managed by a trained banksman/vehicle marshal to ensure they are conducted safely and concluded quickly - non-percussive demolition techniques would be adopted where reasonably practicable to reduce noise and vibration impact 	Implementation of commitment actions	Contractor	Construction	EMP2 - Requirement 4
Terrestrial Biodiversity	TB002	Maintaining integrity of important habitats adjacent to works	Temporary fencing would be used to demarcate important and protected habitats, preventing construction access to protect them from accidental damage. Important and protected habitats include ecological translocation sites, and retained woodland, trees and hedgerows shown on the Environmental Masterplan. Fencing would be installed under the supervision of the Environmental Clerk of Works and in accordance with good practice guidance such as BS 5837:2012 Trees in relation to design, demolition and construction.	Successful retention of important habitats.	Contractor	Construction	EMP2 - Requirement 4
Terrestrial Biodiversity	TB003	Maintaining integrity of important habitats adjacent to works	Work compounds, access tracks, haulage routes, material storage areas, generators and other construction activities would not be located within areas of retained vegetation shown on the Environmental Masterplan.	Implementation of commitment actions.	Contractor	Construction	EMP2 - Requirement 4
Terrestrial Biodiversity	TB004	Breeding birds	Disturbance, and incidental mortality, of breeding birds would be avoided by timing vegetation clearance and structure removal outside of the bird nesting season (March to August inclusive) wherever possible. Where this is not possible, appropriate measures would be taken to avoid harming birds or their nests (such as temporary fencing around nesting sites where they are immediately adjacent to construction works), under supervision by a suitably experienced Environmental Clerk of Works.	Compliance with the Wildlife and Countryside Act 1981 (as amended).	Contractor	Construction	EMP2 - Requirement 4

Topic	REAC ref no.	Issue	Commitment	Achievement criteria	Party responsible	Stage	Securing mechanism in DCO
Terrestrial Biodiversity	TB005	Invasive species	Invasive species would be identified prior to construction and would be removed or treated to prevent their spread, following the Construction Industry Research and Information Association's (CIRIA) guidance in Wade et al. (Invasive Species Management for Infrastructure Managers and the Construction Industry, 2008)	Implementation of commitment actions.	Contractor	Construction	EMP2 - Requirement 4
Terrestrial Biodiversity	TB006	Environmental Clerk of Works	Employment of suitably qualified and experienced Environmental Clerks of Works (ECoW) throughout the construction phase of the project to supervise implementation of environmental mitigation and protection commitments.	Acceptance by Highways England of the ECoW nominated by the Contractor.	Contractor	Construction	EMP2 - Requirement 4
Terrestrial Biodiversity	TB008	Badger setts	Badger setts identified within the Order Limits for closure would be closed by permanently excluding badgers and then removing the empty setts. The setts would be closed under licence from Natural England outside of the badger breeding season (breeding season takes place between 1 December and 30 June). For any main setts that will be closed with no suitable naturally occurring alternative sett, an artificial sett will be constructed in a suitable location.	Compliance with requirements of Natural England licences.	Contractor	Construction	EMP2 - Requirement 4
Terrestrial Biodiversity	TB009	Bat roosts	Bat roosts that would be lost or heavily disturbed due to construction or operational activities would be removed under licence and alternative roosting structures would be provided in areas indicated on the Environmental Masterplan.	Compliance with requirements of Natural England licences.	Contractor	Construction	EMP2 - Requirement 4
Terrestrial Biodiversity	TB010	Barn owl breeding sites (direct loss)	Barn owl breeding sites that would be lost due to construction would be removed while not in active use. Alternative breeding sites (nest boxes) would be provided >1.5km away from the Project boundary and other major roads, within an appropriate setting and in compliance with Barn Owl Trust advice (2015). As agreed with the Essex Wildlife Trust (EWT), a minimum of 12 artificial nest boxes would be installed in land managed by them. This would provide a replacement ratio two boxes for one lost site; the final number of boxes required would be informed by pre-construction surveys.	Provision of Barn owl breeding sites	Contractor	Construction	EMP2 - Requirement 4
Terrestrial Biodiversity	TB011	Barn owl breeding sites (disturbance)	Barn owl breeding sites which would not require closure, but that may be subject to disturbance due to proximity to works would be screened by acoustic fencing to prevent disturbance during the breeding season under the supervision of the Environmental Clerk of Works.	Implementation of commitment actions in accordance with Natural England guidance.	Contractor	Construction	EMP2 - Requirement 4
Terrestrial Biodiversity	TB012	Breeding birds (temporary loss of nesting habitat)	Bird nest boxes would be provided within areas of retained woodland and trees shown on the Environmental Masterplan to supplement the habitat creation by offsetting the loss of nesting opportunities whilst newly created habitats establish. A ratio of 10 assorted small nest boxes and one medium open fronted nest box per hectare of lost woodland/scrub would be adopted in accordance with BTO Field Guide No. 23, where it is reasonably practicable to erect this number of nest boxes. For hedgerows, a ratio of 10	Implementation of commitment actions in accordance with BTO guidance.	Contractor	Construction	EMP2 - Requirement 4

Topic	REAC ref no.	Issue	Commitment	Achievement criteria	Party responsible	Stage	Securing mechanism in DCO
			assorted small nest boxes per kilometre of hedgerow would be adopted, where it is reasonably practicable to erect these numbers within retained vegetation. The measures would be implemented under the supervision of the Environmental Clerk of Works.				
Terrestrial Biodiversity	TB013	Displacement of protected/not able species	Where habitats that are known or assumed to support protected or notable species, clearance would take place in a phased, directional manner towards areas of contiguous retained habitat. This would encourage mobile species to actively move from the construction site into the wider landscape. These measures would be implemented under the supervision of the Environmental Clerk of Works.	Compliance with requirements of Natural England licences.	Contractor	Construction	EMP2 - Requirement 4
Terrestrial Biodiversity	TB014	Natural England licences	All required Natural England licences and associated working practices and method statements would be in place prior to any related construction works starting in areas where licensable species occur.	Compliance with requirements of Natural England licences.	Contractor	Construction	EMP2 - Requirement 4
Terrestrial Biodiversity	TB015	Monitoring of pre-existing protected species and important habitats	Monitoring of protected species during and post-construction would be in line with the requirements of the protected species mitigation licence.	Compliance with requirements of Natural England licences.	Contractor	Construction	EMP2 - Requirement 4
Terrestrial Biodiversity	TB016	Translocation of protected species	Where the approach to habitat clearance referred to in REAC ref. TB013 is not considered appropriate to avoid potential mortality of protected species, a programme of trapping and translocation would occur to move animals away from the construction site and to established receptor sites with sufficient carrying capacity prior to habitat clearance occurring. Species or groups which may be subject to trapping and translocation are GCN (and all other native amphibian species found during this process), water voles and dormice.	Compliance with requirements of Natural England licences.	Contractor	Construction	EMP2 - Requirement 4
Terrestrial Biodiversity	TB017	Translocation of notable species	Where protected species licences are not required, the approach to habitat clearance and the potential need to trap and translocate non-licensable species (reptiles and/or native amphibians species excluding GCN) to established receptor sites with sufficient carrying capacity would be determined and undertaken by the Environmental Clerk of Works.	Implementation of commitment actions	Contractor	Construction	EMP2 - Requirement 4

Topic	REAC ref no.	Issue	Commitment	Achievement criteria	Party responsible	Stage	Securing mechanism in DCO
Terrestrial Biodiversity	TB018	Translocation of habitat features of value to protected/not able species	Habitat features of value to protected species that can themselves be moved to mitigation areas/receptor sites (for example dead-wood features for terrestrial invertebrates, and refugia for amphibians and reptiles) would be translocated where appropriate, to be determined by the Environmental Clerk of Works.	Implementation of commitment actions	Contractor	Construction	EMP2 - Requirement 4
Terrestrial Biodiversity	TB020	Translocation of important lichens	Where important lichen species, <i>Usnea cf. esparantiana</i> , present within woodland south-west of the M25 junction 29, and <i>Physconia distorta</i> and <i>Fellhaneropsis vezdae</i> , present within The Wilderness woodland, are found on trees being felled or pruned to accommodate works, any timber hosting these species would be retained and moved immediately after felling into retained areas of the same woodland as shown in the Environmental Masterplan. Timber would be placed on the woodland floor immediately adjacent to a tree of the same host species. All works would be supervised by the Environmental Clerk of Works.	Presence of translocated lichen 24 months after translocation	Contractor	Construction	EMP2 - Requirement 4

Table 7.2 REAC table

Topic	REAC ref no.	Issue	Commitment	Achievement criteria	Party responsible	Stage	Securing mechanism in DCO
Air Quality	AQ001	Vehicle and plant emissions	<ol style="list-style-type: none"> 1. All on-road heavy vehicles would comply with the standards set within the London Low Emission Zone (LEZ) across all sites within Order Limits for the relevant class of vehicle. 2. All Non-Road Mobile Machinery (NRMM) net power 37kW to 560kW would comply with the engine emission standards set by London's Low Emission Zone for NRMM across all sites within Order Limits. From 1 September 2020, NRMM used on any site would therefore be required to meet emission standard Stage IIIB as a minimum. From 1 January 2025, NRMM used on any site would be required to meet emission standard Stage IV as a minimum. 3. Ensure all vehicle engines, mobile and fixed plant stationed on site are not left running or idling unnecessarily. 4. Use low emission vehicles and plant fitted with catalysts, diesel particulate filters or similar devices where reasonably practicable. 5. Use ultra-low sulphur fuels in plant and vehicles where reasonably practicable. 6. Keep vehicles and plant well maintained, with routine servicing to be completed in accordance with the manufacturer's recommendations and records maintained for the work undertaken. 	Implementation of commitment actions	Contractor	Construction	EMP2 – Requirement 4
Air Quality	AQ002	Demolition	<p>Implement good practice measures to reduce dust during demolitions works such as:</p> <ol style="list-style-type: none"> 1. Soft strip inside buildings before demolition (i.e. retain external walls and windows where safe to provide a screen against dust) 2. Use water suppression for dust control during demolition operations 3. Avoid explosive blasting, using appropriate manual or mechanical alternatives 4. Bag and remove any biological debris or damp down such material before demolition 	Implementation of commitment actions	Contractor	Construction	EMP2 – Requirement 4

Topic	REAC ref no.	Issue	Commitment	Achievement criteria	Party responsible	Stage	Securing mechanism in DCO
Air Quality	AQ003	Earthworks and construction	<p>Implement good practice controls to reduce dust during works such as:</p> <ol style="list-style-type: none"> 1. Cover with topsoil and re-vegetate earthworks and exposed areas including soil stockpiles to stabilise surfaces 2. Use a cover such as hessian, mulches or tackifiers where it is not possible to re-vegetate or cover with topsoil 3. Remove the cover systematically during work to reduce exposure of areas that are not being worked on 4. Avoid removing thin layer scabbling of concrete from structures by compressed air powered machines, where reasonably practicable 5. Ensure sand and other aggregates are stored in bunded areas and are not allowed to dry out, unless required for a particular process, in which case ensure that appropriate additional control measures are in place to prevent escape 6. Ensure bulk cement and other fine powder materials are delivered in enclosed tankers and stored with suitable emission control systems to prevent escape 7. For small supplies of fine powder materials ensure bags are sealed after use and stored appropriately to prevent dust 	Implementation of commitment actions	Contractor	Construction	EMP2 – Requirement 4
Air Quality	AQ004	Dust from trackout	<ol style="list-style-type: none"> 1. Use of water-assisted dust sweepers on the access and local roads to remove any material tracked out of the site 2. Avoid dry sweeping of large areas 3. Ensure vehicles entering and leaving worksites are securely covered to prevent escape of materials during transport 4. Inspect haul routes for integrity, instigate necessary repairs and record in site log book 5. Access gates to be sited at least 10m from receptors, e.g. residential properties, where reasonably practicable 6. Apply dust suppressants to locations where large volume of vehicles enter and exit the construction site 	Implementation of commitment actions	Contractor	Construction	EMP2 - Requirement 4

Topic	REAC ref no.	Issue	Commitment	Achievement criteria	Party responsible	Stage	Securing mechanism in DCO
Air Quality	AQ005	Dust management good practice	<ol style="list-style-type: none"> 1. Undertake on-site and off-site inspections to monitor dust 2. Plan site layout so that machinery, stockpiles, mounds and dust causing activities are located away from receptors, as far as this is reasonably practicable 3. Erect suitable solid screens or barriers around dusty activities or the site boundary 4. Avoid site runoff of water or mud 5. Remove waste materials that have a potential to produce dust from site as soon as reasonably practicable 6. Cover, seed or fence stockpiles to prevent wind whipping 7. Cutting/grinding/sawing equipment to use water as dust suppressant or suitable local extract ventilation 8. Ensure an adequate water supply on the site for effective dust/particulate matter suppression, using recycled water where reasonably practicable 9. Use enclosed chutes, conveyors and covered skips to reduce escape of dust 10. Reduce drop heights from conveyors, loading shoves, hoppers and other loading or handling equipment to a practical minimum and use fine water sprays on such equipment where appropriate 11. Ensure equipment is readily available on site to clean any spillages and clean up spillages as soon as reasonably practicable after the spill is identified 12. Reuse and recycle waste to reduce dust from waste materials 	Implementation of commitment actions	Contractor	Construction	EMP2 - Requirement 4
Air Quality	AQ006	Air Quality monitoring during construction	The Contractor shall determine the level of any dust and particulate monitoring carried out on project construction sites by means of a risk-based approach. This will identify the type of monitoring that is required on each worksite by looking at the details of the specific packages of work within the site boundaries and the location of receptors around the site. Should monitoring be required, the monitoring locations will be approved by the Secretary of State (SoS) in consultation with the relevant local authority.	Approval of air quality monitoring programme by the SoS in consultation with relevant local authorities	Contractor	Construction	EMP2 - Requirement 4

Topic	REAC ref no.	Issue	Commitment	Achievement criteria	Party responsible	Stage	Securing mechanism in DCO
Air Quality	AQ007	Baseline dust monitoring	Should dust monitoring be required in accordance with the requirements of AQ006, it would begin at least three months prior to the commencement of the construction works to allow a suitable pre-construction baseline to be established unless otherwise agreed by Highways England following consultation with the relevant local authorities.	Approval of baseline dust monitoring programme by the SoS in consultation with relevant local authorities	Contractor	Construction	EMP2 - Requirement 4
Air Quality	AQ008	Actions in case of air quality monitoring exceedance	<p>If required during construction, continuous particulate monitoring for PM₁₀, PM_{2.5} and TSP (total suspended particles) will be carried out using appropriate survey instruments at locations approved under REAC item AQ006, in consultation with the relevant local authority. Instruments will be set up at relevant sites to operate an alert system when a predetermined site action level approved by the Secretary of State in consultation with the relevant local authority, is reached. If the alarm is triggered, the following actions will be taken:</p> <p>a. The Contractor, or a delegated representative, shall at the earliest reasonable opportunity, investigate activities on the site to ascertain whether any visible dust is emanating from the site or activities are occurring that are not in line with dust control procedures.</p> <p>b. Any identified causes will be rectified, where reasonably practicable. Actions will be recorded in a site logbook and the relevant local authority notified of the event and actions by telephone or email, as soon as is reasonably practicable, after or during the dust event.</p> <p>c. If no source of the dust event is identified, other project sites and local authority or Automatic Urban and Rural Network monitoring sites will be contacted to establish whether there is an increase in particulate concentrations in the wider area.</p> <p>d. If the cause of the alert is not related to site operations, the outcome of any investigation will be recorded in a site logbook which would be made available to the relevant local authority on request.</p> <p>e. Dust monitoring will continue until that part of the construction works has been completed, or earlier, if the site is deemed to be low risk in</p>	Compliance with the approved air quality monitoring programme	Contractor	Construction	EMP2 - Requirement 4

Topic	REAC ref no.	Issue	Commitment	Achievement criteria	Party responsible	Stage	Securing mechanism in DCO
			consultation with Highways England and the relevant local authority.				
Climate	CC001	PAS2080	The main works Contractors will adhere to PAS 2080 throughout the works and develop a compliant approach detailing how greenhouse gas (GHG) emissions reductions will be identified, prioritised, implemented and monitored during construction. The main works Contractors will be required to submit their PAS 2080 approach to Highways England for acceptance within three months of appointment. The main works Contractors will be required to obtain certification/verification by an accredited organisation that verifies PAS 2080 within 12 months of appointment.	Implementation of a PAS2080 compliant GHG emission monitoring and minimisation approach during construction.	Contractor	Construction	EMP2 - Requirement 4
Climate	CC002	Greenhouse gas emissions: reduction from the carbon model baseline	The Contractor would develop and achieve a carbon reduction target to be agreed by Highways England.	Achievement of target GHG emissions	Contractor	Construction	EMP2 - Requirement 4
Climate	CC003	Greenhouse gas emissions: quantification and reporting of GHG emissions	The main works Contractor(s) would quantify and report GHG emissions quarterly to Highways England in line with the requirements of DMRB LA 114 Climate. This information would be evaluated by Highways England and used to inform assessment of future projects.	Submission of quarterly reports on GHG emissions	Contractor	Construction	EMP2 - Requirement 4
Climate	CC004	Greenhouse gas emissions: compound electricity	The Contractor(s) would procure electricity from renewable electricity suppliers to cover the consumption from the Project's construction compounds (including the consumption of the tunnel boring machine and concrete batching plant).	Procurement of renewable electricity to cover consumption from construction compounds	Contractor	Construction	EMP2 - Requirement 4
Climate	CC005	Greenhouse gas emission: Operational phase emissions monitoring	The road operator would provide quarterly GHG emissions returns and analysis from the operation and maintenance of the Project to Highways England during the operational phase in accordance with the requirements of DMRB LA 114 Climate. This information would be evaluated by Highways England and used to inform assessment of future projects.	Reporting of quarterly greenhouse gas emissions returns and evaluate data	Highways England	Operation	EMP2 - Requirement 4

Topic	REAC ref no.	Issue	Commitment	Achievement criteria	Party responsible	Stage	Securing mechanism in DCO
Climate	CC006	Resilience to climate change	The Contractor(s) would design the permanent works in accordance with, relevant design standards and use construction materials and products that would be resilient to the effects of projected future climate change in line with UKCP18.	Design and specification of materials resilient to the effects of future climate change	Contractor	Construction	EMP2 - Requirement 4
Climate	CC007	Greenhouse gas emissions - operational supply of electricity	Electricity used for operation of the Project would be procured from renewable electricity suppliers.	Procurement of renewable electricity for operation of the Project	Highways England	Operation	EMP3 - Requirement 4
Climate	CC008	Low energy lighting	Low energy light sources (for example light-emitting diode (LED) or equivalent technology) would be used within Project lighting systems (subject to emergency lighting requirements) to reduce energy consumption during the operation of the Project and offer a more readily recyclable product at the end of life, compared to traditional light source lamps and luminaires.	Use of LED or equivalent technology low energy lighting	Highways England	Operation	EMP3 - Requirement 4
Cultural Heritage	CH001	Physical damage to heritage assets	The draft Archaeological Mitigation Strategy and Outline Written Scheme of Investigation (AMS-OWSI) includes details of specifically identified measures to mitigate the impact to known heritage assets and a range of generic mitigation measures from which appropriate mitigation would be applied for currently unknown heritage assets that could be physically damaged by construction. The draft AMS-OWSI will be updated as further information from archaeological evaluation becomes available. The AMS-OWSI sets out the scope of Written Schemes of Investigation (WSIs) to be prepared. The WSIs would define the details of specific mitigation measures for protection or recording of heritage assets which would be implemented before or during construction at locations identified within the AMS-OWSI.	Implementation of mitigation measures set out in the AMS-OWSI approved by the Secretary of State including measures specified in the WSIs and in accordance with Requirement 9 of the DCO.	Contractor	Construction	Requirement 9
Cultural Heritage	CH002	Limiting land take for archaeological investigations	The spatial extent of intrusive archaeological investigations shall not extend beyond the limits of deviation for the works proposed in the DCO application.	Implementation of commitment actions.	Contractor	Construction	Requirement 9

Topic	REAC ref no.	Issue	Commitment	Achievement criteria	Party responsible	Stage	Securing mechanism in DCO
Cultural Heritage	CH003	Cropmark complex scheduled monument at Orsett	The Contractor shall follow the MoRPHE procedural model (Historic England, 2015) to prepare a detailed project design for the archaeological investigation of the cropmark complex at Orsett (SM1). This design will inform the WSI and the development of archaeological mitigation. After completion of the archaeological works, as specified in the WSI, the relevant archaeological contractor shall apply to Historic England for removal of the site from the official list of protected historic sites.	Implementation of mitigation measures set out in the AMS-OWSI approved by the Secretary of State including measures specified in the WSIs and in accordance with Requirement 9 of the DCO. Submission of application to Historic England for delisting of the scheduled monument.	Contractor	Construction	Requirement 9
Cultural Heritage	CH004	Grade II listed buildings	The WSIs will require Level 4 Historic Building Recording (Understanding Historic Buildings: A Guide to Good Recording Practice (Historic England, 2016)) of the three listed buildings at 1 and 2 Grays Corner (LB89), Thatched Cottage (LB58) and Murrells Cottage (LB96). This would include an intrusive watching brief prior to the demolition of the properties, focusing on areas of previously hidden structure. After completion of the historic buildings recording works the relevant archaeological contractor shall apply to Historic England for removal of the three buildings from the official list of protected historic sites.	Implementation of mitigation measures set out in the AMS-OWSI approved by the Secretary of State including measures specified in the WSIs and in accordance with Requirement 9 of the DCO. Submission of application to Historic England for delisting of the listed buildings.	Contractor	Construction	Requirement 9
Cultural Heritage	CH005	Fencing of heritage assets	Fencing for the protection of heritage assets required as mitigation in any WSI shall be securely installed prior to commencement of that part of the works. The Contractor shall prepare a method statement for all fencing works required for the protection of heritage assets, having regard for the mitigation measures set out in the WSIs for that part of the works, for consultation with the relevant local planning authority and, in the case of scheduled monuments and listed buildings, Historic England, prior to installation.	Implementation of mitigation measures set out in the AMS-OWSI approved by the Secretary of State including measures specified in the WSIs and in accordance with Requirement 9 of the DCO.	Contractor	Construction	Requirement 9

Topic	REAC ref no.	Issue	Commitment	Achievement criteria	Party responsible	Stage	Securing mechanism in DCO
Cultural Heritage	CH006	Covering of heritage assets	Where potentially sensitive archaeological remains would be buried or sealed beneath fill material to ensure they are not disturbed during construction, in accordance with mitigation to be identified in the site specific WSIs, the Contractor shall prepare a method statement for consultation with the relevant local planning authority and, in the case of designated sites, Historic England, prior to construction of that part of the works. The method statement will describe: - measures to preserve in situ sensitive archaeological remains and prevent deformation of topsoil or subsoil horizons - measures for monitoring the continued protection of in situ archaeological remains - how the measures would be reversed at the end of construction at locations where the ground surface is to be restored to its original shape and condition in accordance with mitigation to be identified in the site-specific WSIs	Implementation of mitigation measures set out in the AMS-OWSI approved by the Secretary of State including measures specified in the WSIs and in accordance with Requirement 9 of the DCO.	Contractor	Construction	Requirement 9
Cultural Heritage	CH007	Surveillance of heritage mitigation	The WSIs shall set out the arrangements and responsibilities for implementing, monitoring and auditing the mitigation measures identified in the WSIs for the protection of heritage assets during the construction. The findings shall be reported to Highways England and made available to the relevant local planning authorities or Historic England on request.	Demonstration of implementation of mitigation measures set out in the AMS-OWSI approved by the Secretary of State including measures specified in the WSIs and in accordance with Requirement 9 of the DCO.	Contractor	Construction	Requirement 9
Cultural Heritage	CH008	Management of heritage assets	Cultural Heritage Asset Management Plans (CHAMPs) would be implemented by Highways England in accordance with DMRB LA 116, for any heritage assets that remain within their ownership following construction of the Project.	Ongoing preservation of relevant heritage assets.	Highways England	Operation	EMP3 - Requirement 4
Geology and Soils	GS001	Ground investigation	The Contractor would complete further ground investigations prior to construction to inform detailed design of the Project. If, during further intrusive ground investigations, drilling is required in areas underlain with contaminated soils, drilling and excavation techniques in line with BS 5930 (British Standards Institution, 2020) and BS 10175 (British Standards Institution, 2017) would be adopted (e.g. environmental seals) to reduce the risk of	Acceptance of method statement by Highways England in consultation with the Environment Agency	Contractor	Construction	EMP2 - Requirement 4

Topic	REAC ref no.	Issue	Commitment	Achievement criteria	Party responsible	Stage	Securing mechanism in DCO
			creating pollutant pathways. The Contractor would provide ground investigation method statements for acceptance of Highways England in consultation with the Environment Agency prior to commencement of the works.				
Geology and Soils	GS002	Pre-construction surveys	Prior to any construction compound area being prepared, a pre-condition survey would be undertaken to determine the current land quality across the compound area. A repeat survey would be done after the compounds have been removed to confirm that the area has been returned to its previous condition where reasonably practicable or in line with landowner agreements.	Completion of surveys	Contractor	Construction	EMP2 - Requirement 4
	GS003		NOT USED				
Geology and Soils	GS004	Chemical and fuel storage	Construction site compounds where chemical, waste oils or fuel storage and refuelling activities take place would be managed in line with the following measures: i. Within the construction site compounds, specific areas would be designated for the storage of chemicals, waste oils and fuel and refuelling activities. ii. These designated areas would be bunded to provide capacity for at least 110% of the largest container and placed on hardstanding to prevent downward migration of contaminants. iii. These designated areas would be designed with drainage to include measures for isolating spillages. iv. Any transfer of fuel or other potentially contaminated liquids would only take place within a designated transfer area. v. Drip trays would be provided to reduce the risk of spillages.	Implementation of commitment actions	Contractor	Construction	EMP2 - Requirement 4
Geology and Soils	GS006	Materials management	All excavated materials and soils proposed for reuse under a Materials Management Plan would be required to meet risk-based acceptability criteria applicable to its intended use. The procedures and criteria to be used would be set out in the Materials Management Plan (REAC ref. MW007) prior to commencement of that part of the works.	Compliance with the Materials Management Plan	Contractor	Construction	EMP2 - Requirement 4

Topic	REAC ref no.	Issue	Commitment	Achievement criteria	Party responsible	Stage	Securing mechanism in DCO
	GS007		NOT USED				
	GS008		NOT USED				
	GS008		NOT USED				
Geology and Soils	GS009	Soil management	Soils would be handled and stored to allow their sustainable reuse in line with the Defra Construction Code of Practice for the Sustainable Use of Soil on Construction Sites (2009) and the MAFF Good Practice Guide for Soil Handling (2000). Full details of the soil resources present and the procedures for soils management (covering vegetation clearance, setting out haul routes, soil stripping, stockpile creation and management, soil reconditioning (where required) and soil reuse) would be set out prior to any soil stripping works commencing, covering all proposed end uses (e.g. agricultural land, woodland or other habitat types).	Approval of the procedures for soils management by Highways England	Contractor	Construction	EMP2 - Requirement 4
Geology and Soils	GS010	Soil management	Characterisation of the existing soil to determine its resilience to handling and stripping depths would be based on detailed soil surveys. Where information is not available (i.e. from the detailed ALC surveys), pre-construction soil surveys would be carried out by the Contractor to inform the development of appropriate soils management procedures.	Implementation of the procedures for soils management approved by Highways England	Contractor	Construction	EMP2 - Requirement 4
Geology and Soils	GS011	Soil management	Soil on land identified on the Environmental Masterplan (REF TBC), which is used during construction, will be profiled to support the land use identified on the Environmental Masterplan. The soil will be fully restored, in accordance with the soil reuse requirements in the soils management procedures (REAC ref. GS009), and will be recreated in the correct sequence of horizons, in such a manner that there are good fissures to facilitate soil profile drainage and plant root development.	Implementation of the procedures for soils management approved by Highways England	Contractor	Construction	EMP2 - Requirement 4

Topic	REAC ref no.	Issue	Commitment	Achievement criteria	Party responsible	Stage	Securing mechanism in DCO
Geology and Soils	GS012	Soil management	Reinstatement of soils affected by temporary works would aim to avoid any reduction in soil function. For agricultural land this will be measured by the quality of the land as defined by the ALC system (with a soil profile recreated to 1.2m below ground level where this was the pre-construction soil depth). For areas of landscape planting or habitat creation this will be measured by the successful restoration of the soil profile (both physical and chemical characteristics) defined for that particular habitat in the soils management procedures suitable to allow the establishment and long-term health of the habitat.	Implementation of the procedures for soils management approved by Highways England	Contractor	Construction	EMP2 - Requirement 4
Geology and Soils	GS013	Soil management	Procedures for the management of soil resources would include provisions for: i. Ensuring soils are stripped and handled in the driest condition reasonably practicable. ii. Ensuring topsoil and subsoil resources are stripped and stockpiled separately. iii. Keeping records of excavated and stored soils. iv. Confining vehicle movements to defined haul routes until all the soil resource has been stripped. v. Protection of stockpiles from erosion through establishment of a grass cover unless the soil materials are to be reused in a short timeframe (<60 days) in which case alternative erosion control measures may be required, such as silt fencing or the use of geotextile blankets. vi. Protection from tracking over using signage or fencing. vii. Ensuring the physical condition of the replaced soil profile to at least 1.2m below ground level and that is sufficient for the post-construction use. viii. The use of toolbox talks to inform all those working on the site of the requirements for soil handling, storage and reuse.	Implementation of the procedures for soils management approved by Highways England	Contractor	Construction	EMP2 - Requirement 4
Geology and Soils	GS014	Soil management	Following soil reinstatement there would be a five-year aftercare period during which defects would be corrected. The Contractor would prepare and present to Highways England for acceptance, a schedule of aftercare monitoring, maintenance and defect correction, to include soil testing, appropriate to the target specification (e.g. land grade where restoration is to agricultural use or specific characteristics where restoration is to support habitat creation or re-	Implementation of commitment actions	Highways England	Construction	EMP2 - Requirement 4

Topic	REAC ref no.	Issue	Commitment	Achievement criteria	Party responsible	Stage	Securing mechanism in DCO
			provision). Implementation of the aftercare monitoring, maintenance and defect correction will be overseen by an Environmental Clerk of Works.				
Geology and Soils	GS015	Soil management	The Contractor would have in place an agricultural liaison officer or named deputy who shall be contactable by telephone 24 hours a day, seven days a week during construction activities on agricultural land.	Implementation of commitment actions	Contractor	Construction	EMP2 - Requirement 4
Geology and Soils	GS016	Contamination verification	A verification report would be prepared by the Contractor after completion of work to remediate contamination at each site where this is undertaken. This would identify the locations of the remediation works undertaken and the final tested ground quality. These reports would be provided to the relevant local authority and Environment Agency as a record.	Submission of verification reports to the relevant local authority and Environment Agency	Contractor	Construction	EMP2 - Requirement 4
Geology and Soils	GS017	Contamination verification	The findings of the verification report (REAC ref. GS016) would be available for inclusion within the operations Health and Safety file or equivalent.	Implementation of commitment actions	Highways England	Operation	EMP3 - Requirement 4
Geology and Soils	GS018	Gas management	The ground gas regime across the Project and especially in close proximity to landfill sites would be investigated to inform design of enclosed and confined spaces (e.g. service ducts/boxes) to reduce the risk to human health (asphyxiation) and buildings or structures (explosion). No confined spaces associated with the Project would be accessible to the public.	Implementation of commitment actions	Contractor	Construction	EMP2 - Requirement 4
Geology and Soils	GS019	Contamination	If any incident were to occur which resulted in localised contamination, soils which had become significantly affected would be assessed and if necessary removed to reduce the risk of contamination migrating across a wider area or entering controlled waters.	Implementation of commitment actions in accordance with standard Highways England operating procedures	Highways England	Operation	EMP3 - Requirement 4

Topic	REAC ref no.	Issue	Commitment	Achievement criteria	Party responsible	Stage	Securing mechanism in DCO
Geology and Soils	GS020	East Tilbury haul road	A temporary access route would be created across East Tilbury landfill site for the ecology translocation to land to the east of the Project. The temporary access route would be designed to safeguard the capping layer on the landfill and minimise the risk of liquid waste being brought to the surface by the consolidation of the ground along the temporary access route. The design would be agreed with the Environment Agency in consultation with Thurrock Council unless otherwise agreed with Secretary of State prior to installation. Vehicle movements and the type of vehicles (tonnage) would be restricted to further reduce the risk of damaging the integrity of the cap and the wider environment. The temporary access route will be removed as soon as it is no longer required for ecological management purposes.	Design of the temporary access route would be agreed with the Environment Agency unless otherwise agreed with Secretary of State.	Contractor	Construction	EMP2 - Requirement 4
Geology and Soils	GS021	North Portal	Leachate from the East Tilbury landfill could be drawn towards the construction area of the North Portal and ramps due to the level of groundwater control required during excavation works. This would be mitigated through the construction of a deep barrier around the excavations to reduce groundwater ingress. The depth of the barrier walls would be informed by the results of modelling and consultation with the Environment Agency and Thurrock Council unless otherwise agreed with Secretary of State prior to the commencement of excavation works to construct the North Portal box structure and ramps. The need for any supplementary mitigation measures and any necessary monitoring would be informed by the results of modelling and consultation with the Environment Agency prior to the commencement of excavation works. Technical solutions would be developed by the Contractor following further investigation and assessment. Potential solutions could include: i. Ground treatment such as grouting to form a low permeability plug below the depth of excavation to reduce the risk of water inflow. ii. Construction of a slurry cut-off wall immediately west of the East Tilbury Landfill to decrease the permeability of the ground to lessen the risk of contaminant mobilisation and saline intrusion. iii. Potential to reduce the footprint of the structure by optimising the tunnel bore spacing and layout of the TBM launch structure.	Implementation of measures agreed with the Environment Agency unless otherwise agreed with Secretary of State to prevent mobilisation of leachate and saline intrusion	Contractor	Construction	EMP2 - Requirement 4

Topic	REAC ref no.	Issue	Commitment	Achievement criteria	Party responsible	Stage	Securing mechanism in DCO
			iv. Creating a hydraulic barrier in the chalk between the East Tilbury Landfill and the excavated area, by recharging the chalk aquifer with some of the abstracted groundwater (subject to its quality).				
Geology and Soils	GS022	North Portal	Dewatering may be required during excavation works which could potentially cause waterborne contaminants to mobilise and flow in the groundwater towards the excavation. If dewatering is required, then the Contractor would treat groundwater from dewatering works to standards agreed with the Environment Agency before discharge under licence.	Compliance with terms of Environment Agency discharge licence	Contractor	Construction	EMP2 - Requirement 4
Geology and Soils	GS023	North Portal	The North Portal is located within an area historically used for landfill. Groundwater control during the excavation and construction activities for the tunnel boring machine (TBM) launch may cause an increased volume of gases to escape as soils, made ground and underlying alluvium become unsaturated. In addition, drilling through the area of historic landfill could lead to a build-up of gases behind the TBM. These factors would be considered during the detailed design to establish appropriate and safe procedures and working methods to construct the tunnel and North Portal. Gas monitoring will be undertaken during the construction for the launch and use of the TBM to detect changes in the gas regime as a safeguard to protect construction workers.	Compliance with relevant Health and Safety legislation and the CDM Regulations	Contractor	Construction	EMP2 - Requirement 4
Geology and Soils	GS024	Ground improvement tunnel	The design of the main crossing TBMs may require the construction of a ground improvement tunnel beneath the Thames Estuary and Marshes Ramsar site. The Environment Agency would be consulted on measures to reduce the risk of blow out and spreading of grout during tunnelling if a ground improvement tunnel is required.	Agreement of risk control procedures with Highways England in consultation with the Environment Agency	Contractor	Construction	EMP2 - Requirement 4
Geology and Soils	GS025	Northern tunnel entrance compound. Ground gas	Accommodation and welfare facilities are proposed within the Northern tunnel entrance compound which would service the North Portal construction activities. Ground gas associated with the historic landfill sites which may be present in the area could pose a risk to health. Prior to the accommodation being constructed, a gas assessment (investigation and monitoring) would be undertaken in the area to determine	Acceptance by Highways England of the gas assessment report	Contractor	Construction	EMP2 - Requirement 4

Topic	REAC ref no.	Issue	Commitment	Achievement criteria	Party responsible	Stage	Securing mechanism in DCO
			the need for appropriate gas protection measures.				
Geology and Soils	GS026	Foundation works risk assessment	Construction of foundations has the potential to create pollution pathways and mobilise contaminants. The Contractors would prepare a foundation risk assessment report during detailed design specific to structures and ground conditions. This would be submitted to the Environment Agency for review prior to commencement of that part of the works to which the report relates.	Acceptance of foundation risk assessment report by Highways England in consultation with Environment Agency	Contractor	Construction	EMP2 - Requirement 4
Geology and Soils	GS027	Remediation strategy	The Contractor would develop proposals for site-specific remediation in consultation with the relevant local authority prior to implementation.	Acceptance of site remediation proposals by Highways England in consultation with the relevant local authority	Contractor	Construction	EMP2 - Requirement 4
Geology and Soils	GS028	Remediation of contamination	The construction works would include the removal of vegetation, stripping of topsoil, excavation and earth movements. These activities could cause the spreading and mobilisation of contaminants. i. During earth movement works, a watching brief protocol would be implemented under the supervision of an Environmental Clerk of Works. ii. Site workers would be vigilant to ensure visual or olfactory signs of contamination are noted and that contaminated soil is kept separate from other materials.	Implementation of commitment actions	Contractor	Construction	EMP2 - Requirement 4
Geology and Soils	GS029	Long term temporary stockpiles	Surplus clean chalk soils generated from construction works south of the River Thames are proposed to be stockpiled to facilitate control of offsite HGV traffic. The stockpiles of surplus clean chalk would be designed to safeguard the underlying soils and groundwater and the design would be agreed with the Environment Agency prior to stockpiling commencing.	Implementation of environmental management measures agreed with the Environment Agency	Contractor	Construction	Protective Provisions – Schedule 14
Geology and Soils	GS030	Temporary road location	A temporary access road is proposed across the former Esso petrol station on the northside of the A2/M2 junction. This is to provide access to construction the A2 compound. The former petrol station is identified in ES as a high-risk site due to contamination. However, prior to construction of the access road, the Environment Agency would be consulted on the alignment of the road to ensure that potential disturbance of residual contamination present in this area is avoided so	Highways England to agree temporary road alignment in consultation with the Environment Agency	Contractor	Construction	EMP2 - Requirement 4

Topic	REAC ref no.	Issue	Commitment	Achievement criteria	Party responsible	Stage	Securing mechanism in DCO
			as not to disturb any ongoing remediation works in this area.				
Geology and Soils	GS031	Low Street Pit potential local geological site.	Low Street Pit has been identified as a potential local geological site due to the presence of Mucking Gravels. The Project has the potential to impact the Mucking Gravels during the construction of the Tilbury viaduct and the associated embankment earthworks and drainage, as well as due to the required diversion of statutory undertakers' impacted apparatus, which are located within the Low Street Pit. Construction activities on the eastern side of Low Street Pit, where an area of Mucking Gravels is present, would be restricted to prevent any excavations of the Mucking Gravels in this area and retain the existing eastern quarry slope.	No excavation of Mucking Gravel in the identified area unless otherwise approved by the Secretary of State.	Contractor	Construction	EMP2 - Requirement 4
HRA	HR001	Seasonal constraints to construction of discharge from construction of South Portal	Works to construct the infrastructure for the new South Portal construction drainage discharge would not take place within the Thames Estuary and Marshes Ramsar and any work within functionally linked land, would only be undertaken during April, May, June and July to avoid disturbance to passage and overwintering birds associated with European designated sites unless otherwise agreed with SoS in consultation with Natural England.	Implementation of commitment action	Contractor	Construction	EMP2 - Requirement 4
HRA	HR002	Seasonal constraints to works at the northern outfall	Works within the intertidal area to construct or decommission the northern outfall would be undertaken during April, May, June, July and August only to avoid disturbance to passage and overwintering birds associated with European designated sites unless otherwise agreed with SoS in consultation with Natural England.	Implementation of commitment action	Contractor	Construction	EMP2 - Requirement 4
HRA	HR003	Response to extreme weather	To avoid impacts to wintering birds during prolonged periods of sub-zero temperatures, activities potentially causing disturbance to wintering bird qualifying interests of the Thames Estuary and Marshes SPA/Ramsar will be undertaken in accordance with the general principles of the JNCC's 'Scheme to reduce disturbance to waterfowl during severe winter weather' (https://jncc.gov.uk/our-work/severe-weather-scheme/).	Implementation of commitment action	Contractor	Construction	EMP2 - Requirement 4

Topic	REAC ref no.	Issue	Commitment	Achievement criteria	Party responsible	Stage	Securing mechanism in DCO
HRA	HR004	Noise barriers for compounds in or adjacent to Ramsar functionally linked land	Noise attenuation measures shall be incorporated within the Northern tunnel entrance, A226 Gravesend Road and Milton compounds and having regard for HR005 & HR006 to ensure that the construction activities do not result in noise levels within the Thames Estuary and Marshes SPA/Ramsar or any land functionally linked to it) that would cause disturbance to the wintering bird qualifying interests. The measures shall be in place prior to the operation of those compounds (or areas of compounds) and shall remain until the end of the compound operation.	Implementation of commitment action	Contractor	Construction	EMP2 - Requirement 4
HRA	HR005	Protection of birds from activities at the Northern tunnel entrance compound	The Northern tunnel entrance compound earthworks area immediately north of the River Thames shall be no closer than 75m to the existing field boundary and all soil reprofiling shall occur behind a 3m high bund that will delimit the extent of the works from functionally linked land associated with the Thames Estuary and Marshes SPA/Ramsar. Construction of the 3m high bund will be substantially started during April, May, June and July only, to avoid disturbance of birds in the passage and winter period from completion of construction of the bund and subsequent works behind it.	Implementation of commitment action	Contractor	Construction	EMP2 - Requirement 4
HRA	HR006	Seasonal constraints to works to form noise barriers at compounds	Erection of noise attenuation measures at the boundaries of compounds identified in HR004 will be carried out in April, May, June and July only to avoid disturbance of birds in the passage and winter period.	Implementation of commitment action	Contractor	Construction	EMP2 - Requirement 4
HRA	HR007	Habitat enhancement in functionally linked land	To provide enhanced functionality of functionally linked land associated with the Thames Estuary and Marshes SPA/Ramsar during the construction period, the management of the three fields in the plot south of the Metropolitan Police firing range and adjacent to the SPA/Ramsar (Land Registry ref. K794941) will consist of either a standing ripe crop ready to be harvested, winter stubbles or grass ley from 1 October to 1 March each year throughout the construction and operation of the A226 Gravesend Road and Milton compounds.	Implementation of commitment action	Contractor	Construction	EMP2 - Requirement 4

Topic	REAC ref no.	Issue	Commitment	Achievement criteria	Party responsible	Stage	Securing mechanism in DCO
HRA	HR008	Groundwater surveillance	<p>Surveillance of groundwater levels will be carried out within the Thames Estuary and Marshes Ramsar in the vicinity of the tunnelling works for the duration of the construction period at borehole locations to be agreed with SoS in consultation with Natural England and Environment Agency.</p> <p>The Contractor would complete an annual review, for the period of construction and first five years of operation, of the groundwater levels and consult on any implications for qualifying features of the Ramsar site, and any necessary remedial measures with Natural England and the Environment Agency.</p>	Results of groundwater surveillance of agreed boreholes reported to Natural England and Environment Agency	Contractor	Construction	EMP2 - Requirement 4
HRA	HR009	Bird behaviour surveillance	<p>Between 1 September and 31 March inclusive during each year of construction, undertake monthly bird survey surveillance visits from fixed vantage points to observe functionally linked land associated with the Thames Estuary and Marshes SPA/Ramsar that lies within 300m of Order limits of the Project. The surveys will record numbers of waterfowl present and any behaviours in response to disturbance stimuli (including no response) to a specification developed in consultation with Natural England. If the bird surveillance visits show a change in bird behaviour the Contractor will investigate if this is attributable to construction activities, and if this is agreed with SoS, after consultation with Natural England, the Contractor will review mitigation measures in consultation with Natural England.</p>	Bird survey results reported to Natural England	Contractor	Construction	EMP2 - Requirement 4
Landscape	LV001	Trees and vegetation, utilities	Detailed design for the alignment of the Project, including diverted utilities, to reduce the removal of trees and vegetation as far as reasonably practicable, and in accordance with the LEMP as approved by the SoS.	Acceptance by Highways England of tree removal drawings prior to commencement of utility diversion works within order limits and approval of SoS of landscaping scheme	Contractor	Construction	LEMP - Requirement 5
Landscape	LV002	Land reinstatement	Land temporarily impacted by works to divert utilities would be reinstated to its former condition and composition upon completion, as far as reasonably practicable, unless otherwise specified in the Environmental Masterplan or under the terms of article 35 of the dDCO which sets out the temporary possession powers.	Successful reinstatement of vegetation at these locations within 12 months for grassland, 24 months for hedgerows and five years for trees and woodland.	Contractor	Construction	LEMP - Requirement 5

Topic	REAC ref no.	Issue	Commitment	Achievement criteria	Party responsible	Stage	Securing mechanism in DCO
Landscape	LV003	Landscape maintenance	The first five years of vegetation establishment would be overseen by an Environmental Clerk of Works. Vegetation that has failed to establish would be replaced as soon as identified within the next available planting season. At the end of the establishment period, subsequent landscape management would be undertaken in accordance with the Landscape and Ecology Management Plan (LEMP) [Successful establishment of planting within five years to serve its mitigation purpose as identified on the Environmental Masterplan.	Contractor	Construction	LEMP - Requirement 5
33Landscape	LV004	Planting	Where guards are used to protect seedlings and whips, the use of plastic tree guards would be avoided in favour of biodegradable options where available. In the event that plastic guards are used, these will be removed within five years of installation.	Avoidance of litter from broken or abandoned tree guards	Contractor	Construction	EMP2 - Requirement 4
Landscape	LV005	Siting of construction compounds	No main compounds would be located within the Kent Downs AONB.	Highways England acceptance of construction compounds locations	Contractor	Construction	EMP2 - Requirement 4
Landscape	LV006	Marling Cross compound, Views, Valley Drive, Mackenzie Way	Construction compound facilities greater than 6m in height would be located as southerly as is reasonably practicable to maximise the distance from residential properties on Valley Drive and Mackenzie Way and minimise visual prominence.	Highways England acceptance of the layout of buildings within construction compounds	Contractor	Construction	EMP2 - Requirement 4
Landscape	LV007	A2 compound. Construction compounds facilities	Construction compound facilities greater than 6m in height would be located as south-westerly as is reasonably practicable to maximise distance from nearby residential properties on Thong Lane and from the adjacent boundary of the Kent Downs AONB.	Highways England acceptance of the layout of buildings within construction compounds	Contractor	Construction	EMP2 - Requirement 4
Landscape	LV008	Southern tunnel entrance compound, Bund	Earth bunds of approximately 2-3m in height formed from material excavated on site would be sited along the boundary of the compound, as material becomes available to facilitate visual screening for residential properties on Thong Lane and Rochester Road (A226) during construction.	Highways England acceptance of the location of stockpiles within construction compounds	Contractor	Construction	EMP2 - Requirement 4
Landscape	LV009	Southern tunnel entrance compound, Stockpile slopes	Softening the appearance of temporary earthwork stockpiles adjacent to the Kent Downs AONB by phasing the works to be such that south-east facing slopes are retained as grass seeded slopes for visual screening purposes for as long as reasonably practicable.	Implementation of commitment actions.	Contractor	Construction	EMP2 - Requirement 4
Landscape	LV010	Southern tunnel entrance compound, Construction compound facilities	Construction compound facilities greater than 6m in height would be located to maximise distance from residential areas of Chalk and adjoining	Highways England acceptance of the layout of buildings within construction compounds	Contractor	Construction	EMP2 - Requirement 4

Topic	REAC ref no.	Issue	Commitment	Achievement criteria	Party responsible	Stage	Securing mechanism in DCO
			Thong Lane, together with Thamesview School, as far as reasonably practicable.				
Landscape	LV011	A226 Gravesend Road compound, Bunds	Earth bunds of 3m in height would be formed from material excavated and retained on site, as material becomes available to facilitate visual screening for residential properties on Castle Lane, Chalk.	Highways England acceptance of the location of stockpiles within construction compounds	Contractor	Construction	EMP2 - Requirement 4
Landscape	LV012	A226 Gravesend Road compound, Construction compound facilities	Construction compound facilities greater than 6m in height would be located as south-easterly as reasonably practicable to maximise distance from residential properties on Castle Lane, Chalk.	Highways England acceptance of the layout of buildings within construction compounds	Contractor	Construction	EMP2 - Requirement 4
	LV013		NOT USED				
Landscape	LV014	Northern tunnel entrance compound, Construction compound facilities, Readmans	Concrete batching plant and segment factory would be located adjacent to Readmans Industrial Estate.	Highways England acceptance of the layout of buildings and concrete batching plant within construction compounds	Contractor	Construction	EMP2 - Requirement 4
Landscape	LV015	Station Road compound, Bunds	Where soil is excavated and retained on site temporarily, it would be stockpiled in the form of earth bunds to facilitate visual screening for residential properties along Church Road and Station Road.	Highways England acceptance of the location of stockpiles within construction compounds	Contractor	Construction	EMP2 - Requirement 4
Landscape	LV016	Station Road compound, Construction compound facilities	Construction compound facilities greater than 6m in height would be located at the south of the compound, adjacent to the Northern tunnel entrance compound, where reasonably practicable, to maximise distance and visual screening from residential properties on Church Road and Station Road	Highways England acceptance of the layout of buildings within construction compounds	Contractor	Construction	EMP2 - Requirement 4
Landscape	LV017	Brentwood Road compound, Bunds	Where soil is excavated and retained on site temporarily, it would be stockpiled in the form of an earth bund on the southern boundary of the compound to facilitate visual screening for residential properties within Chadwell St Mary where reasonably practicable.	Highways England acceptance of the location of stockpiles within construction compounds.	Contractor	Construction	EMP2 - Requirement 4

Topic	REAC ref no.	Issue	Commitment	Achievement criteria	Party responsible	Stage	Securing mechanism in DCO
Landscape	LV018	Brentwood Road compound, Compound construction facilities	Construction compound facilities greater than 6m in height would be located at the north of the compound, as far as reasonably practicable, to reduce visibility from residential properties at Chadwell St Mary.	Highways England acceptance of the layout of buildings and concrete batching plant within construction compounds.	Contractor	Construction	EMP2 - Requirement 4
Landscape	LV019	Stifford Clays Road compound East, Construction compound facilities	Construction compound facilities greater than 6m in height would be located as westerly as reasonably practicable, to maximise distance from residential properties on Stifford Clays Road and Fen Lane.	Highways England acceptance of the layout of buildings within construction compounds.	Contractor	Construction	EMP2 - Requirement 4
Landscape	LV020	Mardyke compound, Construction compound facilities	Construction compound facilities of greater than 6m in height would be located as westerly as reasonably practicable to minimise visibility from residential property (Hobletts).	Highways England acceptance of the layout of buildings within construction compounds.	Contractor	Construction	EMP2 - Requirement 4
Landscape	LV021	Mardyke compound, Bund	Where soil is excavated and retained on site temporarily, it would be stockpiled in the form of earth bunds to facilitate screening for Hobletts to the north-east.	Highways England acceptance of the location of stockpiles within construction compounds	Contractor	Construction	EMP2 - Requirement 4
Landscape	LV022	M25 compound, Construction compound facilities	Construction compound facilities of greater than 6m in height would be located as westerly as reasonably practicable to maximise the distance from the North Ockendon Conservation Area.	Highways England acceptance of the layout of buildings within construction compounds	Contractor	Construction	EMP2 - Requirement 4
Landscape	LV023	M25 compound, Construction compound facilities,	It is anticipated that a concrete batching plant would be located within this compound. This facility would be located as south-westerly as reasonably practicable, to maximise distance from the North Ockendon Conservation Area.	Highways England acceptance of the layout of buildings and concrete batching plant within construction compounds	Contractor	Construction	EMP2 - Requirement 4
Landscape	LV024	M25 compound, Bunds	Where soil is excavated and retained on site temporarily, it would be stockpiled as earth bunds on the eastern boundary of the compound to facilitate visual screening for the North Ockendon Conservation Area.	Highways England acceptance of the location of stockpiles within construction compounds.	Contractor	Construction	EMP2 - Requirement 4
Landscape	LV025	Ockendon Road compound, Construction compound facilities	Construction of compound facilities of greater than 6m in height would be located as north-westerly as is reasonably practicable to minimise visibility from residential properties within the static caravan park located off Ockendon Road.	Highways England acceptance of the layout of buildings within construction compounds.	Contractor	Construction	EMP2 - Requirement 4
Landscape	LV026	Ockendon Road compound, Bunds	Where soil is excavated and retained on site temporarily, it would be stockpiled in the form of earth bunds on the south and west boundaries of the compound, where required to facilitate screening for Ockendon Road and the nearest residential properties at the static caravan park.	Highways England acceptance of the location of stockpiles within construction compounds.	Contractor	Construction	EMP2 - Requirement 4

Topic	REAC ref no.	Issue	Commitment	Achievement criteria	Party responsible	Stage	Securing mechanism in DCO
Landscape	LV027	Warley Street, Construction compound facilities	Construction compound facilities of greater than 6m in height would be located adjacent to the M25, as far as is reasonably practicable.	Highways England acceptance of the layout of buildings within construction compounds.	Contractor	Construction	EMP2 - Requirement 4
Landscape	LV028	Protection of retained vegetation	An Arboricultural Method Statement and Tree Protection Plan would be prepared in accordance with BS 5837:2012 identifying measures for the protection of retained vegetation prior to the commencement of site clearance works. These measures would be complied with during construction and all works to trees and vegetation removal would be implemented under the supervision of the Environmental Clerk of Works.	Implementation of measures for the protection of retained vegetation and avoidance of harm to retained vegetation.	Contractor	Construction	EMP2 - Requirement 4
	LV029		NOT USED				
Landscape	LV030	Veteran and ancient tree fencing	In accordance with standing advice prepared by Natural England and the Forestry Commission (2018), the following measures would be developed to protect veteran trees, ancient trees and ancient woodland identified on the Environmental Masterplan: 1. Screening barriers would be provided to protect retained ancient trees, ancient woodland and veteran trees from dust and pollution from nearby works. Locations of barriers will be defined in accordance with the requirements set out in REAC item LV028. 2. A buffer zone would be defined to avoid impact on root zones. These would be as follows: - For veteran trees, the buffer would be a minimum of 15 times the diameter of the tree trunk or five metres beyond the canopy, whichever is the greater - For ancient trees and ancient woodland, a separation distance of 15m from the canopy of the ancient trees/woodland edge would be maintained between the proposed construction activity and the asset. These measures would be followed by the Contractor unless specifically agreed by Highways England, following the advice of a qualified arboriculturist, and following non-invasive root investigations which have	Clearly defined approach to deliver successful establishment of vegetation as set out in the Environmental Masterplan	Contractor	Construction	EMP2 - Requirement 4

Topic	REAC ref no.	Issue	Commitment	Achievement criteria	Party responsible	Stage	Securing mechanism in DCO
			determined that a smaller buffer would be appropriate to the tree or woodland.				
Landscape	LV031	Relocating lost veteran trees	Where removal of dead wood or veteran trees is required, the intact hulks of felled veteran trees would be relocated in close proximity to a nearby veteran tree, woodland or parkland area in accordance with standing advice prepared by Natural England and the Forestry Commission (2018). Dead wood would be placed within the woodland within which is located, in log piles and left to decompose naturally. This would provide opportunity for invertebrates and fungi resident within the tree to relocate. The location for the placement of the hulk will be identified following liaison with the relevant local planning authorities and be supervised by a qualified arboriculturist.	Relocation of intact tree hulks in accordance with NE and FE guidance	Contractor	Construction	EMP2 - Requirement 4
Landscape	LV032	Veteran tree replacement	A minimum of 30 individual specimen trees would be planted as replacement for 10 lost veteran trees. Fifteen such trees would be planted to the south of the River Thames and 15 to the north of the River Thames, to reflect the equal split of lost trees on either side of the River. The location, stock size and species selection would be agreed with the Secretary of State following consultation with the relevant local planning authorities. Suitable species could include a combination of Oak (<i>Quercus robur</i>) and Sweet Chestnut (<i>Castanea sativa</i>). This would be undertaken during the construction phase within locations selected to allow sufficient open space for establishment of an open crown, whilst being as close as reasonably practicable to the location of the lost existing veteran trees to provide some ecological connection with other veterans nearby.	Implementation of the landscaping scheme approved by the SoS	Contractor	Construction	LEMP - Requirement 5

Topic	REAC ref no.	Issue	Commitment	Achievement criteria	Party responsible	Stage	Securing mechanism in DCO
Landscape	LV033	Long Lane compound A. Bunds	Where reasonably practicable, stockpiles formed from material excavated on site would be sited along the eastern boundaries of Long Lane Compound A, as material becomes available. This is to reduce visual impacts for the caravan site off Gammon Fields, and its subsequent relocation site immediately to the west.	Highways England acceptance of the location of stockpiles within construction compounds.	Contractor	Construction	EMP2 - Requirement 4
Marine Biodiversity	MB001	Construction of water management pipeline and outfall	Works to construct the water management pipeline and outfall, including any piling, must not be undertaken when the work area is either fully submerged, or partially covered by water where this would result in the transmission through the water column of noise and vibration or the generation of suspended sediments in accordance with the conditions set out by the Marine Management Organisation (MMO) in the Deemed Marine Licence.	Compliance with conditions of the Deemed Marine Licence	Contractor	Construction	Deemed Marine Licence - Schedule 15
Marine Biodiversity	MB002	Piling below mean high water spring	Techniques such as soft start/ramp-up would be utilised for the first 20 minutes of piling operations and should piling activities cease for more than 10 minutes, the soft start/ramp-up technique be repeated. Vibro-piling will be used until first refusal; thereafter impact piling being used to toe in the piles. Hammer energy would be reduced once an acceptable drive rate is observed.	Compliance with conditions of the Deemed Marine Licence	Contractor	Construction	Deemed Marine Licence - Schedule 15
Marine Biodiversity	MB003	Lighting during construction below mean high water spring	Prior to the commencement of works below mean high water springs, proposals for lighting of marine construction works subject to the Deemed Marine Licence that require 24-hour working will be developed and submitted to the MMO. This would include an assessment of the effects of measures such as directional lighting and controls on lux levels to mitigate effects on waterfowl during 24-hour operations.	Compliance with Deemed Marine Licence	Contractor	Construction	Deemed Marine Licence - Schedule 15
	MB004		NOT USED.				
	MB005		NOT USED.				

Topic	REAC ref no.	Issue	Commitment	Achievement criteria	Party responsible	Stage	Securing mechanism in DCO
Marine Biodiversity	MB006	Implementation invasive species introduction controls	A biosecurity risk assessment and method statement will be developed and implemented in line with the International Convention for the Control and Management of Ships' Ballast Water and Sediments (adopted in 2004; entry into force in 2017). This will outline the risks and control measures for managing the introduction of invasive non-native species.	Compliance with Deemed Marine Licence	Contractor	Construction	Deemed Marine Licence - Schedule 15
Material assets and waste	MW001	Preferentially avoiding use of primary materials	<p>1. Where design specification permits, key construction materials used would include a measurable recycled or secondary content.</p> <p>2. In line with the target set out in DMRB LA 110, 31% of aggregates used in construction would be recycled or secondary, for those applications where it is technically and economically feasible to substitute these alternative materials for primary aggregates. To facilitate compliance with this target, the Contractor would calculate the total aggregate required to achieve the detailed design, and the total where design specification dictates only primary aggregate is used. During construction, the Contractor would record the amount of primary and secondary/recycled aggregate by weight and calculate compliance with the target (offsetting the amount excluded by design specification).</p> <p>3. In line with the target set out in DMRB LA 110, 70% recycling and reuse on site of suitable, uncontaminated concrete from demolition activities to substitute use of primary material.</p> <p>4. Suitable uncontaminated concrete from demolition and construction activities would be processed to achieve non waste status in accordance with the Aggregates from Inert Waste Quality Protocol (WRAP, 2013).</p>	Implementation of commitment actions.	Contractor	Construction	EMP2 - Requirement 4
Material assets and waste	MW002	Responsible sourcing	<p>1. Priority would be given to sourcing primary, secondary and recycled aggregates from Kent, Essex and Greater London whenever the design specification permits and supply is available to embody the proximity principle.</p> <p>2. The Contractor would use the BRE Framework Standard for Responsible Sourcing (BES 6001) (BRE, 2008), to verify imported materials are sustainably sourced and managed, to reduce the impacts throughout the supply chain.</p>	Implementation of commitment actions.	Contractor	Construction	EMP2 - Requirement 4
Material assets and waste	MW003	Components standardisation	The Contractors would be required to review the design and investigate opportunities to standardise (where reasonably practicable)	Acceptance by Highways England of the material efficiency design report for works under the control of	Contractor	Construction	EMP2 - Requirement 4

Topic	REAC ref no.	Issue	Commitment	Achievement criteria	Party responsible	Stage	Securing mechanism in DCO
			construction components such as beam depths, abutment sizes and piers to increase efficiency of materials use in production and reduce waste production. This initiative would be progressed through detail design and documented in a material efficiency design report submitted to Highways England prior to construction.	Highways England and its Contractors			
Material assets and waste	MW004	Design for off-site construction	The Contractors would be required to review the design to investigate the use of pre-fabricated structures and components and encourage a process of assembly rather than construction on site where economically and technically feasible.	Contractors to submit reports for Highways England review and acceptance prior to construction for works under the control of Highways England and its Contractors	Contractor	Construction	EMP2 - Requirement 4
Material assets and waste	MW005	Pre-demolition surveys	During construction it will be necessary to demolish various buildings, concrete structures and steel gantries. Pre-demolition surveys of these structures and buildings would be undertaken. Demolition materials would be identified and quantified including potential sources of recycled aggregate to be reused on site, as well as hazardous materials such as asbestos.	Completion of pre-demolition surveys	Contractor	Construction	EMP2 - Requirement 4
Material assets and waste	MW006	Site waste manager	During both detailed design and construction, Contractors would appoint a materials and waste manager to ensure that the waste hierarchy is implemented and opportunities are identified and implemented to reduce waste generation or improve recovery/recycling rates are identified. The materials and waste manager would be responsible for ensuring compliance with waste mitigation requirements set out in the REAC and ensuring the Site Waste Management Plan or equivalent procedures (REAC ref. MW009) are written and updated.	Acceptance by Highways England of the manager for materials and waste nominated by the Contractor for works under the control of Highways England and its Contractors.	Contractor	Construction	EMP2 - Requirement 4

Topic	REAC ref no.	Issue	Commitment	Achievement criteria	Party responsible	Stage	Securing mechanism in DCO
Material assets and waste	MW007	Reuse of excavated materials and soils	<p>1. Excavated material would be managed in line with the waste hierarchy with preference given to reuse where feasible and the design allows.</p> <p>2. Clean, naturally occurring soils would be reused on-site in line with Directive 2008/98/EC on Waste (Waste Framework Directive), Article 2.</p> <p>3. Contractors would implement all required environmental permits, exemptions and a Materials Management Plan (in accordance with the Definition of Waste: Development Industry Code of Practice (CL:AIRE, 2011) for the reuse of made ground and contaminated soils.</p> <p>4. Material that are not suitable for reuse or in excess to requirements would likely be managed as waste.</p>	Compliance with Material Management Plan and Duty of Care Requirements	Contractor	Construction	EMP2 - Requirement 4
Material assets and waste	MW008	Characterisation of excavated fill	A ground investigation would be used to identify material that would be excavated on site that could be used as Class I-IV fill materials or construction aggregate to reduce the need to import equivalent materials in more detail.	Completion of ground investigation for works under the control of Highways England and its Contractors	Contractor	Construction	EMP2 - Requirement 4
Material assets and waste	MW009	Site waste management procedures	The Contractors would produce Construction Site Waste Management Plans (CSWMP), substantially in accordance with the requirements of the Outline Site Waste Management Plan (oSWMP).	Approval of Construction Site Waste Management Plans as part of EMP 2 by the Secretary of State	Contractor	Construction	EMP2 - Requirement 4

Topic	REAC ref no.	Issue	Commitment	Achievement criteria	Party responsible	Stage	Securing mechanism in DCO
Material assets and waste	MW010	Site waste management	<p>Contractors would implement the following measures during construction in order to enhance recovery and recycling rates and minimise the quantities of waste:</p> <ol style="list-style-type: none"> 1. All waste arisings would be characterised and recorded. 2. All wastes would be classified, with mirror entry code wastes sampled to determine classification, in line with the prevailing technical guidance. 3. Waste management off-site would be completed under Duty of Care (Section 34 Environmental Protection Act). All waste would be transported using licensed carriers and taken only to appropriately permitted facilities. All waste movements would be accompanied by waste documentation such as Waste Transfer or Consignment Notes (dependent of waste class) which would be retained for the appropriate legal period. 4. Satisfy the legal need under the Waste (England and Wales) Regulations 2011 (as amended) for pre-treatment of waste and confirm this in a written declaration on the associated waste documentation. 5. Demonstrate and document that sufficient space has been allowed within the construction working areas for stockpiles for topsoil, contaminated material (for later off-site management), materials to be reused, excess clean material and imported materials for construction. This would enable the segregation of waste types, prevent the mixing of hazardous and non-hazardous wastes and enhance recovery rates by minimising degradation, damage and loss. 6. Segregate hazardous and non-hazardous waste, separating waste at source by type, where reasonably practicable, providing separate skips for general waste, metal, dry recycling and timber as a minimum at each compound. Suitable provision would also be made for common hazardous wastes, e.g. used absorbents, aerosol cans, oily rags and waste electronics. 	Implementation of site waste management procedures and Duty of Care obligations	Contractor	Construction	EMP2 - Requirement 4

Topic	REAC ref no.	Issue	Commitment	Achievement criteria	Party responsible	Stage	Securing mechanism in DCO
Material assets and waste	MW010 (continued)		<p>7. Provide impermeable surfaces with sealed drainage for remediation, quarantine and hazardous waste storage areas to minimise cross contamination of other waste streams and surrounding ground.</p> <p>8. Label stockpiles and skips with contents, to prevent the mixing of hazardous and non-hazardous wastes.</p> <p>9. Comply with any specific waste storage and handling requirements required by legislation, e.g. for asbestos or waste electronics.</p> <p>10. Vegetation waste should be reused on site wherever possible, e.g. for ecological mitigation (unless contaminated by invasive species).</p> <p>11. Where possible agree with material suppliers to reduce the amount of packaging on materials or to participate in a packaging take-back scheme.</p> <p>12. Implement a material delivery system to avoid materials being stockpiled, which increases the risk of their damage and disposal as waste.</p> <p>13. Monitor material quantity requirements to avoid over-ordering to reduce opportunity for oversupply and damage on site which would generate waste materials.</p> <p>14. Prioritise off-ground storage, e.g. on pallets, retention of materials in original packaging, protection from rain and collision by plant or vehicles.</p> <p>15. Ensure that the storage of lightweight or liquid/sludge waste materials will prevent dispersion by wind and precipitation.</p> <p>16. Seal stockpiles in place for over 30 days to maintain integrity of material.</p> <p>17. Seed topsoil stockpiles to reduce soil loss and maintain soil quality.</p> <p>18. Prohibit the burning of waste and unwanted materials on-site.</p> <p>19. In line with the requirements of DMRB LA 110, enhancement opportunities would be identified, reported and implemented during detailed design and construction to minimise the demand for material and the amount of waste sent for final disposal in landfill.</p>	Implementation of site waste management procedures	Contractor	Construction	EMP2 - Requirement 4
Material assets and waste	MW011	Reuse of materials	The Contractor would seek to achieve a target that 95% (by weight) of inert excavated materials destined for off-site waste management outside the Order Limits would be diverted from final disposal in landfill.	No more than 5% (by weight) of waste inert excavated materials would be placed in landfill.	Contractor	Construction	EMP2 - Requirement 4

Topic	REAC ref no.	Issue	Commitment	Achievement criteria	Party responsible	Stage	Securing mechanism in DCO
Material assets and waste	MW012	Reuse sites	The Contractor would identify reuse sites that score positively against a sustainability scoring system agreed with Highways England.	Implementation of commitment actions for works under the control of Highways England and its Contractors	Contractor	Construction	EMP2 - Requirement 4
Material assets and waste	MW013	Recycling and recovery of materials	The Contractor would use the methodology in the Waste Framework Directive (2008/98/EC) to demonstrate the recovery of non-hazardous construction waste, with a target of 90%. The Contractor would achieve a minimum recovery of 70% (by weight).	Achievement of specified target for works under the control of Highways England and its Contractors	Contractor	Construction	EMP2 - Requirement 4
Material assets and waste	MW014	Monitoring operational phase	The road operator would provide a summary of materials used and waste generated during the first year of operation in line with requirements of DMRB LA 110 Material Assets and Waste and used to update the Environmental Management Plan for future operational years.	Reporting of first year operational demand for materials and waste generation	Highways England	Operation	EMP2 - Requirement 4
Material assets and waste	MW015	Hazardous construction waste disposal	The Contractor would seek to achieve a target of 70% (by weight) of hazardous construction waste to be diverted from landfill. It is anticipated that this would be achieved by undertaking remediation or treatment within the Order Limits or off site at third party facilities. It is acknowledged that the nature of some hazardous construction waste may preclude this. Where a hazardous construction waste cannot be diverted from landfill, the justification and evidence will be provided by the Contractor and logged by the Contractor in the SWMP.	Achievement of specified target for works under the control of Highways England and its Contractors	Contractor	Construction	EMP2 - Requirement 4
Noise and vibration	NV001	Noise and Vibration level controls	Noise and vibration levels would be controlled in accordance with BS 5228: Code of practice for noise and vibration control on construction and open sites, to reduce disturbance to the environment and communities in the vicinity of the construction works, including Thames Estuary and Marshes SPA/Ramsar and associated functionally linked land.	Implementation of commitment actions	Contractor	Construction	EMP2 - Requirement 4
Noise and vibration	NV002	Noise and Vibration Plan	A Noise and Vibration Management Plan (NVMP) or equivalent would be prepared for each part of the construction works subject to Section 61 control for consideration by the relevant planning authority.	Approval of NVMP or equivalent by the SoS in consultation with local planning authority	Contractor	Construction	EMP2 - Requirement 4
Noise and vibration	NV003	Conveyor systems	A maintenance programme which includes inspection of the conveyor equipment would be implemented to reduce noise and vibration.	Implementation of commitment actions	Contractor	Construction	EMP2 - Requirement 4

Topic	REAC ref no.	Issue	Commitment	Achievement criteria	Party responsible	Stage	Securing mechanism in DCO
Noise and vibration	NV004	Section 61 Consents	Where appropriate, consents would be obtained from the relevant local authorities under Section 61 of the Control of Pollution Act 1974 (which may include noise and vibration limits where relevant) for the proposed construction works.	Compliance with the terms of Section 61 consents	Contractor	Construction	EMP2 - Requirement 4
Noise and vibration	NV005	Baseline noise levels	Pre-construction baseline noise levels would be submitted to the relevant planning authority to establish a pre-construction baseline for monitoring compliance with construction noise limits.	Acceptance by the EHO for relevant planning authorities on baseline levels to inform Section 61 consents	Contractor	Construction	EMP2 - Requirement 4
Noise and vibration	NV006	noise assessment	Construction works would be assessed in accordance with BS 5228 using specific manufacturer's data and proposed position of equipment. Results of the assessment would be presented to the Environmental Health Officers of the relevant planning authorities prior to commencement of that part of the construction works, as appropriate, to inform consideration of Section 61 agreements.	Agreement with the EHO for relevant planning authorities on the terms of Section 61 consents	Contractor	Construction	EMP2 - Requirement 4
Noise and vibration	NV007	Best Practicable Means	<p>Best Practicable Means as defined under Section 72 of the Control of Pollution Act 1974 would be employed during the construction phase to reduce noise nuisance. These would include measures such as:</p> <ul style="list-style-type: none"> - installing and maintaining hoarding around the construction areas likely to generate noise - keeping site access routes in good condition with condition assessments on site to inspect for defects such as potholes - turning off plant machinery when not in use - maintaining all vehicles and mobile plant such that loose body fittings or exhausts do not rattle or vibrate - using silenced equipment where available, in particular silenced power generators and pumps - no music or radios would be played for entertainment purposes outdoors on-site - plan site layout to ensure that reversing is kept to a reasonably practicable minimum. Reversing manoeuvres, that are required would be managed by a trained banksman/vehicle marshal to ensure they are conducted safely and concluded quickly - non-percussive demolition techniques would be adopted where reasonably practicable to reduce noise and vibration impact 	Implementation of commitment actions	Contractor	Construction	EMP2 - Requirement 4

Topic	REAC ref no.	Issue	Commitment	Achievement criteria	Party responsible	Stage	Securing mechanism in DCO
Noise and vibration	NV008	Community Engagement	Residents would be notified of particularly noisy work such as percussive piling and concrete breaking prior to their commencement. The mechanisms for notification will be detailed in the Community Engagement Plan. Effective communication would be established, keeping local residents informed of the type and timing of works involved, paying particular attention to potential evening and night-time works and activities which may occur in close proximity to receptors.	Implementation of commitment actions	Contractor	Construction	EMP2 - Requirement 4
Noise and vibration	NV009	Noise Monitoring	During the construction phase, day- and night-time noise and vibration monitoring would be undertaken at locations identified in consultation with the relevant local planning authorities to ensure that the mitigation measures suggested are working effectively.	Compliance with the terms of Section 61 consents	Contractor	Construction	EMP2 - Requirement 4
	NV010	Haulage routes	A maintenance programme which includes inspection of all haul routes and infill of potholes and other surface irregularities would be implemented to reduce noise and vibration.	Implementation of commitment actions	Contractor	Construction	EMP2 - Requirement 4
Noise and vibration	NV011	Acoustic barriers	The performance of acoustic barriers would be compliant with the specifications and requirements of DMRB LD 119 'Roadside environmental mitigation and enhancement – Appendix A'.	Installation of acoustic barriers	Contractor	Operation	EMP2 - Requirement 4
Noise and vibration	NV012	Conveyor systems	An acoustic insulation cover would be installed to reduce noise from conveyor systems that are operating within 300m of noise sensitive receptors including the Thames Estuary and Marshes SPA/Ramsar and associated functionally linked land.	Implementation of commitment actions	Contractor	Construction	EMP2 - Requirement 4
Noise and vibration	NV013	Road surfacing	A 'Level 3', very quiet road surfacing system, as defined by Highways England Specification for Highways Work Volume 1, Series 900, Table 9-17, shall be provided on all new and altered trunk roads and associated slip roads forming part of the Project.	Implementation of commitment actions	Contractor	Operation	EMP2 - Requirement 4
Noise and vibration	NV014	Operational fixed plant at tunnel service buildings	The noise emitted from operational fixed plant located at the tunnel service buildings shall not result in exceedance of the existing background level by more than 0dB(A) at the nearest residential receptors when assessed in accordance with BS 4142: 2014+A1:2019.	Implementation of commitment actions	Contractor	Operation	EMP2 - Requirement 4

Topic	REAC ref no.	Issue	Commitment	Achievement criteria	Party responsible	Stage	Securing mechanism in DCO
Noise and vibration	NV015	Actions in case of noise monitoring exceedance	In the event that noise and vibration monitoring (as provided for in NV009) identifies that noise and vibration limits (as provided for in NV004) have been exceeded, the Contractor shall, at the earliest reasonably practicable opportunity, investigate to confirm that works being undertaken as part of the Project are the source of the noise. If this is confirmed, then the Contractor shall immediately undertake a further review of the best practicable means (as defined under the Control of Pollution Act, 1974) employed for the activity to minimise noise and agree additional or modified mitigation with the relevant local authority unless otherwise agreed with the Secretary of State .	Agreement with the EHO for relevant planning authorities on revisions to the terms of Section 61 consents unless otherwise agreed with the Secretary of State.	Contractor	Construction	EMP 2-Requirement 4
Population and Human Health	PH001	Public Rights of Way	Construction works would be planned in order to reduce the durations of time which footpaths, cycleways and bridleways would need to be closed. For such Public Rights of Way the following mitigation measures would be adopted: a) Early engagement with members of the public and relevant stakeholders (for example, local walking groups), in order to ensure they are fully appraised of any closures and diversions as far in advance as reasonably practicable. b) Clear and concise signposting would be used in order to clearly outline any temporary diversions as and when they are necessary. This would be carried out in consultation with the local highways authority, Public Right of Way officers and other relevant stakeholders. c) Social media would be used in order to update members of the public of any closures and diversions which are in place.	Implementation of commitment actions	Contractor	Construction	EMP2 - Requirement 4 and the Traffic Management Plan under Requirement 10
Road Drainage and Water Environment	RDWE001	Temporary drainage design	Work site drainage systems would incorporate pollution control systems designed in line with Control of Water Pollution from Construction Sites C532 (CIRIA, 2001) or as agreed with the Secretary of State. Watercourses near work sites would be regularly inspected for signs of siltation or other forms of pollution in line with CIRIA C741 guidance (CIRIA, 2015) and pumped groundwater, process effluents and construction site runoff would be tested to ensure compliance with discharge consent requirements.	Approval by SoS of construction site drainage systems following consultation with the relevant planning authority	Contractor	Construction	Requirement 8
Road Drainage and Water Environment	RDWE002	Temporary drainage design	Work site drainage systems would be inspected and maintained to ensure they continue to	No pollution of surface or groundwater from site drainage	Contractor	Construction	EMP2 - Requirement 4

Topic	REAC ref no.	Issue	Commitment	Achievement criteria	Party responsible	Stage	Securing mechanism in DCO
			operate to their design standard, safeguarding surface and groundwater quality.				
Road Drainage and Water Environment	RDWE003	TBM water supply	The water to supply to the TBM may be supplied by groundwater abstracted from a Northumbrian Water borehole at Linford. If this is the case, then extraction rates would be agreed Northumbrian Water prior to commencement of main tunnelling works and would not be exceeded.	Compliance with agreed extraction rates	Contractor	Construction	EMP2 - Requirement 4
Road Drainage and Water Environment	RDWE004	Construction water management	Water use efficiency and leakage reduction measures would be adopted during the construction phase, such as use of water efficient fittings (taps, toilets) in site offices and welfare facilities, use of misting/atomising systems for dust suppression, drive on recirculating systems for wheel washing, and sub metering to help in detecting leaks where reasonably practicable.	Implementation of commitment actions	Contractor	Construction	EMP2 - Requirement 4
Road Drainage and Water Environment	RDWE005	Construction water management	Wastewater generated from the compound welfare facilities would be discharged to sewer, subject to the agreements with the utility providers, or in locations where a sewer connection is not reasonably practicable, collected and tankered off site for disposal at a licensed treatment facility.	Compliance with sewer discharge consents	Contractor	Construction	EMP2 - Requirement 4
Road Drainage and Water Environment	RDWE006	Construction water management	Surface water drainage would be provided for all surfaced roads and yards, buildings and any other hard or impermeable surfaces within construction compounds or worksites. Berms and bunds would be constructed to manage surface water runoff where necessary to protect watercourses, prevent ponding and to keep general runoff separate from contaminated runoff. Rainfall runoff from areas where there is a risk of contamination would be managed using temporary drainage systems and would be subject to treatment prior to discharge to any surface watercourse or drain. Rainfall runoff from areas of low contamination risk would be captured and reused where reasonably practicable e.g. to supply wheel wash facilities or for dust suppression, to reduce consumptive water use.	SoS approval of drainage system details following consultation with the relevant planning authority	Contractor	Construction	Requirement 8
Road Drainage and Water Environment	RDWE007	Protection of flood defences from ground movement	The potential for an impact on the integrity of the River Thames flood defences due to ground movement during tunnelling would be reduced by adopting good tunnelling practice, such as;	Avoidance of settlement that may affect the integrity of flood defences	Contractor	Construction	EMP2 - Requirement 4

Topic	REAC ref no.	Issue	Commitment	Achievement criteria	Party responsible	Stage	Securing mechanism in DCO
			continuous working, erecting linings immediately after excavation, grouting, management of tunnel face pressures and the measurement of excavated material quantities. In line with the requirements of the Environment Agency, flood defences would be monitored to establish a pre-construction baseline and for a period of at least two years after completion of works to construct the tunnel to enable detection of any effects on the structural integrity/condition of the assets during construction of the Project. The monitoring methodology would be agreed with the Environment Agency and would continue until the annual rate of settlement is less than a rate identified agreed with the Environment Agency.				
Road Drainage and Water Environment	RDWE008	Protection of watercourses during utility works	Where below ground utilities diversions are required, watercourses would be crossed using trenchless techniques in order to avoid disturbance to channel form, flow regimes and riparian habitats and species, unless other techniques are agreed with the Environment Agency or LLFA, where relevant.	Implementation of commitment actions	Contractor	Construction	Protective Provisions – Schedule 14
Road Drainage and Water Environment	RDWE009	Reinstatement of bankside vegetation	Bankside vegetation would be reinstated at culvert entries and exits following the completion of construction works as soon as conditions are suitable for planting.	Successful reinstatement of vegetation at these locations within 12 months.	Contractor	Construction	LEMP - Requirement 5
Road Drainage and Water Environment	RDWE010	Bank protection	Where bank protection is required during construction work, this would take the form of soft or natural river bank protection, such as coir or other biodegradable geotextiles.	Implementation of commitment actions	Contractor	Construction	EMP2 - Requirement 4
Road Drainage and Water Environment	RDWE011	Operational drainage design	To reduce the potential for scour and associated hydromorphological change, highway drainage outfall headwall arrangements would be set back from the banks of the receiving watercourses and outfall designs would accord with DMRB CD 529.	SoS approval for details of drainage system following consultation with the relevant planning authority	Contractor	Construction	Requirement 8
Road Drainage and Water Environment	RDWE012	Operational drainage maintenance	Drainage infrastructure and treatment systems would be maintained in accordance with the Highways England GS 801: Asset Delivery asset inspection requirements and GM 701: Asset delivery asset maintenance requirements (ADAMr) as applicable, to ensure they continue to operate to their design standard to safeguard surface and groundwater quality.	No pollution of surface or groundwater from site drainage	Highways England	Operation	EMP3 - Requirement 4

Topic	REAC ref no.	Issue	Commitment	Achievement criteria	Party responsible	Stage	Securing mechanism in DCO
Road Drainage and Water Environment	RDWE013	Culvert design	Where culverting cannot be avoided, new culverts would be sized to maintain the current land drainage regime and to convey flood flows, inclusive of an allowance for climate change, without causing any detriment to baseline flood risk. Culvert inverts would be buried below existing bed levels to allow baseline bed levels, slopes and bed materials to be maintained.	SoS approval for details of drainage system following consultation with the relevant planning authority	Highways England	Operation	Requirement 8
Road Drainage and Water Environment	RDWE014	Culvert maintenance	Culverts would be inspected and maintained, in accordance with Highways England GS 801: Asset Delivery asset inspection requirements and GM701: Asset delivery asset maintenance requirements (ADAMr) as applicable. Where there are any additional specific inspection or maintenance requirements these would be documented in the Maintenance and Repair Statement.	Unobstructed free flow of culverted waters	Highways England	Operation	EMP3 - Requirement 4
Road Drainage and Water Environment	RDWE015	Replacement of existing reservoir at Low Street	An existing well and reservoir at Low Street used by a landowner to pump and store groundwater to feed irrigations systems would be crossed by the Project. Prior to works for the construction of the viaduct crossing that may impact this well and reservoir, this water supply system would be reconfigured, as agreed with the landowner, to maintain continuity of supply during construction and operation of the Project.	Continued provision of irrigation water at this location.	Contractor	Operation	EMP2 - Requirement 4
Road Drainage and Water Environment	RDWE016	Replacement of landowner water supply at North Ockendon	An existing surface water abstraction which is fed by groundwater flows emerging as a spring near North Ockendon may be compromised by the construction of the cutting beneath the M25. Prior to construction of the cutting an alternative water supply would be provided. The new supply would be tested for continuity of supply and water quality for a minimum period of six months from installation or as agreed with the landowner. A supply route from the new source to the existing landowner irrigation system would also be provided.	Continued provision of irrigation water at this location.	Contractor	Operation	EMP2 - Requirement 4
Road Drainage and Water Environment	RDWE017	Ground improvement tunnel	The Contractor would stabilise the ground to reduce ground movement (e.g. to protect Network Rail assets), facilitate operation of the TBM and maintenance of the cutterhead using a ground improvement tunnel or other suitable methods accepted by Highways England that would avoid the need for surface excavations/penetrations within areas designated for protection of wildlife.	Avoidance of surface excavation associated with TBM operation in areas on the southern shores of the River Thames designated for wildlife protection.	Contractor	Construction	EMP2 - Requirement 4

Topic	REAC ref no.	Issue	Commitment	Achievement criteria	Party responsible	Stage	Securing mechanism in DCO
Road Drainage and Water Environment	RDWE018a	Ground improvement tunnel	<p>The ground improvement tunnel and shafts, if used under REAC ref. RDWE017, would be constructed using methods to control groundwater pumping and ingress such as:</p> <ul style="list-style-type: none"> • Wet excavation and grout plug placement to form the shafts • Use of an earth pressure balancing TBM to form a lined tunnel with a specified maximum leakage rate compliant with the Lower Thames Crossing tunnelling specification. <p>Water and flow monitoring would be undertaken for the periods that the ground improvement tunnel is being used for construction purpose, in consultation with Environment Agency, to verify compliance with the tunnels design specification regarding maximum permissible rates of water ingress.</p>	Prior acceptance of methods by Highways England and implementation of monitoring in consultation with the Environment Agency	Contractor	Construction	EMP2 - Requirement 4
Road Drainage and Water Environment	RDWE018b	Ground improvement tunnel	<p>The ground improvement tunnel and shafts, if used under REAC ref. RDWE017, would be decommissioned by backfilling with suitable materials to ensure the ground improvement tunnel and shafts are completely filled. No temporary works would be left in the upper 2m of ground. Shaft sites would be returned to their current land use.</p>	Prior acceptance of methods by Highways England and implementation of commitment actions	Contractor	Construction	EMP2 - Requirement 4
Road Drainage and Water Environment	RDWE019	Ground treatment	<p>Chemicals and materials, such as cement, grout and lubricants used during construction activities in proximity to any groundwater Source Protection Zone would be stored, transported and used in a suitable manner to safeguard potable water supply.</p>	Implementation of commitment actions	Contractor	Construction	EMP2 - Requirement 4
Road Drainage and Water Environment	RDWE020	Ground treatment	<p>Construction of cross passages between the main tunnels would use groundwater control techniques, such as grouting or ground freezing, to reduce the requirement for dewatering and therefore local groundwater drawdown.</p>	Working methods to be approved by Highways England prior to construction	Contractor	Construction	EMP2 - Requirement 4
Road Drainage and Water Environment	RDWE021	Bankside reinstatement	<p>Bankside vegetation reinstatement and planting at the entrances to West Tilbury Main culvert would be designed to ensure no sharp light/dark interface to encourage continued fish passage. This would be achieved by planting with a scrub mix that will include Alder. Root barriers would be installed to protect structural integrity of the bank as appropriate.</p>	Successful establishment of suitable scrub mix within 24 months to provide diffuse shading	Contractor	Construction	LEMP - Requirement 5

Topic	REAC ref no.	Issue	Commitment	Achievement criteria	Party responsible	Stage	Securing mechanism in DCO
Road Drainage and Water Environment	RDWE022	A226 Gravesend Road, Milton, Northern tunnel entrance, Station Road and Mardyke compounds. Construction flood risk	In accordance with the requirements of the National Planning Policy Framework regarding development and flood risk, the Northern tunnel entrance, Station Road and Mardyke compounds to the north of the River Thames and the Southern tunnel entrance and Milton compounds to the south of the River Thames which are partially sited within Flood Zones 2 and 3, would be laid out in accordance with a site-specific flood risk assessment following the Sequential Test, where facilities at highest vulnerability to flooding, e.g. sleeping accommodation, medical and welfare and principal office facilities, are located in the lowest flood risk zone (Zone 1). Only low vulnerability and water compatible uses would be situated in the high-risk Flood Zone 3.	Acceptance by Highways England of the layout of buildings and facilities within construction compounds.	Contractor	Construction	EMP2 - Requirement 4
Road Drainage and Water Environment	RDWE023	River Thames discharge	To mitigate potential effects on water quality and hydrodynamics within the River Thames, the discharge arrangement described in REAC ref. RDWE028 would be constructed and operational in advance of the excavation of the North Portal and tunnelling works and would be used as the temporary discharge for treated construction phase effluents. All effluents would receive treatment prior to discharge into the Thames to ensure compliance with any limits detailed in the conditions of discharge as agreed with the Environment Agency.	Compliance with the Deemed Marine Licence and EA Discharge Consent	Contractor	Construction	Deemed Marine Licence - Schedule 15
Road Drainage and Water Environment	RDWE024	Maintenance and decommissioning of marine structures	Potential effects arising from the maintenance, use and decommissioning of marine structures would be controlled by the measures agreed with the MMO as detailed in the Deemed Marine Licence.	Compliance with the Deemed Marine Licence	Contractor	Construction	Deemed Marine Licence - Schedule 15
Road Drainage and Water Environment	RDWE025	Operational drainage design	Drainage design would include a treatment train for highway runoff designed in accordance with DMRB CG 501 and CD 532 to meet the requirements specified for each outfall to surface watercourses. Further survey and sampling to define the flow regime and water quality of receiving watercourses would be carried out at proposed points of discharge to inform the detailed design of treatment measures.	SoS approval for details of drainage system following consultation with the relevant planning authority	Contractor	Operation	Requirement 8
Road Drainage and Water Environment	RDWE026	Tunnel operational drainage design	The drainage system would include provision for the capture and isolation of contaminated waters to prevent pollution of the receiving watercourse. Discharges would be restricted to high tide conditions in order to maximise available dilution and mixing and to prevent scour/erosion of the intertidal zone.	SoS approval for details of drainage system following consultation with the relevant planning authority	Contractor	Operation	Requirement 8

Topic	REAC ref no.	Issue	Commitment	Achievement criteria	Party responsible	Stage	Securing mechanism in DCO
Road Drainage and Water Environment	RDWE027	Tunnel lining specification	Water infiltration into the tunnel bores and cross passages during operation would be reduced by measures including gaskets (for segmentally lined tunnels) and membranes (for sprayed concrete lined tunnels), compliant with the Lower Thames Crossing tunnelling specification.	Acceptance of detail design by Highways England	Highways England	Construction	EMP2 - Requirement 4
Road Drainage and Water Environment	RDWE028	North Portal construction compound drainage discharge	Drainage from the North Portal construction compound is proposed to outfall from the north side of the River Thames. The design of the discharge pipeline and outfall to the River Thames would provide for a subtidal mid-water discharge for effective dilution and dispersal, and to reduce disturbance to the intertidal zone. The discharge infrastructure would be designed in accordance with measures agreed with the Marine Management Organisation (MMO) as detailed in the Deemed Marine Licence (DCO Schedule 15).	Compliance with Deemed Marine Licence	Contractor	Construction	Deemed Marine Licence - Schedule 15
Road Drainage and Water Environment	RDWE029	Flood alleviation	Incorporation of a suite of flood alleviation measures such as altering road geometry to set the vertical alignment of carriageways above the design flood level, inclusive of freeboard and allowance for climate change resilience, including provision for flood bunds or walls to protect areas where the vertical alignment of the road is lower than the design flood level, to make the development safe from flooding over its design lifetime in line with the requirements of DMRB LA 113.	Approval of the flood risk design measures by the Secretary of State in consultation by the Environment Agency	Contractor	Operation	EMP2 - Requirement 4
Road Drainage and Water Environment	RDWE030	Culverting of Tilbury Main and maintaining fish passage	The West Tilbury Main culvert would integrate a fish pass aid designed for eels and elvers, incorporating some form of matrix, such as bristles, to assist their migration by crawling/climbing instead of swimming.	Highways England acceptance of the detailed design after consultation with the Environment Agency	Contractor	Operation	EMP2 - Requirement 4
Road Drainage and Water Environment	RDWE031	Culverting of Tilbury Main and maintaining fish passage	The West Tilbury Main culvert would be partially submerged at its downstream end to prevent perching and a resting pool for coarse fish would be provided immediately downstream of the culvert, with a minimum depth of 30cm.	Highways England acceptance of the detailed design after consultation with the Environment Agency	Contractor	Operation	EMP2 - Requirement 4

Topic	REAC ref no.	Issue	Commitment	Achievement criteria	Party responsible	Stage	Securing mechanism in DCO
Road Drainage and Water Environment	RDWE032	Potable groundwater protection	The proposed road drainage attenuation and treatment pond located at Chadwell St Mary, as indicated on the Environmental Masterplan, is situated within a groundwater Source Protection Zone 1. The pond would include an impermeable lining in order to prevent seepage of drainage discharges into the ground to safeguard potable groundwater quality.	SoS approval for details of drainage system following consultation with the relevant planning authority	Contractor	Operation	Requirement 8
Road Drainage and Water Environment	RDWE033	Discharge from construction of South Portal	Water discharged into the western ditch from the South Portal construction compound would be treated to the standard specified within the discharge licence consent granted by the Environment Agency and released at greenfield runoff rates. The runoff collection and management system would be operated until full reinstatement of the compound area is complete. The water quality standards for the discharge into the western ditch will include (but not be limited to) the following parameters and would not exceed these values unless otherwise agreed by the Environment Agency as part of its discharge licence consents (such agreement not to be unreasonably withheld or delayed) which would be set following consultation with Natural England: Discharge rate of no more than 2ls ⁻¹ ; chemical composition of suspended solids less than or equal to 25mg/l; and pH between 6.56 and 9.86.	Compliance with EA discharge licence	Contractor	Construction	EMP2 - Requirement 4
Road Drainage and Water Environment	RDWE034	Operational drainage	To safeguard groundwater Water Framework Directive chemical status, infiltration basins fitted with treatment systems would be provided at the locations identified on the Environmental Masterplan. Proposed new infiltration basins serving smaller road drainage catchments at the A13 junction and south of the River Thames would have vortex grit separators. Those serving larger drainage catchments south of the River Thames would include lined sedimentation basins, vortex grit separators and penstock chambers. The two cascading infiltration basin systems, both located to the south of the River Thames as illustrated on the Environmental Masterplan, would incorporate sedimentation basins, areas of vegetated wetlands and penstock chambers. Where existing infiltration basins along the A2/M2 and at the M25 are to be retained and used by the Project, existing oil interceptors would be replaced with vortex grit separators	SoS approval for details of drainage system following consultation with the relevant planning authority	Contractor	Operation	Requirement 8

Topic	REAC ref no.	Issue	Commitment	Achievement criteria	Party responsible	Stage	Securing mechanism in DCO
			and a penstock chamber to allow isolation and clean-up of accidental spillages.				
Road Drainage and Water Environment	RDWE035	Operational drainage	Where the Project ties in with the existing A2/M2 and M25 highways, the existing drainage infrastructure would be enlarged to accommodate the discharge from catchments affected by the Project in accordance with current design guidance, with appropriate allowances for climate change as detailed in DMRB CG 501: Design of Highway Drainage Systems and in line with Lead Local Flood Authority requirements. Specifically, the enlargement of existing M25 drainage infrastructure affected by the Project, as illustrated on the Environmental Masterplan, would achieve a minimum reduction in existing runoff rates of 50% by providing additional storage capacity. New drainage infrastructure, illustrated on the Environmental Masterplan, would serve the remainder of the Project and would provide storage to achieve discharges to surface watercourses at greenfield rates.	SoS approval for details of drainage system following consultation with the relevant planning authority	Contractor	Operation	Requirement 8
	RDWE036		NOT USED				

Topic	REAC ref no.	Issue	Commitment	Achievement criteria	Party responsible	Stage	Securing mechanism in DCO
Road Drainage and Water Environment	RDWE037	Mitigating effects of construction in the floodplain	Compensatory flood storage would be provided to offset the volume of floodplain storage lost to the Project, and to retain water in upland catchments. The compensatory storage would be formed and expanded in stages during construction of the Project. The compensatory storage may be used to offset any temporary loss of floodplain storage provided that the compensatory flood storage provisions always offset the total volume of lost floodplain storage.	Compliance with EA Flood Risk Activity Permit	Contractor	Construction	EMP2 - Requirement 4
Road Drainage and Water Environment	RDWE038	Avoiding impacts on Cranham Marsh Local Nature Reserve	Habitat survey data have identified discrete pockets of vegetation which is typically groundwater dependent at Cranham Marsh Local Nature Reserve (LNR). During detailed design, having regard for ground investigation (GI) data, measures to reduce groundwater drawdown beyond the M25 cutting, comprising either the extension of retaining walls or other seepage control systems, would be confirmed. If confirmed to be necessary, the detail of such measures will be agreed in consultation with London Borough of Havering and the Environment Agency and implemented as needed to protect groundwater dependent habitat at the LNR.	No detriment to groundwater supply at Cranham Marsh LNR	Contractor	Construction	EMP2 - Requirement 4
Road Drainage and Water Environment	RDWE039	Flood bund at Orsett Fen	A flood bund would be provided to ensure that flood risk outside of land to be retained by Highways England is not increased as a result of the Project. The bund would be located in Orsett Fen, to the west of the route alignment.	SoS approval for details of drainage system following consultation with the relevant planning authority	Contractor	Operation	Requirement 8
Road Drainage and Water Environment	RDWE040	Maintaining floodplain flow connectivity	A flood relief channel would be provided to maintain floodplain connectivity and prevent embankments forming continuous barriers to floodplain flow conveyance. The channel would be formed immediately to the west of the Mardyke at the point it crosses under the proposed viaduct.	SoS approval for details of drainage system following consultation with the relevant planning authority	Contractor	Operation	Requirement 8
Road Drainage and Water Environment	RDWE041	Avoiding scour protection works in River Thames	The main tunnels would be constructed so that the crown of the tunnel is at sufficient depth below the bed of the River Thames to avoid the need for any works within the river to provide tunnel scour protection.	No works within the River Thames channel to provide tunnel scour protection	Contractor	Construction	EMP2 - Requirement 4

Topic	REAC ref no.	Issue	Commitment	Achievement criteria	Party responsible	Stage	Securing mechanism in DCO
	RDWE042		NOT USED				
Road Drainage and Water Environment	RDWE043	Managing construction drainage	In order not to compromise their function, existing drainage attenuation features (ponds and infiltration basins) on the A2/M2 and M25 highways affected by the Project, as illustrated on the Environmental Masterplan, would not be used to receive construction work site runoff over and above runoff from the existing drained area.	Use of construction site drainage systems, which do not use the existing drainage attenuation features on the A2/M2 and M25 highways.	Contractor	Construction	EMP2 - Requirement 4
Road Drainage and Water Environment	RDWE044	Mammal passages in culverts	To ensure continued mammal passage, mammal ledges and underpasses at locations identified in the Environmental Masterplan would be designed to be set above flood levels at a 1 in 100 year (1% annual probability) flood event, while maintaining 600mm headroom from the top of the mammal ledge to the soffit of the culvert. Following Essex County Council's (2012) Culvert Policy and the Environment Agency Fluvial Design Guide – Chapter 8.6 'Culverting of watercourses' (2019), ledges would be at least 500mm wide and accessible from bank ramps.	Implementation of commitment actions	Contractor	Construction	EMP2 - Requirement 4
Terrestrial Biodiversity	TB001	Hedgerow replacement	Hedgerow habitat lost during construction would be compensated by creating new hedgerows at locations shown on the Environmental Masterplan, using native species of local provenance. Planting would be undertaken as early in the construction programme as reasonably practicable, having regard for the completion of potentially damaging construction activities within and adjacent to the planting area, and seasonal requirements for planting.	Successful establishment of new hedgerow.	Contractor	Construction	LEMP - Requirement 5
Terrestrial Biodiversity	TB002	Maintaining integrity of important habitats adjacent to works	Temporary fencing would be used to demarcate important and protected habitats, preventing construction access to protect them from accidental damage. Important and protected habitats include ecological translocation sites, and retained woodland, trees and hedgerows shown on the Environmental Masterplan. Fencing would be installed under the supervision of the Environmental Clerk of Works and in	Successful retention of important habitats.	Contractor	Construction	EMP2 - Requirement 4

Topic	REAC ref no.	Issue	Commitment	Achievement criteria	Party responsible	Stage	Securing mechanism in DCO
			accordance with good practice guidance such as BS 5837:2012 Trees in relation to design, demolition and construction.				
Terrestrial Biodiversity	TB003	Maintaining integrity of important habitats adjacent to works	Work compounds, access tracks, haulage routes, material storage areas, generators and other construction activities would not be located within areas of retained vegetation shown on the Environmental Masterplan.	Implementation of commitment actions.	Contractor	Construction	EMP2 - Requirement 4
Terrestrial Biodiversity	TB004	Breeding birds	Disturbance, and incidental mortality, of breeding birds would be avoided by timing vegetation clearance and structure removal outside of the bird nesting season (March to August inclusive) wherever possible. Where this is not possible, appropriate measures would be taken to avoid harming birds or their nests (such as temporary fencing around nesting sites where they are immediately adjacent to construction works), under supervision by a suitably experienced Environmental Clerk of Works.	Compliance with the Wildlife and Countryside Act 1981 (as amended).	Contractor	Construction	EMP2 - Requirement 4
Terrestrial Biodiversity	TB005	Invasive species	Invasive species would be identified prior to construction and would be removed or treated to prevent their spread, following the Construction Industry Research and Information Association's (CIRIA) guidance in Wade et al. (Invasive Species Management for Infrastructure Managers and the Construction Industry, 2008)	Implementation of commitment actions.	Contractor	Construction	EMP2 - Requirement 4
Terrestrial Biodiversity	TB006	Environmental Clerk of Works	Employment of suitably qualified and experienced Environmental Clerks of Works (ECoW) throughout the construction phase of the project to supervise implementation of environmental mitigation and protection commitments.	Acceptance by Highways England of the ECoW nominated by the Contractor.	Contractor	Construction	EMP2 - Requirement 4
Terrestrial Biodiversity	TB007	Habitat management	Retained and new habitats would be managed having regard for Natural England's The Mosaic Approach: Managing Habitats for Species (2013) to improve both priority habitats and species.	Implementation of procedures for long term management of habitat created under the landscaping scheme	Highways England	Operation	EMP3 - Requirement 4

Topic	REAC ref no.	Issue	Commitment	Achievement criteria	Party responsible	Stage	Securing mechanism in DCO
Terrestrial Biodiversity	TB008	Badger setts	Badger setts identified within the Order Limits for closure would be closed by permanently excluding badgers and then removing the empty setts. The setts would be closed under licence from Natural England outside of the badger breeding season (breeding season takes place between 1 December and 30 June). For any main setts that will be closed with no suitable naturally occurring alternative sett, an artificial sett will be constructed in a suitable location.	Compliance with requirements of Natural England licences.	Contractor	Construction	EMP2 - Requirement 4
Terrestrial Biodiversity	TB009	Bat roosts	Bat roosts that would be lost or heavily disturbed due to construction or operational activities would be removed under licence and alternative roosting structures would be provided in areas indicated on the Environmental Masterplan.	Compliance with requirements of Natural England licences.	Contractor	Construction	EMP2 - Requirement 4
Terrestrial Biodiversity	TB010	Barn owl breeding sites (direct loss)	Barn owl breeding sites that would be lost due to construction would be removed while not in active use. Alternative breeding sites (nest boxes) would be provided >1.5km away from the Project boundary and other major roads, within an appropriate setting and in compliance with Barn Owl Trust advice (2015). As agreed with the Essex Wildlife Trust (EWT), a minimum of 12 artificial nest boxes would be installed in land managed by them. This would provide a replacement ratio two boxes for one lost site; the final number of boxes required would be informed by pre-construction surveys.	Provision of Barn owl breeding sites	Contractor	Construction	EMP2 - Requirement 4
Terrestrial Biodiversity	TB011	Barn owl breeding sites (disturbance)	Barn owl breeding sites which would not require closure, but that may be subject to disturbance due to proximity to works would be screened by acoustic fencing to prevent disturbance during the breeding season under the supervision of the Environmental Clerk of Works.	Implementation of commitment actions in accordance with Natural England guidance.	Contractor	Construction	EMP2 - Requirement 4
Terrestrial Biodiversity	TB012	Breeding birds (temporary loss of nesting habitat)	Bird nest boxes would be provided within areas of retained woodland and trees shown on the Environmental Masterplan to supplement the habitat creation by offsetting the loss of nesting opportunities whilst newly created habitats establish. A ratio of 10 assorted small nest boxes and one medium open fronted nest box per hectare of lost woodland/scrub would be adopted in accordance with BTO Field Guide No. 23, where it is reasonably practicable to erect this number of nest boxes. For hedgerows, a ratio of 10 assorted small nest boxes per kilometre of hedgerow would be adopted, where it is reasonably practicable to erect these	Implementation of commitment actions in accordance with BTO guidance.	Contractor	Construction	EMP2 - Requirement 4

Topic	REAC ref no.	Issue	Commitment	Achievement criteria	Party responsible	Stage	Securing mechanism in DCO
			numbers within retained vegetation. The measures would be implemented under the supervision of the Environmental Clerk of Works.				
Terrestrial Biodiversity	TB013	Displacement of protected/notable species	Where habitats that are known or assumed to support protected or notable species, clearance would take place in a phased, directional manner towards areas of contiguous retained habitat. This would encourage mobile species to actively move from the construction site into the wider landscape. These measures would be implemented under the supervision of the Environmental Clerk of Works.	Compliance with requirements of Natural England licences.	Contractor	Construction	EMP2 - Requirement 4
Terrestrial Biodiversity	TB014	Natural England licences	All required Natural England licences and associated working practices and method statements would be in place prior to any related construction works starting in areas where licensable species occur.	Compliance with requirements of Natural England licences.	Contractor	Construction	EMP2 - Requirement 4
Terrestrial Biodiversity	TB015	Monitoring of pre-existing protected species and important habitats	Monitoring of protected species during and post-construction would be in line with the requirements of the protected species mitigation licence.	Compliance with requirements of Natural England licences.	Contractor	Construction	EMP2 - Requirement 4
Terrestrial Biodiversity	TB016	Translocation of protected species	Where the approach to habitat clearance referred to in REAC ref. TB013 is not considered appropriate to avoid potential mortality of protected species, a programme of trapping and translocation would occur to move animals away from the construction site and to established receptor sites with sufficient carrying capacity prior to habitat clearance occurring. Species or groups which may be subject to trapping and translocation are GCN (and all other native amphibian species found during this process), water voles and dormice.	Compliance with requirements of Natural England licences.	Contractor	Construction	EMP2 - Requirement 4
Terrestrial Biodiversity	TB017	Translocation of notable species	Where protected species licences are not required, the approach to habitat clearance and the potential need to trap and translocate non-licensable species (reptiles and/or native amphibians species excluding GCN) to established receptor sites with sufficient carrying capacity would be determined and undertaken by the Environmental Clerk of Works.	Implementation of commitment actions	Contractor	Construction	EMP2 - Requirement 4

Topic	REAC ref no.	Issue	Commitment	Achievement criteria	Party responsible	Stage	Securing mechanism in DCO
Terrestrial Biodiversity	TB018	Translocation of habitat features of value to protected/notable species	Habitat features of value to protected species that can themselves be moved to mitigation areas/receptor sites (for example dead-wood features for terrestrial invertebrates, and refugia for amphibians and reptiles) would be translocated where appropriate, to be determined by the Environmental Clerk of Works.	Implementation of commitment actions	Contractor	Construction	EMP2 - Requirement 4
Terrestrial Biodiversity	TB019	Translocation of acid grassland	An area (approximately one hectare) of priority Biodiversity Action Plan acid grassland in Low Street Pit would be translocated to a receptor site. The receptor site is an area of grassland located between the sea wall and the Parish Church of St. Catherine (centred on Grid Reference TQ 69011 77146), approximately 100m to the north of Coalhouse Fort. This would be achieved by removing turf from the acid grassland and replanting it on the receptor site shown on the Environmental Masterplan.	Successful re-establishment of acid grassland at the donor site within 24 months of planting	Contractor	Construction	EMP2 - Requirement 4
Terrestrial Biodiversity	TB020	Translocation of important lichens	Where important lichen species, <i>Usnea</i> cf. <i>esparantiana</i> , present within woodland south-west of the M25 junction 29, and <i>Physconia</i> the landowner, unless otherwise agreed by the Secretary of State.	Plot reinstated with habitat enhancements to satisfaction of landowner.	Contractor	Construction	EMP2 - Requirement 4
	TB023		NOT USED				
	TB024		NOT USED				
	TB025		NOT USED				
	TB026		NOT USED				
Terrestrial Biodiversity	TB027	Construction of replacement air raid bunker	An air raid bunker within Shorne Woods containing a hibernation bat roost would be lost as a result of the Project. A replica bunker would be constructed, prior to demolition of the existing structure, within land between Shorne Wood and Great Crabbles Wood at a location to be agreed with Natural England. The bunker would be constructed from brick with block work covering, designed to provide similar internal temperatures and humidity levels to the existing air raid bunker. Internally there would be additional brick work timber boarding approximately 150 x 75mm in size, on angles within the bunker allowing access behind them for bats. There would be 20 bat bricks installed in the internal walls.	Construction of bunker to meet design specifications and to provide similar internal temperature/humidity levels to existing air raid bunker.	Contractor	Construction	EMP2 - Requirement 4

Topic	REAC ref no.	Issue	Commitment	Achievement criteria	Party responsible	Stage	Securing mechanism in DCO
Terrestrial Biodiversity	TB028	Ancient Woodland Soil Translocation	Areas identified on the Environmental Masterplan for compensatory ancient woodland planting to offset the loss of ancient woodland would be inoculated, where reasonably practicable, with soils from ancient woodland sites within Order Limits that would be disturbed by construction activity. The suitability of the soil from the donor sites would be determined by a soil scientist prior to commencement of works in those areas, with consideration for existing ground flora composition and diversity and potential contamination. The soils would be translocated in advance of construction activities commencing at the donor sites, avoiding weather constraints e.g. heavy rainfall; timing conflicts with protected species licensing activities (e.g. capture and translocation of dormice); and only once any essential mitigation required for buried archaeology identified within the receptor sites has been completed. Soils would typically be stripped to approximately 300mm, disturbing the soil structure as little as reasonably practicable and carefully placed within the pre-prepared adjacent receptor sites, following guidance from CIRIA within Habitat Translocation - A Best Practice Guide (C600).	Evidence of establishment of typical ancient woodland ground flora indicator species within 60 months of soil translocation and tree planting in compensatory area.	Contractor	Construction	EMP2 - Requirement 4

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Highways England Complaints Procedure

<https://highwaysengland.co.uk/about-us/complaints-procedure/>

Glossary

Term	Explanation
AONB	Area of Outstanding Natural Beauty: Statutory designation intended to conserve and enhance the ecology, natural heritage and landscape value of an area of countryside.
BS 5489	British Standard for the Design of Road Lighting
CaPS	Consents and Agreements Position Statement
CA05	Compound Area 5
CCS	Considerate Constructors Scheme
CCTV	Closed-Circuit Television
CEMP	Construction Environmental Management Plan
CEP	Communications and Engagement Plan
CES	Communications and Engagement Strategy
CLG	Community Liaison Group
CLOCS	Construction Logistics Community Safety
CoCP	Code of Construction Practice
DCO	Development Consent Order
DfT	Department for Transport
DMRB	Design Manual for Roads and Bridges: A comprehensive manual (comprising 15 volumes) which contains requirements, advice and other published documents relating to works on motorway and all-purpose trunk roads for which one of the Overseeing Organisations (Highways England, Transport Scotland, The Welsh Government or the Department for Regional Development (Northern Ireland)) is highway authority. The DMRB has been developed as a series of documents published by the Overseeing Organisations of England, Scotland, Wales and Northern Ireland. For the Lower Thames Crossing the Overseeing Organisation is Highways England.
EIA	Environmental Impact Assessment
EMP1	First iteration of the Environmental Management Plan as defined by the Design Manual for Roads and Bridges, LA 120.
EMP2	Second iteration of the Environmental Management Plan as defined by the Design Manual for Roads and Bridges, LA 120.
EMP3	Third iteration of the Environmental Management Plan as defined by the Design Manual for Roads and Bridges, LA 120.
EMS	Environmental Management System
ES	Environmental Statement

Term	Explanation
HEMP	Handover Environmental Management Plan
HRA	Habitats Regulations Assessment: A tool developed by the European Commission to help competent authorities (as defined in the Habitats Regulations) to carry out assessment to ensure that a project, plan or policy will not have an adverse effect on the integrity of any Natura 2000 or European sites (Special Areas of Conservation, Special Protection Areas and Ramsar sites), (either in isolation or in combination with other plans and projects), and to begin to identify appropriate mitigation strategies where such effects were identified.
HS1	High Speed 1 rail line (formerly Channel Tunnel Rail Link (CTRL))
ISO 9001:2015	International Organisation for Standardisation's standard for quality
ISO 14001:2015	International Organisation for Standardisation's standard for environment
ISO 45001:2018	International Organisation for Standardisation's standard for health and safety
JOF	Joint Operations Forum
LEMP	Landscape and Ecology Management Plan
LTC EMS	Lower Thames Crossing Environmental Management System
MCHW	Manual of Contracts Documents for Highways Works
NSIP	Nationally Significant Infrastructure Project: major infrastructure developments in England and Wales, such as proposals for power plants, large renewable energy projects, new airports and airport extensions, major road projects etc.
OEMP	Outline Environmental Management Plan
oLEMP	Outline Landscape and Ecology Management Plan
PRoW	Public Rights of Way
REAC	Register of Environmental Actions and Commitments
SMART	Specific, Measurable, Attainable, Realistic and Time-bound
SoS	Secretary of State
SPA	Special Protection Area: a designation under the European Union Directive on the Conservation of Wild Birds.
STEM	Science, Technology, Engineering and Maths
TBM	Tunnel boring machine
ToR	Terms of Reference
UXO	Unexploded Ordnance

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Lower Thames Crossing Design Principles

DATE: June 2021

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Lower Thames Crossing

Design Principles

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Covering Note

This document is a draft of one of a series of Control Documents that will form part of our planned DCO application. Following this consultation we will carefully consider your feedback as we finalise the documents for our planned submission of the DCO application for the Lower Thames Crossing later this year.

The Design Principles set out guidance that underpins the design measures that integrate the new road into the local landscape. This captures mitigation measures and establishes parameters that must be met in the final design of the road.

The following contains a draft copy of this document to provide an example of how mitigation and commitments would be secured within the DCO application when it is submitted.

The Design Principles reflect the changes to the design described in this consultation. Updates may be made to this document to reflect feedback received from stakeholders ahead of submitting the document as part of the DCO application.

As this is a draft control document, there will be references to the upcoming Development Consent Order (DCO). Any documents referenced that will form the DCO will be mentioned with a (REF TBC).

1 Introduction

1.1 Scope of this report

- 1.1.1 This report describes the Design Principles that underpin the design and integration of the A122 Lower Thames Crossing (the Project) into its context. They are written to capture the key principles (documented in the Project Design Report (REF TBC) that have shaped the design thus far, and to make a commitment that these will be maintained and developed in the future detailed design and delivery phases of the Project in accordance with National Policy Statement for National Networks (NPSNN) (Department for Transport, 2014) requirements for ‘good design’.
- 1.1.2 The Design Principles are very much a ‘forward-looking’ document whereas the Project Design Report is a ‘backwards-looking’ document illustrating the process whereby the Preliminary Design was achieved.
- 1.1.3 Clauses 4.28-4.35 of the NPSNN set out the criteria for ‘good design’ for national networks noting that design shall be an integral consideration from the outset. It states:
- ‘4.29 Visual appearance should be a key factor in considering the design of new infrastructure, as well as functionality, fitness for purpose, sustainability and cost. Applying “good design” to national network projects should therefore produce sustainable infrastructure sensitive to place, efficient in the use of natural resources and energy used in their construction, matched by an appearance that demonstrates good aesthetics as far as possible.’*
- 1.1.4 Highways England (the Applicant) has published The Road to Good Design (Highways England, 2018). This document provides a framework for the application of this requirement within the NPSNN, to the strategic road network.
- 1.1.5 For more information on how the Project has been developed to comply with the NPSNN criteria for good design please see the Accordance Table within the Planning Statement (REF TBC) and the Project Design Report (REF TBC).
- 1.1.6 Achieving compliance with the NPSNN requires a high level of coordination across design, engineering, and environmental specialisms as well as consultation with external stakeholders. The design principles apply to the Project’s permanent physical structures (including highways, tunnels and buildings) and landscape works; they do not apply to the temporary works, utilities diversions and/or methods of construction, nor do they describe in detail how the works will be operated and maintained.
- 1.1.7 The Design Principles are submitted for approval as part of the application for development consent. As such, the Design Principles are commitments that will be secured through the Development Consent Order (DCO) and is certified in Schedule 16. Requirement 3 of the DCO states:
- ‘The authorised development must be designed in detail and carried out in accordance with the design principles document and the preliminary scheme design shown on the engineering drawings and sections, and the general arrangement drawings, unless otherwise agreed in writing by the Secretary of State following consultation by the undertaker with the relevant planning*

authority on matters related to its functions, provided that the Secretary of State is satisfied that any amendments to those documents showing departures from the preliminary scheme design would not give rise to any materially new or materially different environmental effects in comparison with those reported in the environmental statement.'

- 1.1.8 The Design Principles are one of a suite of documents that capture the Project's design and environmental commitments. These documents include:
- a. The Environmental Statement (REF TBC), including:
 - i. The Environmental Masterplan (REF TBC) which defines the spatial layout of physical mitigation proposals.
 - ii. The Register of Environmental Actions and Commitments (REAC) which defines commitments on the processes that need to be used in the delivery, management, monitoring and maintenance of the works.
 - b. The Code of Construction Practice (CoCP) which covers commitments pertaining to the processes of construction only.
- 1.1.9 The principles reflect the commitments of the Applicant in relation to the Project and consider its clear and overriding need. They are intended to set out a unified approach to design and capture the collective knowledge of the Project team at the time of application for development consent. The design principles therefore create an overarching, shared resource which give clarity to stakeholders over the required design outcomes. They give more detail on design intent and objectives to be achieved, but still provide some flexibility for the detailed designs to be developed.
- 1.1.10 A project design narrative was produced for Supplementary Consultation, which describes the Project context and proposed possible approaches to be adopted throughout the design. The project design narrative broke the Project down into eight 'character areas'. Each character area was then divided into regional areas, which include the broad regional policies that inform the design and the overarching multi-discipline design development. Each regional area is further broken down into 'local' areas that describe the local context (e.g. local features and not the character, which is covered earlier). Each local area has a summary of the design constraints and opportunities.
- 1.1.11 The project design narrative was issued to statutory stakeholders as part of ongoing engagement in 2018. The feedback received was grouped together by area and similarity of issues raised. These were then used to develop the Project-wide Design Principles and also area-specific Design Principles as set out in Section 4 of this document.
- 1.1.12 The principles serve a number of functions:
- a. Along with the Environmental Masterplan (REF TBC), they capture the embedded mitigation that has informed the Environmental Statement.
 - b. They set a consistent set of parameters for the detailed design of the Project.
 - c. In discharging Requirement 3 of the DCO, the Applicant will need to demonstrate accordant with the Design Principles.

- d. In conjunction with the Project Design Report and Consultation Report the Design Principles illustrate how Highways England has responded to public consultation feedback in relation to design.
- e. They illustrate how the Applicant has taken account of the criteria for good design set out in the NPSNN (Department for Transport, 2014) in order to ensure that the development is as sustainable and as aesthetically sensitive, durable, adaptable and resilient as it can reasonably be.
- f. They capture the results of feedback from independent design reviews conducted by the Design Council on behalf of the Applicant.

1.1.13 This report is structured as follows:

- a. Section 2 outlines the high-level design objectives and vision for the Project. These are Highways England's overarching objectives for the design of permanent works.
- b. Section 3 sets out the Project-wide principles. However, they must be read in conjunction with the area-specific principles as they are not always appropriate to each character area. For example, lighting design principles do not apply where there is no lighting. A table at the beginning of each area section lists the generic principles that do not apply to that area.
- c. Section 4 details the area-specific commitments. These are contextual principles that are unique to each area or that elaborate on the Project-wide principles.

1.2 Project description

1.2.1 The A122 Lower Thames Crossing (the Project) would provide a connection between the A2 and M2 in Kent, east of Gravesend, crossing under the River Thames through a tunnel, before joining the M25 south of junction 29. The Project route is presented in Plate 1.1.

1.2.2 The A122 road would be approximately 23km long, 4.25km of which would be in tunnel. On the south side of the River Thames, the Project route would link the tunnel to the A2 and M2. On the north side, it would link to the A13 and junction 29 of the M25. The tunnel entrances would be located to the east of the village of Chalk on the south of the River Thames and to the west of East Tilbury on the north side.

1.2.3 Junctions are proposed at the following locations:

- a. New junction with the A2 to the south-east of Gravesend
- b. Modified junction with the A13/A1089 in Thurrock
- c. New junction with the M25 between junctions 29 and 30

1.2.4 The Project route would be three lanes in both directions, except for:

- a. link roads
- b. stretches of the carriageway through junctions
- c. the southbound carriageway from the M25 to the junction with the A13/A1089, which would be two lanes

- 1.2.5 In common with other A-roads, the A122 would operate with no hard shoulder but would feature a 1m hard strip on either side of the carriageway. It would also feature technology including stopped vehicle and incident detection, lane control, variable speed limits and electronic signage and signalling. Our A122 road design outside of the tunnel includes emergency areas spaced at intervals between 800 metres and 1.6km (less than one mile). The tunnel would include a range of enhanced systems and response measures instead of emergency areas.
- 1.2.6 The A122 would be classified as an ‘all-purpose trunk road’ with green signs. For the benefit of safety, walkers, cyclists, horse-riders and slow-moving vehicles would be prohibited from using it.

Junction modifications

- 1.2.7 Widening works would be required to both the M25 at the northern limits of the route and on the A2 at the southern end, to manage the traffic volumes. The existing A13/A1089 junction would also require modifications to connect to the Project route.

Vertical alignment

- 1.2.8 The new A122 road would be at varying heights along the route, with approximately 80% in a cutting, false cutting or tunnel. The A2 would remain at its current level, with the junction between the A2 and the A122 road requiring some link roads at ground level, on embankments and structures such as bridges. As it approaches the southern tunnel entrance, the A122 road would be at ground level before descending into a deep cutting. To the north, the A122 road would be lowered as much as practicable to reduce its impact on the landscape. Where the road crosses the Tilbury floodplain, railway lines, and the Mardyke floodplain, it would be elevated.

Side roads

- 1.2.9 The Project would include adjustment to a number of side roads. Most existing side roads affected by the Project route would be reconnected or designed to provide alternative provision. In most locations, the affected side roads would cross over the Project route.

Tunnel

- 1.2.10 It is currently proposed that two tunnel boring machines (TBMs) would be used to construct the tunnel, one for each bore.
- 1.2.11 Emergency access and vehicle turn-around facilities would be provided at the tunnel entrances. Cross-passages providing a connection between the two bores would be provided for emergency incident response and tunnel user evacuation. Tunnel portal structures would accommodate service buildings for control operations, mechanical and electrical equipment, drainage and maintenance operations.

Highway structures

- 1.2.12 Approximately 60 new structures would be required, including road bridges, underpasses, green bridges and footbridges. In addition, widening and other modification of existing structures would be required.

Highway drainage

- 1.2.13 South of the River Thames, drainage systems would discharge to soakaways. North of the river, drainage systems would generally be piped systems, discharging through outfalls into watercourses.

Safety and security

- 1.2.14 The Project route would include the following:
- a. Modern safety measures and construction standards with technology to manage traffic and provide better information to drivers
 - b. Variable Message Signs to display variable speed limits, travel information, hazard warnings and both advisory and mandatory signage to drivers
 - c. CCTV cameras and detection equipment to monitor and manage network usage, for alerting and investigating incidents (e.g. stopped vehicles); for maintenance and asset protection; and for detection of crime
 - d. Above-ground traffic detection to control automatic traffic management systems (e.g. variable speed limits) and to collect data on traffic flows
 - e. Free-flow road user charging infrastructure
 - f. Equipment within the tunnel to monitor and control the tunnel environment during normal and emergency operations

Road User charging

- 1.2.15 In December 2014, the Government stated in the National Policy Statement for National Networks (NPSNN) (Department for Transport, 2014) that the '*Government will consider tolling as a means of funding new road capacity on the SRN. River and estuarial crossings will normally be funded by tolls or road user charges*'.
- 1.2.16 To align with NPSNN policy and to help the Project meet the Scheme Objectives, it is proposed that road user charges would be levied. Vehicles would be charged for using the new tunnel.

Walkers, cyclists and horse riders

- 1.2.17 Walkers, cyclists and horse-riders, as well as slow-moving vehicles, would be prohibited from using the A122 road. Where the Project affects existing Public Rights of Way, these would be reinstated with provision of under- or overbridges, or a suitable alternative provision would be made. The Project proposes a number of new, diverted, upgraded and reinstated routes for walkers, cyclists and horse riders.

Environmental design

- 1.2.18 The Project has been developed to avoid or minimise significant effects on the environment, and during the design process further measures have been incorporated into the Project to mitigate adverse impacts that would arise and that cannot be avoided. Some of the measures adopted include landscaping, noise mitigation measures, and the provision of green infrastructure along the Project route including a number of green bridges. The Project would create a number of new areas of ecological habitat, providing mitigation or compensation for the impacts on existing areas. Two new parks would be created including Tilbury Fields to the west of the northern tunnel entrance, and Chalk Park, to the south of the River Thames.

Construction compounds and utility logistics hubs

- 1.2.19 While the Project is being built, construction compounds would be located along the Project route. Larger compounds would be required at the northern and southern tunnel entrances to allow for tunnelling operations and materials management. Utility logistics hubs would be needed for specific utility works.

Haulage routes and construction traffic management

- 1.2.20 Where there is no direct access from the strategic road network, suitable local roads would initially be used to access and establish construction compounds. Traffic management measures would be used to control the impacts of construction on the local and strategic road network.
- 1.2.21 Haul roads designed for heavy or bulk transfer of materials would be constructed alongside the Project route and connect to the existing strategic road network to minimise construction impacts on the local road network where practicable.

Services and utility installations and diversions

- 1.2.22 To accommodate the construction and operation of the Lower Thames Crossing, it will be necessary to install and divert multiple utilities which would otherwise be affected by the Project route. This would involve the installation and diversion of overhead high voltage electricity transmission and distribution lines, high-pressure gas mains and other utilities and associated infrastructure including cabinets, substations and maintenance compounds.

Land required

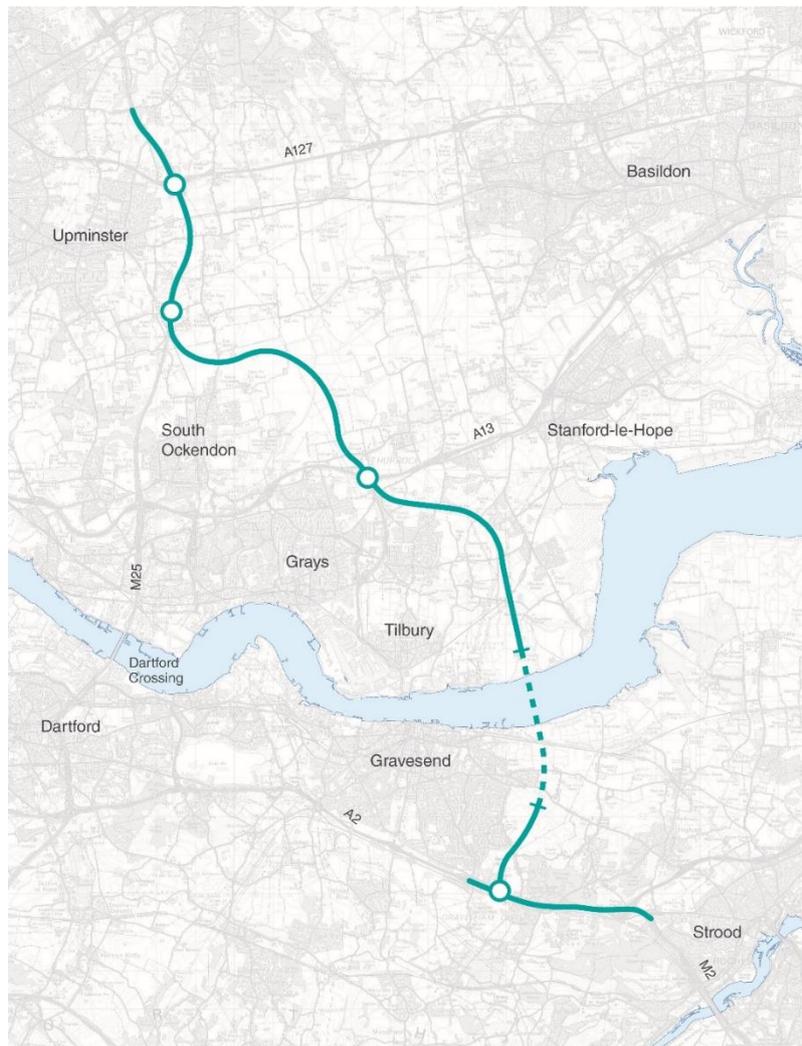
- 1.2.23 The Project would require land on a permanent basis for the road and tunnel, along with other operational infrastructure, and ecological mitigation and compensation. On a temporary basis, land would be required for construction compounds, logistics areas and other construction activities. The utility installations and diversions, some environmental mitigation and flood compensation requirements would require land to be taken on a temporary basis, and for permanent rights to be acquired for the operation and maintenance of any utility infrastructure, and to secure the environmental mitigation and flood compensation.

- 1.2.24 The Project also requires both permanent acquisition and temporary use of areas of special category land, which includes common land and public open space. Replacement land would be provided for some of this special category land. In other cases, in accordance with the Planning Act 2008, replacement land has not been included, for example because the use of this land would be temporary, or because it is only proposed to install and divert utilities through the land. This means that its previous use can continue once the works are finished.
- 1.2.25 Consultation with relevant landowners, occupiers and agents remains an ongoing focus through the development of the Project. Compensation for affected parties follows the statutory Compensation Code.

Operations and maintenance

- 1.2.26 Following completion, the A122 road would be part of the strategic road network.
- 1.2.27 To carry out inspection, certain specified maintenance activities in the tunnel and periodic emergency exercises, a periodic full closure of the relevant bore(s) would be required. These would be planned to minimise disruption, and where feasible lane closures would be used instead.

Plate 1.1 Lower Thames Crossing route



1.3 Scheme Objectives

- 1.3.1 The Applicant has worked with the Department for Transport (DfT) to agree the following objectives that the Lower Thames Crossing should achieve:
- a. To support sustainable local development and regional economic growth in the medium to long term.
 - b. To be affordable to government and users.
 - c. To achieve value for money.
 - d. To minimise adverse impacts on health and the environment.
 - e. To relieve the congested Dartford Crossing and approach roads, and improve their performance by providing free-flowing, north-south capacity.
 - f. To improve resilience of the Thames crossings and the major road network.
 - g. To improve safety.
- 1.3.2 As well as the Scheme Objectives above, the Lower Thames Crossing is being developed in line with the NPSNN, which sets out government policies for Nationally Significant Infrastructure Projects (NSIPs) for England (also refer to

the Planning Statement (REF TBC). As the Project includes both gas pipeline and overhead line NSIPs, the Overarching National Policy Statement for Energy (EN-1), National Policy Statement for Gas Supply Infrastructure and Gas and Oil Pipelines (EN-4), and National Policy Statement for Electricity Networks Infrastructure (EN-5) are being considered. This is defined further with the Planning Statement (REF TBC).

2 Overarching design vision

2.1 Vision

2.1.1 The Project is part of the biggest investment in the country's road network for a generation and an essential component in the UK's future transport infrastructure. It will boost local, regional and national economies, while offering new connections, better journeys and fewer delays.

2.1.2 The Scheme Objectives are listed in Section 1.3, above.

2.1.3 There are several ways that the design and integration of the road can contribute to achieving the Scheme Objectives. The section below sets out the overarching tenets of the Road to Good Design (Highways England, 2018), and how the Project engages those tenets:

- a. *'Connecting people: People are at the heart of our design work, making good roads safe and useful, inclusive and understandable. Good road design reflects users' needs, engages with communities and works intuitively for all'.*
 - i. Its scale means that the Project will be experienced by large numbers of people in many different ways, including people travelling along the route, those living in the towns and villages close to it, those who make recreational use of the landscape through which it passes, and those who will be employed in its operation. It has been, and will continue to be, designed to respond to the needs of each of these groups.
 - ii. To serve its strategic transport objectives, the Project has been designed, and will continue to be designed, and built to make the operation, management and maintenance as easy as reasonably practicable and meet safety targets in order to achieve Highways England's 2041 strategic goals on safety. It will be designed to be resilient to flood risk and climate change and be robust, attractive and durable.
 - iii. The Project interacts with many Public Rights of Way (PRoW) and is designed to minimise severance within the existing PRoW network. Furthermore, the Project shall enhance the existing network by forming new connections to encourage active travel within areas local to the route.
- g. *'Connecting places: Good road design demands a deep understanding and response to place, to create a quality aesthetic experience for the user and wider community. This is restrained and environmentally sustainable design, in fitting with the context'.*

- i. The majority of the Project sits within the green belt, as well as within some landscapes of exceptional value and variety. Therefore, it shall be as green and sympathetic (forming a positive response) to its context as reasonably practicable. Tailoring the design of the road and new landscape works to their context will make it fit more harmoniously within it. The design of all architectural elements, such as overbridges, portals and operational buildings, shall reflect the nature of their character area, while being recognisable as part of the wider Project.
 - ii. A common design language announces the Project to users. For all the different people using and impacted by the Project, the route will be characterised with enhanced structures and landscaping through the varied landscape, made coherent by an underlying narrative which draws from its context and function. This is through enhancement to structures at Thames Chase and Thong Lane to celebrate arrival onto the Project. In addition, the River Thames and the two portal thresholds in the north and south will form a key threshold. The design will be enhanced to differentiate and draw attention to these key moments of transition and threshold that emphasise the response to landscape to give people a sense of location on the Project. Enabling road users to experience this range of landscapes will help them to enjoy their journey.
- h. 'Connecting processes: A successful outcome focused on people and places requires good design processes. These are collaborative, thorough and innovative, generating long-lasting outcomes that are of benefit to users and the wider community'.*
- i. The Project strives and will continue to strive, for the best approach to integrated design. Among other things, this means working collaboratively to design elements of the Project that address multiple functional requirements. Design measures shall meet a variety of compatible environmental needs and be embedded into the engineering design wherever reasonably practicable. Engineering proposals will be developed to consider opportunities to enhance rather than detract from the local environment.

3 Project-wide design principles

3.1 Introduction

- 3.1.1 The Project-wide design principles have been broken down against the tenets laid out in the Road to good design (Highways England, 2018)¹: Connecting people, Connecting places and Connecting processes. After this, there are also separate sections specific to discipline/type of asset for structures, lighting, signage and technology, and landscape.

3.2 Connecting people

- 3.2.1 *‘People are at the heart of our design work, making good roads safe and useful, inclusive and understandable. Good road design reflects users’ needs, engages with communities and works intuitively for all’.*

Terminology

- 3.2.2 Various acronyms exist across policy and guidance documents to describe those who travel without some type of car, van/lorry, or motorbike. Historically, the most common is NMU (for ‘Non-Motorised User’) but other terms are in circulation also; WCH for ‘walking, cycling and horse riding’ is sometimes used within the Design Manual for Roads and Bridges (DMRB) (Highways England, 2019), as is the term PCE for ‘Pedestrians Cyclists and Equestrians’. WCH has been chosen for this document as it is the term most frequently used within DMRB, however, the other terms may be used interchangeably across the broader application.
- 3.2.3 The principles in Table 3.1 apply to all areas unless stated otherwise.

¹ https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/672822/Good_road_design_Jan_18.pdf

Table 3.1 Project-wide design principles: Connecting people

Reference	Design principle name	Design principle
PEO.01	Walking, Cycling and Horse Riding (WCH)	All Public Rights of Way (PRoWs) crossing the Project route shall have a detailed design that is safe and considers the convenience of the users and appropriateness to the context of the adjacent landscape character, with changes in level minimised.
PEO.02	WCH user experience	In order to allow users to recognise and appreciate their whereabouts, WCH routes across and adjacent the Project within the Order Limits shall include appropriate clear and informative signage to provide wayfinding for the users.
PEO.03	WCH detailed design	Surfacing, signage, boundary treatments and access controls shall be designed with the intent of being efficient and integrated, appropriate to the type of usage permitted and appropriate to its surrounding context as much as is reasonably practicable.
PEO.04	Not used	-
PEO.05	WCH hubs	Certain points of access into the PRoW network shall be designated as WCH hubs. Facilities that make the PRoWs accessible and visible shall be provided here, such as suitable wayfinding, placemaking/design features and where appropriate facilities such as seating and parking for WCH users wishing to access the network.
PEO.06	WCH: accessibility	To improve access to the existing PRoW network and for travel and outdoor recreation, the design of new WCH routes shall maximise access for users (including those with limited mobility) through good design while considering and mitigating the potential impacts from misuse and anti-social behaviour associated with unauthorised vehicles.
PEO.07	WCH: heritage interpretation	To identify and document local heritage and connection to the landscape, the Project during the detailed design phase shall consider and implement an approach for signage and wayfinding for the PRoW network that includes interpretation of relevant historic features in and of the landscape and their role in the development of that place/area.
PEO.08	Not used	-

Reference	Design principle name	Design principle
PEO.09	WCHs south of the Thames	The Project shall provide and enable recreational looping routes around the new junction and the South Portal, linking with routes between Shorne Woods Country Park, Ashenbank Wood and Jeskyns Community Woodland, and linked with existing routes from Gravesend illustrated on Section 2 Sheet 5 and 6 of Figure 2.4 of The Environmental Masterplan (REF TBC). These new routes shall also compensate for the loss of direct routes through what shall become a junction/portal. These shall intersect at Thong Lane over Lower Thames Crossing Overbridge.
PEO.10	WCHs north of the Thames: recreational loop	To support local strategies to improve access to and enjoyment of the PRow network, such as Thurrock Greengrid, Thames Chase Forest Circle (loop) and Mardyke River link, the Project shall enable recreation loops for pedestrians, cyclists and equestrians through sections 11-14 (A13 junction, Ockendon link and M25 junctions). This shall be achieved by improving existing PRowS and forming new connections between existing PRowS within the Order Limits (REF TBC) This is in order to create a cohesive network of paths that help increase access to green space and promote active travel for local residents. By making use of these and other connections, it shall provide a north-south link enabling travel from Thames Chase Forest Centre through to Orsett Showground, across the A13 at Rectory Road, through to Muckingford Road where users can connect to Coalhouse Fort using the existing PRow network.
PEO.11	WCHs north of the Thames: east-west connectivity	The Project shall address access to employment, education and services where distances are suitable for travel by foot or cycle. Specifically, shared tracks, segregated from the carriageway, shall be provided to promote east-west inter-urban connectivity along Muckingford Road, and the existing shared use tracks alongside Stifford Clays Road and the A1013 shall be improved.
PEO.12	Not used	-
PEO.13	Not used	-

3.3 Connecting places

- 3.3.1 'Good road design demands a deep understanding and response to place, to create a quality aesthetic experience for the user and wider community. This is sustainable design, which is unobtrusive and environmentally fitting within its context.' (Highways England, 2018).
- 3.3.2 The principles in Table 3.2 apply to all areas unless stated otherwise.

Table 3.2 Project-wide design principles: Connecting places

Clause no.	Design principle name	Design principle
PLA.01	Smarter design	Architecture, landscape and engineering design shall be efficient in its use of resources and multifunctional wherever reasonably practicable. For example, gantries will be designed to accommodate multiple functions including signage and automatic number plate recognition cameras.
PLA.02	Highways environment	To avoid visual clutter, the amount of roadside furniture and signage shall be reduced (or combined) as far as reasonably practicable (including any necessary departures from Highways England standards), while promoting safety requirements/targets through its location, mounting and lighting.
PLA.03	Common design language	The design shall be developed according to a common design language, which shall be locally differentiated where appropriate to respond to its context, with the common design language adapted/developed for specific structures (e.g. portals) where appropriate.
PLA.05	Habitat connectivity	Design proposals shall prioritise improving connectivity between existing habitats wherever reasonably practicable, as defined within the Environmental Masterplan (REF TBC). Fragmentation of habitats shall be reduced as far as reasonably practicable by avoiding unnecessary barriers to movement and, where necessary, including design features which allow safe passage of animals, and colonisation by plants to enhance biodiversity.

3.4 Connecting processes

3.4.1 ‘A successful outcome focused on people and places requires good design processes. These are collaborative, thorough and innovative, generating long-lasting outcomes that are of benefit to users and the wider community’ (Highways England, 2018).

3.4.2 The principles in Table 3.3 apply to all areas unless stated otherwise:

Table 3.3 Project-wide design principles: Connecting processes

Clause no.	Design principle name	Design principle
PRO.01	Design review	The Project will engage with the Highways England Design Review Panel (HEDRP) on the development of the detailed design. The design proposals shall be developed with regard to comments raised by the HEDRP.
PRO.02	Integrated design	The detailed design shall be developed through a multi-disciplinary collaborative design process such that all features of the highway, maintenance access, its integration with the surroundings, and environmental mitigation are coordinated as a cohesive project. For example, access tracks shall be multiple use (for Statutory Undertakers’ access to utilities, WCHs, highway maintenance and farm access tracks) wherever reasonably practicable.
PRO.03	Carbon reduction	All design proposals shall be developed in accordance with Publicly Available Specification (PAS 2080): Carbon Management in Infrastructure, to support the Project’s aim of achieving a reduction in carbon emissions compared to the figure calculated in the Project’s carbon baseline (REF TBC). Low-carbon materials, energy supply and construction processes (e.g. Design for Manufacture and Assembly (DfMA)) shall be specified wherever reasonably practicable and economic within the Project life cycle.
PRO.04	Biodiversity net gain	The detailed design of structures, buildings and landscape shall be developed with the goal of maximising biodiversity value where reasonably practicable, within the constraints of the DCO.

3.5 Structures

3.5.1 This section relates to specific requirements for bridges and portals across this Project. Though it references Project Enhanced Structures it does not supersede the requirements of the DMRB for careful consideration in the design and appearance of all structures:

‘Aesthetic impact is not limited to higher profile, landmark structures that stand out as a result of their scale, location or role within their local cultural vernacular, but also to structures that are regarded as commonplace, widespread and therefore highly visible elements within the highway network’ (Highways England, 2020).

3.5.2 The principles in Table 3.4 apply to all areas unless stated otherwise:

Table 3.4 Project-wide design principles: Structures

Clause no.	Design principle name	Design principle
STR.01	General structures	The design is to be led by the existing landscape, incorporating, and integrating the structures and buildings, so they appear as fully and seamlessly integrated components within the landscape. Therefore, the Project shall aim to achieve high-quality structures along the Project route, incorporating Design for Manufacture and Assembly (e.g. prefabricated components) and integration of architecture and structural designs. The goal of the design shall be to have structures that are not overbearing or obtrusive in the landscape, thereby reducing impact on the local character and environment.
STR.02	Project Enhanced Structures: Portal design	The design of Project Enhanced Structures shall be coherent and distinctive with a recognisable design language and consistent material palette. It shall be developed to reflect the nature of their context and integrated positively with the landscape works. Specifically, this design principle shall apply to the following structures: <ul style="list-style-type: none"> • The South Portal including ramp and tunnel approach retaining walls, the Tunnel Services Building and ancillary buildings. • The North Portal including tunnel approach retaining walls and the Tunnel Services Building. Further information on these structures is given in STR.01, STR.09, STR.12, Section 4.3 Gravesend link and 4.5 Tilbury Marshes and North Portal.
STR.03	Project Enhanced Structures: Bridge design	The design of Project Enhanced Structures shall be coherent and distinctive with a recognisable design language and consistent material palette. It shall be developed to reflect the nature of their context and integrated positively with the landscape works. Specifically, this design principle shall apply to the following structure (The Kent Downs Area of Outstanding Natural Beauty (AONB) bridge): <ul style="list-style-type: none"> • Thong Lane over Lower Thames Crossing Overbridge (Works No. 3B ii) Further specific requirements for this structure are given in STR.01, STR.06, STR.07, STR.08, STR.11, STR.12 and Section 4.3 Gravesend link.

Clause no.	Design principle name	Design principle
STR.04	Project Enhanced Structures: Bridge design	<p>The design of Project Enhanced Structures shall be coherent and distinctive with a recognisable design language and consistent material palette. It shall be developed to reflect the nature of their context and integrated positively with the landscape works.</p> <p>Specifically, this design principle shall apply to the following structures (the viaducts):</p> <ul style="list-style-type: none"> • Orsett Fen Viaduct (Works No. 8B i) • Mardyke Viaduct (Works No. 8B ii) <p>Further specific requirements for these structures is given below in STR.01, STR.06, STR.07, STR.12 and Section 4.8 Ockendon link.</p>
STR.05	Project Enhanced Structures: Bridge design	<p>The design of Project Enhanced Structures shall be coherent and distinctive with a recognisable design language and consistent material palette. It shall be developed to reflect the nature of their context and integrated positively with the landscape works.</p> <p>Specifically, this design principle shall apply to the following structure:</p> <ul style="list-style-type: none"> • Thames Chase Community Forest Bridge (Works No. 90 i) <p>Further specific requirements for this structure are given in STR.01, STR.06, STR.07, STR.12 and Section 4.9 M25 junctions.</p>

<p>STR.06</p>	<p>Project Enhanced Structures: Consistent design approach</p>	<p>Project Enhanced Structures (ref. STR.01-05 and STR.08) shall share a consistent design approach where:</p> <ul style="list-style-type: none"> • A consistent material palette shall be used for all structures. • The surrounding landscape, earthworks and bridge abutments will provide a coordinated integrated solution resulting in a site-led coordinated engineered landscape. • Bridge pier material and form will be distinctive and consistent across the Project and avoid large expanses of flat concrete surfaces at the abutments. • Within and close to the Kent Downs AONB, materials will be self-finished, minimising maintenance while being consistent and appropriate to the colour palette required in the Kent Downs AONB. • Parapet material and form (e.g. weathering steel) will be distinctive and consistent across the Project. Parapets and acoustic barriers shall be combined where reasonably practicable. • The natural light under bridge structures will be maximised as much as is reasonably practicable. • Components will be limited in variety and consistent in form of construction and of high quality by maximising standard components replicable through DfMA. • A sense of place and pride of asset will be promoted through the application of placemaking features, where the name of each bridge and/or graphics will be incorporated permanently into the deck or parapet so it can be seen by users of the Project (Thames Chase footbridges, Project bridges and AONB bridges) and/or WCH users (viaducts) as they approach. • Bridge-supporting structures such as earth-retaining structures and parapets will seamlessly integrate within the landscape, avoiding the need for exposed wing walls and concrete retaining structures where reasonably practicable. • Where exposed engineered structures are required, these will be designed and constructed to support the principles of a landscape-led approach and mitigate the impact on the existing green infrastructure. • Different access requirements, including for maintenance, will be coordinated where practicable to avoid duplication. Where access structures (e.g. galleries) are required, these will be integrated within the Project rather than added on. • A typical graphic illustrating a Project Enhanced Structure is provided in Appendix B.
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Clause no.	Design principle name	Design principle
STR.07	Bridge structures	<p>All bridges not subject to the requirements of Project Enhanced Structures shall share a consistent design approach with the Project Enhanced Structures in the following respects:</p> <ul style="list-style-type: none"> • A consistent material palette shall be used for all structures. • The surrounding landscape, earthworks and bridge abutments will provide a coordinated integrated solution resulting in a site-led coordinated engineered landscape. • The natural light under bridge structures will be maximised as much as is reasonably practicable. • Components will be limited in variety and consistent in form of construction and of high quality by maximising standard components replicable through DfMA. • Parapets and acoustic barriers shall be combined where reasonably practicable. • Bridge-supporting structures such as earth-retaining structures and parapets will seamlessly integrate within the landscape, avoiding the need for exposed wing walls and concrete retaining structures where reasonably practicable. • Where exposed engineered structures are required, these will be designed and constructed to support the principles of a landscape-led approach and mitigate the impact on the existing green infrastructure. • Different access requirements, including for maintenance, will be coordinated where practicable to avoid duplication. Where access structures (e.g. galleries) are required, these will be integrated within the Project rather than added on.

Clause no.	Design principle name	Design principle
STR.08	Green bridges	<p>Green bridges are required mitigation for the severance and fragmentation of habitat due to the Project. Planting on green bridges shall tie in with the broader landscape to ensure this connectivity. The design of these green bridges shall be further developed during detailed design to also provide an enhanced user experience for those using the crossing and living in the immediate area of the Project (including WCH) and to retain the character of the local roads and routes.</p> <p>The following bridges shall be green bridges:</p> <ul style="list-style-type: none"> • Brewers Road Overbridge (BRN000001) • Thong Lane over M2 Overbridge (BRN000002) • Thong Lane over Lower Thames Crossing Overbridge (BRN0000014) • Muckingford Road Bridge (BRN0000030) • Hoford Road Bridge (BRN0000031) • Green Lane Bridge (BRN0000059) • North Road Bridge (BRN0000073) <p>Subject always to the constraints set out in the DCO, the design of green bridges shall be developed to be compatible with the guidance set out in the Summary of Findings within the Natural England (2015) report, Green Bridges: A Literature Review (NECR181).</p>
STR.09	Barriers and fences	<p>In order to avoid duplication leading to the creation of visual clutter, environmental, acoustic, boundary fences and security barriers shall be combined into a single structure as much as is reasonably practicable. Materiality and appearance shall be designed with consideration of the surrounding context of the landscape (e.g. weathering steel, timber, etc).</p>
STR.10	Noise barriers and tranquillity	<p>Proposals shall balance mitigation requirements for noise and visual impact in such a way as to minimise the negative impact on tranquillity and landscape character.</p> <p>Required noise mitigation structures shall be designed and (where reasonably practicable) screened with planting to minimise the perception of the urbanisation in rural areas.</p> <p>Where screening is not reasonably practicable, the materiality and appearance of the barrier shall be designed with respect to the surrounding context of the landscape (e.g. weathering steel, timber).</p>

Clause no.	Design principle name	Design principle
STR.11	Green Bridge Vehicle restraint systems (VRS)	To help maintain the rural lane character of the landscape over green bridges, where it is identified that VRSs are required (in addition to structural parapets), VRSs shall be a timber Highways England certified system for the level of use identified.
STR.12	Materials and durability	Material selection shall be optimised in all areas to balance capital and maintenance cost, to reduce the frequency of maintenance and replacement.

3.6 Lighting, signage & technology

3.6.1 The principles in Table 3.5 apply to all areas unless stated otherwise:

Table 3.5 Project-wide design principles: Lighting, signage & technology

Clause no.	Design principle name	Design principle
LST.01	Highways furniture	To avoid visual clutter, the amount of roadside furniture and signage shall be reduced (or combined) as far as reasonably practicable, while promoting safety requirements/targets through its location, mounting and lighting. Materiality and appearance shall be designed with consideration of the surrounding context of the landscape.
LST.02	Minimised lighting (main alignment)	To preserve the rural and historic nocturnal character of the landscape along the Project route, only junctions and approaches to the portals shall be lit. Lighting will be minimised wherever it is reasonably practicable and safe to do so, but shall remain in accordance with relevant standards.
LST.03	Minimised lighting (off-line)	To preserve local nocturnal character and habitats, lighting required at 'off-line' operational areas (such as at the portals) shall be controllable, directional and as low-level as is practicable and safe (floodlighting shall be avoided).

3.7 Landscape

3.7.1 The principles in Table 3.6 apply to all areas unless stated otherwise.

Table 3.6 Project-wide design principles: Landscape

Clause no.	Design principle name	Design principle
LSP.01	Retention of existing vegetation	<p>All existing vegetation shall be retained as far as reasonably practicable in order to:</p> <ul style="list-style-type: none"> • Preserve its intrinsic ecological value. • Preserve its function as a natural screen to the works. • Preserve the natural enclosed woodland settings for existing adjacent properties. <p>Minimum areas of retained vegetation are shown in the Environmental Masterplan (REF TBC). Measures for the protection of retained vegetation during site clearance works are provided for in REAC item LV028 (REF TBC). Details relating to root protection for veteran or ancient trees are defined within the REAC document, item LV030.</p>
LSP.02	Planting Strategy	<p>The planting strategy for the Project including species selection and planting pattern shall be developed with consideration of context, of local provenance and be appropriate to its locality. The species mix and pattern shall take into account the underlying geology, aspect, level of disturbance/potential for remediation, and other local character features to ensure it will be suitable within its environs.</p> <p>The planting species mix shall be as diverse as reasonably practicable to ensure resilience against potential future diseases. It will include native species of local provenance and will also consider the inclusion of a small percentage of non-native species, where appropriate, in response to forecasted impacts of climate change.</p>
LSP.03	Landscape integration features for visual screening	<p>The detailed design shall use planting to soften the edge of the earthworks and integrate the Project as defined in the Environmental Masterplan (REF TBC). The earthworks shall be graded into the wider landscape as appropriate for its context and shall respect the local topography and landscape character where reasonably practicable. Where this is not reasonably practicable, the design shall provide additional landscaping adjacent to the receptor to mitigate the loss of visual screening within the Order Limits.</p>

Clause no.	Design principle name	Design principle
LSP.04	Landscape: planting	In order to minimise the visual impact of the Project, the landscaping design shall include planting to integrate the road into the adjacent landscape as defined within the Environmental Masterplan (REF TBC).
LSP.05	Landscape reinstatement	To retain the character of the landscape, where land is utilised during construction, it shall be reinstated to its original use as far as technically practicable or in line with landowner agreements. If required for environmental mitigation, appropriate ecological and visual screening shall be placed on land used temporarily for construction.
LSP.06	Landscape legacy	Where large scale landscape mitigation is required, the design of this shall be developed to maximise the Project's legacy for local communities, landowners, whilst considering existing land use. Where compatible with mitigation proposals the Project shall provide, within the Order Limits, enhanced access, amenities and green infrastructure. Where there is alignment between the Project and other existing or planned green infrastructure schemes identified by local authorities and other relevant stakeholders, the Project's detailed design will be developed to integrate with the delivery of green infrastructure by others.
LSP.07	Respecting historic landscape	To protect views across historic landscape and topography, the new landscape design will take account of local landscape character, respect historic features and reference historic land use, patterns and boundaries.
LSP.08	Landscape earthworks: flood risk	To reduce the loss of existing flood storage capacity, no landscape earthworks for visual mitigation shall be provided in flood plains.

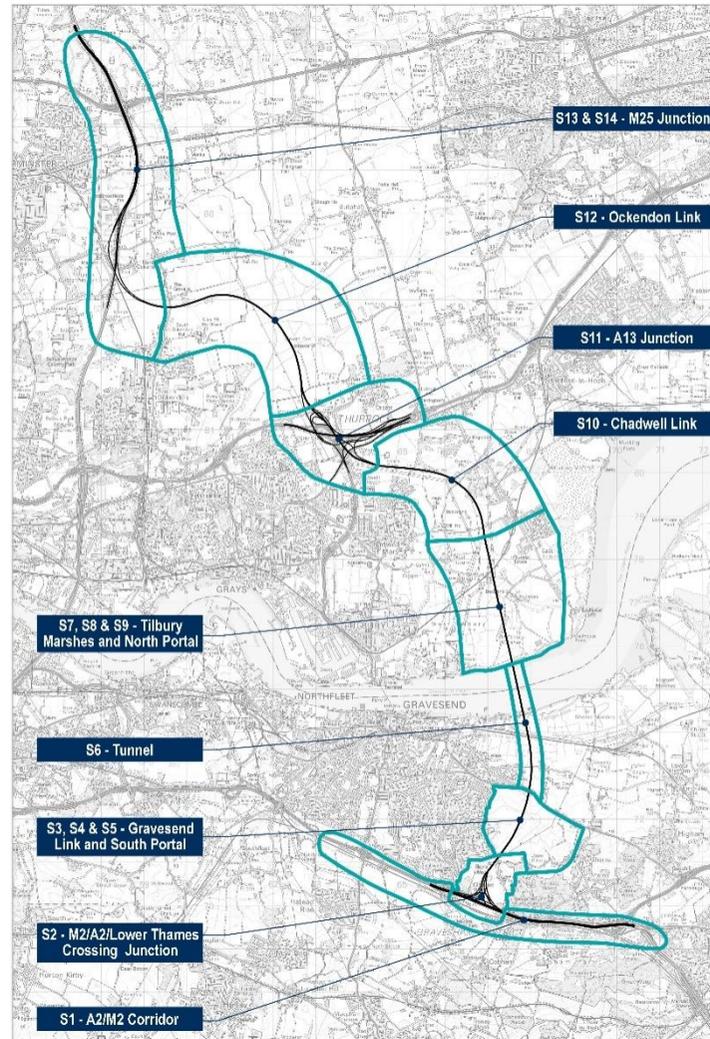
Clause no.	Design principle name	Design principle
LSP.09	Landscape earthworks: false cuttings	<p>All false cuttings shall have rounded crest tops and where reasonably practicable, slackened outward-facing slopes to allow for agriculture and/or planting as appropriate to the surrounding landscape character and use. Any fences or other structures required will be set down from the top of the slopes to reduce visibility from the wider landscape with the exception of acoustic barriers where required for acoustic mitigation. Appropriate soft landscaping shall be planted to integrate and soften the interface of the earthworks to the existing landscape and shall reflect the existing character, land use and pattern. To this end planting shall extend a minimum of 5m beyond the outside toe of the earthworks.</p> <p>Outward-facing slopes shall be slackened to a minimum of 1:4 gradient to allow for woodland planting in suitable locations (as defined within the Environmental Masterplan (REF TBC). Exceptions are where land has been identified as to be returned to agriculture, where slopes shall be slackened to a minimum 1:10 gradient.</p> <p>Where minimising the land required for the Project becomes the overriding concern, slopes shall be designed to a minimum of 1:3 gradient.</p>
LSP.10	Junction planting	<p>Given the complexity of the junctions at the A2, A13 and M25, the landscaping shall focus on woodland planting (as defined in the Environmental Masterplan (REF TBC). This will screen the structures required within the junction (such as bridges and overpasses) from the wider landscape. It will also limit views out so drivers will be more focused on navigating the junction.</p>
LSP.11	Planting palettes	<p>Planting shall be provided in accordance with the palettes in the Appendix A.</p>
LSP.12	New, diverted and reinstated watercourses	<p>Additional diversions of watercourses to those currently defined in the Environmental Masterplan (REF TBC) shall be regarded as a last resort unless it would afford benefits such as a more natural alignment.</p>
LSP.13	Hedgerow reinstatement: field and roadside boundaries	<p>To protect the historic character of the landscape, provide additional screening and enhance biodiversity, reinstated field boundaries shall be demarcated with hedgerows where agreement with the landowner has been reached. Species-diverse hedgerow planting shall be designed to form part of a matrix of biodiverse habitats aiding wildlife movement through areas of intensive arable land. Hedgerow planting shall comprise a diverse mix of native species and, where appropriate, include hedgerow trees.</p>

Clause no.	Design principle name	Design principle
LSP.14	Hedgerows: highways boundaries	Where appropriate, and in keeping with existing landscape character, hedgerow planting is to be planted at the toe of engineered earthworks or beyond proposed Project assets such as drainage ditches and swales. This shall soften the appearance of the engineered earthworks into the existing landscape, provide a boundary to highways assets and integrate any fencing required at the highway's boundary. Exceptions are where land can be returned to agriculture and earthworks have been slackened to accommodate this function.
LSP.15	Planting densities	Planting shall be developed to comply with environmental functions as set out in the Environmental Masterplan (REF TBC).
LSP.16	Surfacing to hard landscape and operational areas	Drainage to operational areas on greenfield sites shall be designed to ensure that post-development surface water runoff rates do not exceed existing rates. To this end permeable paving that is suited to context (e.g. cellular grass paving systems), shall be used wherever practicable.
LSP.17	Pond integration	Drainage attenuation ponds shall be designed to appear as naturalistic elements within the wider setting that take account of existing topography, gradients and field boundaries. Planting shall be provided to soften edges where this is appropriate to the context.
LSP.18	Chalk cuttings	To prevent views of the edges of the exposed chalk cutting across the landscape and create valuable habitat, the top of the cuttings in chalk shall be graded back to allow for the establishment of chalk grassland.
LSP.19	Ancient woodland compensation	The ancient woodland compensation planting strategy will be defined to achieve the most ecologically beneficial woodland habitat and be in accordance with REAC reference TB28 and as shown on the Environmental Masterplan (REF TBC) using the code E3.2.

Clause no.	Design principle name	Design principle
LSP.20	Wildflower planting on earthworks	Grassland on roadside verges and earthworks including embankments, cuttings and false cuts shall be planted to become species-rich grassland and include wildflowers, suitable to underlying soil and subsoil type. Species-rich grassland shall be the default grass type and established where reasonably practicable along the road network to provide biodiversity benefit and visual amenity for road users. Grass verges shall be formed avoiding the use of fertile topsoil and be sown on clean subsoil, with a suitable titre, to encourage establishment of a sustainable diverse plant community. Soil materials used and methods of reinstatement shall be in accordance with the prescribed soil handling requirements in BS 3882:2015 (British Standards Institute, 2015). Seed mixes shall be of British origin, locally sourced and appropriate for the subsoil within the locality.
LSP.21	Blending of earthworks	Where false cuttings and embankments associated with the Project route meet other landscape earthworks or landscape features, the earthworks shall be designed with the aim to integrate and terminate them in a naturalistic way. Earthworks shall maintain a consistent level of screening if appropriate to the location.
LSP.22	Approach to Open Mosaic Habitat (OMH)	<p>Areas of OMH (as defined in the Environmental Masterplan (REF TBC)) shall be a dynamic habitat, the value of which is generated by regular disturbance which prevents habitat succession and retains habitat and structural diversity.</p> <p>The final distribution of habitats will be as follows:</p> <ul style="list-style-type: none"> • Scrub – no greater than 10% coverage • Bare ground – approximately 10% coverage • Rough grassland – approximately 30% coverage • Low nutrient, free-drainage grassland – approximately 50% <p>Pulverised fuel ash (PFA) and sands and gravels generated by the construction works shall be used to provide approximately 10% of overall area of the OMH substrate to mimic the substrate in areas where the habitat is currently found within the Order Limits.</p>
LSP.23	Early planting	Where reasonably practicable planting should be undertaken early in the construction programme to maximise the maturity of the planting scheme at road opening.

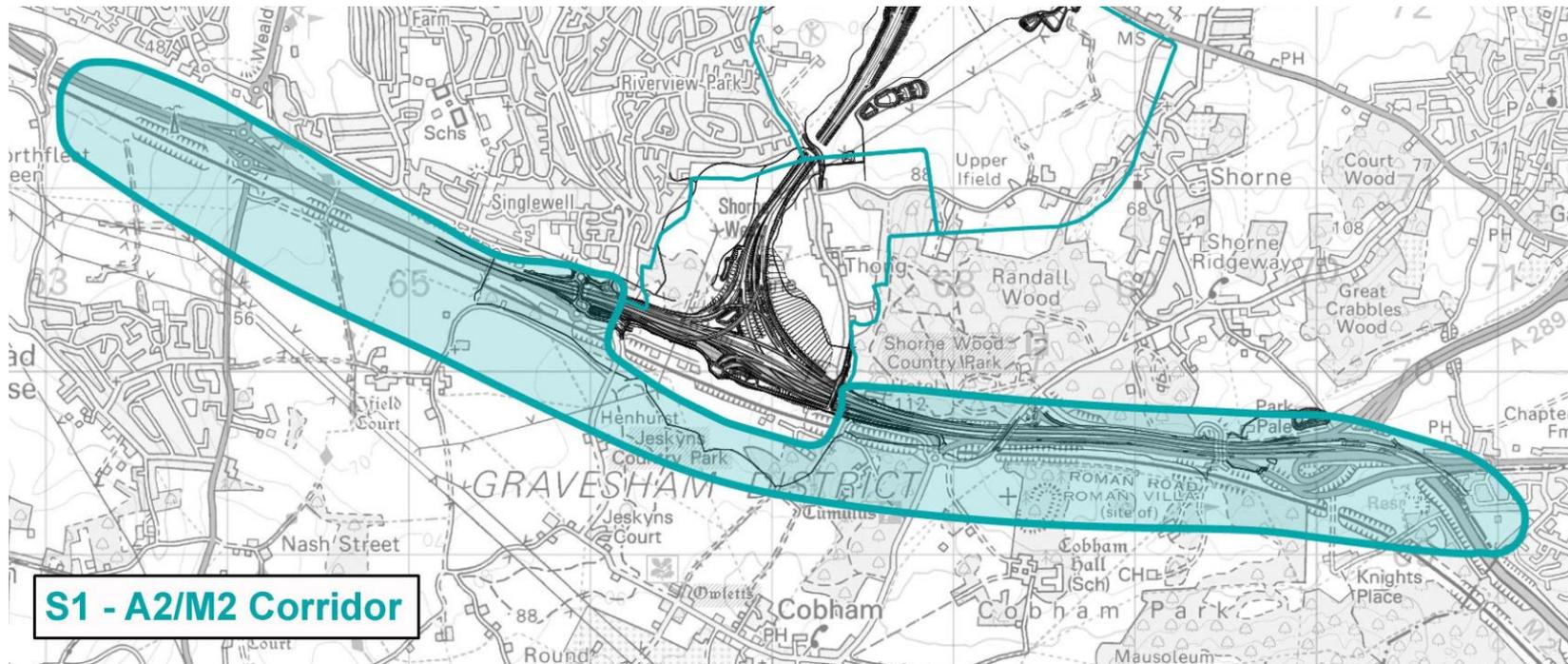
4 Area-specific design principles

Plate 4.1 Project route as Sections



4.1 S1 – A2/M2 Corridor

Plate 4.2 Section 1 – A2/M2 Corridor



4.1.1 The principles in Table 4.1 apply to all works in the Environmental Masterplan (REF TBC), and shown approximately by the teal area in Plate 4.2 above for reference, subject to the Order Limits.

Table 4.1 Section specific principles: Section 1 – A2/M2 Corridor

Clause no.	Design principle name	Design principle
S1.01	Woodland north of the A2 Corridor	To retain the historic woodland landscape character within the Kent Downs AONB and to screen the Project from users of Shorne Woods Country Park (including users of Park Pale), existing planting along the northern edge of the A2 corridor shall be retained as far as reasonably practicable. Where tree loss is unavoidable, landscape proposals shall maximise reinstatement of woodland within the A2 corridor as defined in the Environmental Masterplan (REF TBC)
S1.02	Planting to the south of the A2 Corridor	To reduce the visual impact of the Project on users of Cobham Hall, woodland adjacent to and within Cobham Park shall be retained as far as practicable. Furthermore, in order to mitigate loss of woodland and screen the works within the AONB, trees shall be planted on new earthworks along the southern sides of the A2 as far as practicable. As shown in the Environmental Masterplan (REF TBC)
S1.03	Associated works in the A2/M2 Corridor	To reduce the impact on the Kent Downs AONB, the preliminary design has been developed to minimise the width of the A2 corridor footprint as far as reasonably practicable. The detailed design shall be developed to minimise the footprint of the works associated with the Project and diverted utilities in order to maximise the areas available for woodland planting. For example, steep planted engineered embankments shall be used, and asset maintenance accesses, PRowS and utilities easements shall be combined to make as efficient use of land as is safe and practicable.
S1.04	Brewers Road and Thong Lane Over A2 Overbridges	<p>To provide connectivity of habitats for species including dormice, badgers, reptiles, bats and Great crested newts between Shorne Woods and Ashenbank Woods, Jeskyns and Cobham Park, and to strengthen the woodland character, new green bridges shall be provided for the replacement of Thong Lane (Old) and Brewers Road crossings. Landscape shall be designed to provide continuity of habitat between the bridges along the main highway’s corridor as far as practicable.</p> <p>To act as local landmarks and to signal entry into the Kent Downs AONB for drivers, the tree-line on the bridges shall be visible on the horizon on their approach to the area from the east and west.</p>

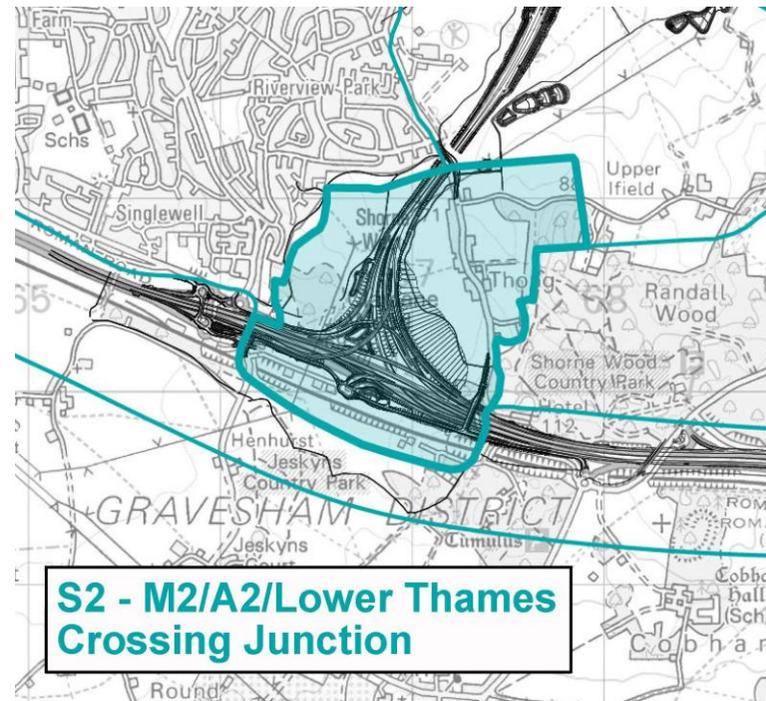
Clause no.	Design principle name	Design principle
S1.05	NCR 177 Realignment	<p>To improve the user experience, maintain east-west connectivity as both a recreational and commuter route for cyclists, and avoid the requirement for crossings through the new junction, National Cycle Route (NCR) 177 shall be permanently realigned south of the High Speed 1 rail line (HS1) away from its current position adjacent to the A2 carriageway. Connections across HS1 and the A2 corridor between recreational areas north and south of the A2 corridor shall be made at the Hares Bridge, East Gravesend, and at Thong Lane, Brewers Road and Park Pale bridges.</p> <p>The realigned route shall be surfaced to maintain the rural character of the setting while providing a robust enough surface for frequent cycle use.</p>
S1.06	Reflect surrounding landscape character	<p>The design of the landscape and mitigation proposals shall take account of the extensive deciduous woodlands surrounding large arable fields, thick deciduous shaws and hedgerows to ensure they complement and strengthen the existing character. A diverse palette of local provenance native shrub and tree species will be reflective of the key characteristics of the West Kent Downs Character Area.</p>
S1.07	Planting Palette within the AONB and its setting	<p>Further to Design Principle LSP.11, a diverse palette of native shrub and tree species characteristic of the local character area and of local provenance shall be used in the area.</p>
S1.08	New woodland east of Shorne Woods Country Park.	<p>New woodland east of Shorne Woods Country Park shall be provided to link Shorne Woods with Great Crabbles Woods. The design shall be developed through collaboration and engagement with Shorne Woods Country Park and relevant local stakeholders, subject to their requirements being compatible with mitigation requirements as defined in the Environmental Masterplan (REF TBC)</p> <p>The design of woodland shall retain key views from the upper slopes of the new woodland across to the Darnley Mausoleum.</p>

Clause no.	Design principle name	Design principle
S1.09	Park Pale screening	A new acoustic barrier constructed from or faced with materials appropriate to the context along the southern edge of the lane between Park Pale bridge, continuing to the Inn on the Lake. This barrier shall replace vegetation lost to the creation of new earthworks and utility diversions, it shall provide screening for users travelling along Park Pale and recreational users on the southern edge of Shorne Woods Country Park. The design shall be developed through collaboration and engagement with Kent Downs AONB unit subject to their requirements being compatible with mitigation requirements as defined in the Environmental Masterplan (REF TBC). The acoustic barrier shall be a minimum of 2m high and positioned to maximise visual screening through placement on elevated ground where reasonably practicable.
S1.10	Old Watling Street screening	To provide screening for residents of Old Watling Street and to replace lost landscaping features, new hedgerow and trees shall be planted along the northern (eastbound) edge of the A2/M2, east of M2 junction 1.
S1.11	Switching station screening	The replacement switching station adjacent to the A2 shall be screened by planting from users of Thong Lane.
S1.12	Reinstatement planting to the west of A2 junction	Where vegetation is removed as a result of utilities work along the former A2 corridor west of the junction with the Project, appropriate reinstatement and planting using suitable species is to take place along the utility route as far as reasonably practicable.
S1.13	Planting of NCR177	To reduce the urbanising impact of the Project on Shorne Woods Country Park, the existing alignment of NCR 177 (to be re-routed) shall be planted where the path is not required for connection into other WCH routes.
S1.14	Planting adjacent to Thong Lane	To integrate the realigned Thong Lane into the surrounding landscape, replace features lost during construction and to re-establish the woodland edge along the road which provides screening for the Inn on the Lake, woodland planting shall be provided adjacent to Shorne Woods along both sides of Thong Lane.
S1.15	The Mount	To integrate reinstated raised earthworks around The Mount into the existing landscape, the new earthworks and retaining structures on the green bridge crossing HS1 shall be designed to match the remaining structure. WCH routes provided across Project infrastructure shall be merged with existing provision here.

Clause no.	Design principle name	Design principle
S1.16	Landforms around the Project	In order to integrate the Project into the surrounding landscape and provide screening to improve the setting of Cobham Hall, new landforms shall avoid the appearance of unnatural valleys between the Project and HS1. Where reasonably practicable, the land required and vegetation removed, shall be reduced between the Project and HS1.

4.2 S2 – M2/A2/Lower Thames Crossing Junction

Plate 4.3 Section 2 – M2/A2/Lower Thames Crossing Junction



- 4.2.1 The principles in Table 4.2 apply to all works in the Environmental Masterplan (REF TBC), and shown approximately by the teal area in Plate 4.3 above for reference subject to the Order Limits.

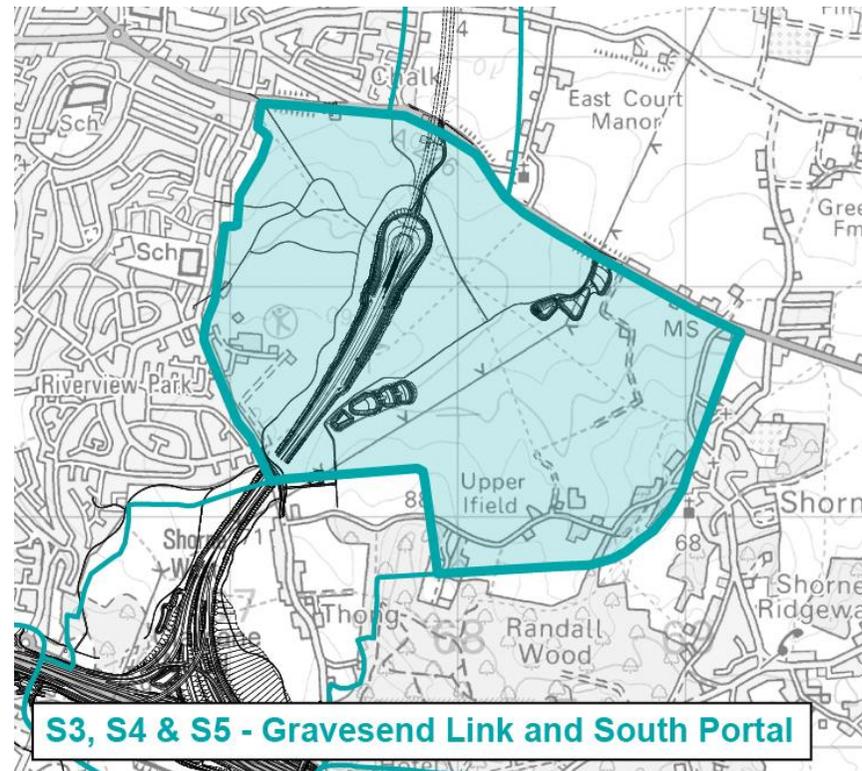
Table 4.2 Section specific principles: Section 2 – M2/A2/Lower Thames Crossing Junction

Clause no.	Design principle name	Design principle
S2.01	Wooded circle around Thong	<p>To retain the open rural setting of the village of Thong, the landscape shall retain an open aspect around the village by use of species-rich grassland and wildflower meadow planting. The open aspect will be enhanced by the contrast created by increased woodland planting along the eastern edge of Gravesend which will form part of a circular wooded habitat corridor linking Claylane Wood and Shorne Woods, and screen the Project from the residents of Gravesend East.</p> <p>Within the open grassland, wildflower meadow planting shall reference the historic layout and runways of RAF Gravesend as shown in the Environmental Masterplan (REF TBC)</p>
S2.02	Circular walks connecting recreational areas	In order to restore PRowS severed by the Project and to create an enhanced user experience, PRowS NS167 and NS169 shall be integrated into the new circular WCH route connecting around the A2 junction. Between Claylane Wood and Shorne Woods Country Park, this shall be via the new green bridge at Thong Lane. NS167 shall not cross the junction.
S2.03	Woodland planting around slip roads	To integrate the Project into the surrounding landscape character, the planting and landscape design shall incorporate woodland planting within the junction and around slip roads, shown on Section 2, Sheet 2 and 5 of the Environmental Masterplan (REF TBC)
S2.04	Thong Lane North green bridge	<p>To connect woodland habitat, lessen the visual impact of the M2/A2/Lower Thames Crossing junction, enhance the user experience and maintain east-west connectivity between Gravesend and Thong/Shorne Woods Country Park, the crossing at Thong Lane North shall be a new green bridge. The landscape across the bridge shall be designed to maintain the character of a well-vegetated lane and to provide a habitat corridor for mammals.</p> <p>The bridge shall provide off-road routes for cyclists and pedestrians away from the main road. Appropriate crossings shall be provided north and south of the bridge to facilitate north-south movement.</p> <p>Design principles for the Project Enhanced Structures shall apply to this bridge.</p>

Clause no.	Design principle name	Design principle
S2.06	Minimise impact on Claylane ancient woodland	<p>To limit the loss of ancient woodland as far as reasonably practicable, the earthworks along the western edge of the A2 junction will be kept to a minimum and no false cut provided. Woodland planting shall be provided on the earthworks slopes to provide visual mitigation and landscape integration.</p> <p>Planting beneath overhead power lines and above underground utilities, between Claylane Wood and the A2 junction, including drainage basins, will be in accordance with LSP.02. Planting will be in suitable locations and of suitable species and heights in agreement with utilities operators who maintain an easement to their assets, but shall provide some cover for small mammals.</p>
S2.07	Retained vegetation	<p>In order to preserve landscape character and to reduce visibility towards the M2/A2/Lower Thames Crossing junction, existing vegetation along and around the junction shall be retained as far as practicable.</p>
S2.08	A2 junction ponds	<p>Where reasonably practicable, central islands within the A2 junction shall be utilised for the drainage and attenuation ponds required, so that the outer edges of the junction can be woodland planted, enclosing the junction and providing visual screening. Ponds shall be appropriately designed within islands to allow planting and landscape integration. Ancillary elements such as fencing and surfacing of access roads shall be appropriate to the context to avoid urbanising the junction.</p>
S2.09	Planting adjacent to Thong Lane	<p>To integrate the new realigned Thong Lane into the surrounding landscape, replace features lost during construction and to re-establish the woodland edge along the road which provides screening for the Inn on the Lake, woodland planting shall be provided adjacent to Shorne Woods along both sides of Thong Lane.</p>
S2.10	Retaining wall materials	<p>To integrate the retaining structures at the junction within the AONB, into the wider landscape, either green walls/earth banks or use of materials or cladding, reflective of the local vernacular (such as flint or ragstone) shall be used.</p>

4.3 S3, S4 & S5 – Gravesend link & South Portal

Plate 4.4 Section 3, 4 & 5 – Gravesend link & South Portal



- 4.3.1 The principles in Table 4.3 apply to all works in the Environmental Masterplan (REF TBC), and shown approximately by the teal area in Plate 4.4 above for reference subject to the Order Limits.

Table 4.3 Section specific principles: Section 3, 4 & 5 – Gravesend Link and South Portal

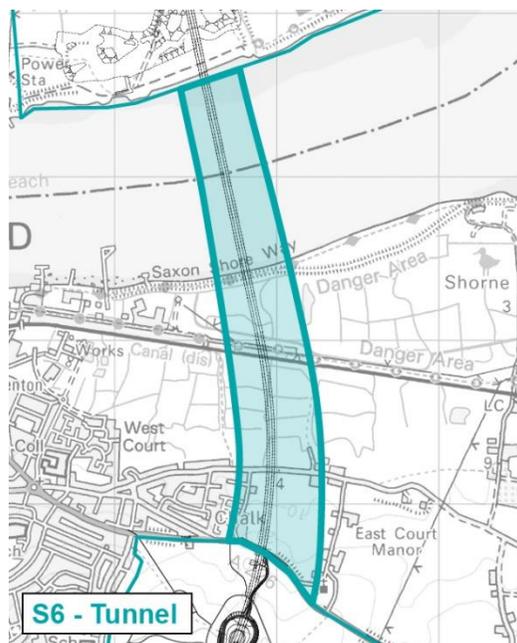
Clause no.	Design principle name	Design principle
S3.01	Retain open views	Open views across the landscape north of Thong Lane shall be maintained as far as reasonably practicable. Where the road is in cutting, fencing, signage, gantries and lighting columns shall be positioned within the cutting to reduce their visual impact on views across the wider landscape as far as reasonably practicable.
S3.02	Mask cutting route	So as not to emphasise the linear nature of the Project route north of Thong Lane Green Bridge, the top of the cutting shall not be edged with fencing and/or hedgerow planting. Where reasonably practicable, fencing shall be incorporated into the cutting slope and hidden from view. Where not reasonably practicable, localised earthworks planting in blocks and not in a continuous linear form adjacent to the alignment (in keeping with the surrounding context) shall be provided to limit its visual impact and to mask the linearity of the cutting.
S3.03	Transition to the South Portal	The profile of the cuttings between the A2 junction and the South Portal shall be considered as a single visually consistent engineered solution developing the profile and levels defined at the tunnel portal and incorporating the bridge abutments at the new Thong Lane bridge seamlessly. To maintain a sense of openness and light for users of the Project as they enter the tunnel, structural concrete walls required near to the South Portal shall be kept at a minimal height with earth embankments above, so far as structural performance constraints will allow.
S3.04	Chalk Park	In order to provide an enhanced amenity for local residents, recreational areas of over 35 hectares shall be provided to the west of the South Portal and approach cutting. Excavated material from the cutting shall be used to integrate the open space into the existing topography. A wooded hilltop shall be provided in a manner characteristic of the setting of nearby settlements at Thong and Shorne to soften the exposed urban edge of Gravesend, as defined in the Environmental Masterplan (REF TBC).
S3.05	Reinstatement of construction compounds	To keep the human-influenced rural character of the area, where practicable the construction compounds east of the cutting shall not result in disturbance of the boundary hedgerows and landform changes associated with the historic parish boundary. Land covered by construction compounds shall be reinstated to reflect existing field patterns and the surrounding landscape character. The landscape proposals will include no engineered features, e.g. fencing.

Clause no.	Design principle name	Design principle
S3.06	Cascading drainage attenuation ponds	To enhance the landscape character around the area of the South Portal, naturalistic drainage ponds whose location and design respond to existing topographical features shall be located adjacent to the A226 Gravesend Road and on the eastern side of the Project route, within the boundary of the existing Southern Valley Golf Course.
S3.07	Screening to residents of Riverview	To provide screening of the Project for residents of Gravesend and to replace lost woodland features, native woodland shall be planted north-west of the Thong Lane green bridge.
S3.08	Chalk & scrub grassland	Areas around the portal cutting shall consist of species-rich grassland. However, to increase nature conservation and biodiversity in the area, and to aid landscape integration of the Project, blocks of scrub and woodland shall be planted at appropriate locations following the existing field pattern.
S3.09	Historic hedgerow reinstatement	New hedgerows will reference historic field boundaries, reversing field aggregation and linking remnant hedgerow trees. Field boundaries to the west shall be planted with hedgerows to reverse the appearance of field aggregation and to screen the Project.
S3.10	Integration of portal facilities	To further integrate the portal into the surrounding landscape and reduce visibility of operational equipment and vehicles to residents of Chalk and Gravesend, localised raised earthworks shall be created around the northern end of the portal structure and bolstered with small blocks of woodland planting. In order to screen portal operations from users of the surrounding PRowS, the access road shall be set at a lower elevation than the surrounding topography.
S3.11	Integration of portal building	The South Portal structure and building shall have a green roof and be designed to sit within the cutting and to blend into the surrounding landscape topography as far as reasonably practicable through the use or similar grassland species to the adjacent chalk grassland. The building shall be earth bunded. The earthworks shall be profiled to merge seamlessly with surrounding ground profiling.
S3.12	Portal maintenance and emergency access	To ensure 24 hour operational and emergency access to the portal, access shall be provided via the A226 and the Project. Vehicular access onto this road shall be controlled. Pedestrians, cyclists and equestrians shall be able to cross the access road in an east-west direction with suitable measures in place, such as fencing that is in keeping with the local context, to avoid public and animals straying onto the Project.

Clause no.	Design principle name	Design principle
S3.13	NG7 diversions	To maintain an inclusive and naturalistic route for the user and avoid unnecessary structures, a recreational loop that connects Gravesend with Shorne Woods Country Park shall be created for NG7. This will be re-routed north around the South Portal and will link to routes going further south at Thong Lane green bridge. The recreational loop will cross the Project access road north of the portal structure, but access across the road shall be maintained at all times.
S3.14	Portal control room	The design of portal control rooms shall maximise natural light, ventilation and passive surveillance, and shall be located to provide views overlooking the highway operations.
S3.15	Woodland planting north of Brummelhill Wood	To replace existing ancient woodland lost, a new area of woodland (Planting Appendix LE2.11 – Woodland with non-native species) shall be planted north-east of Thong on the upper slopes adjacent to the AONB boundary/Brummelhill Wood. The woodland planting shall follow the contours of the landscape and tie into existing field/hedge line boundaries.
S3.16	Substation	A new substation shall be surrounded by bunding and retain access to/from the adjacent farm building across Chalk Park to the reinstated agricultural field.

4.4 S6 – Tunnel

Plate 4.5 Section 6 – Tunnel



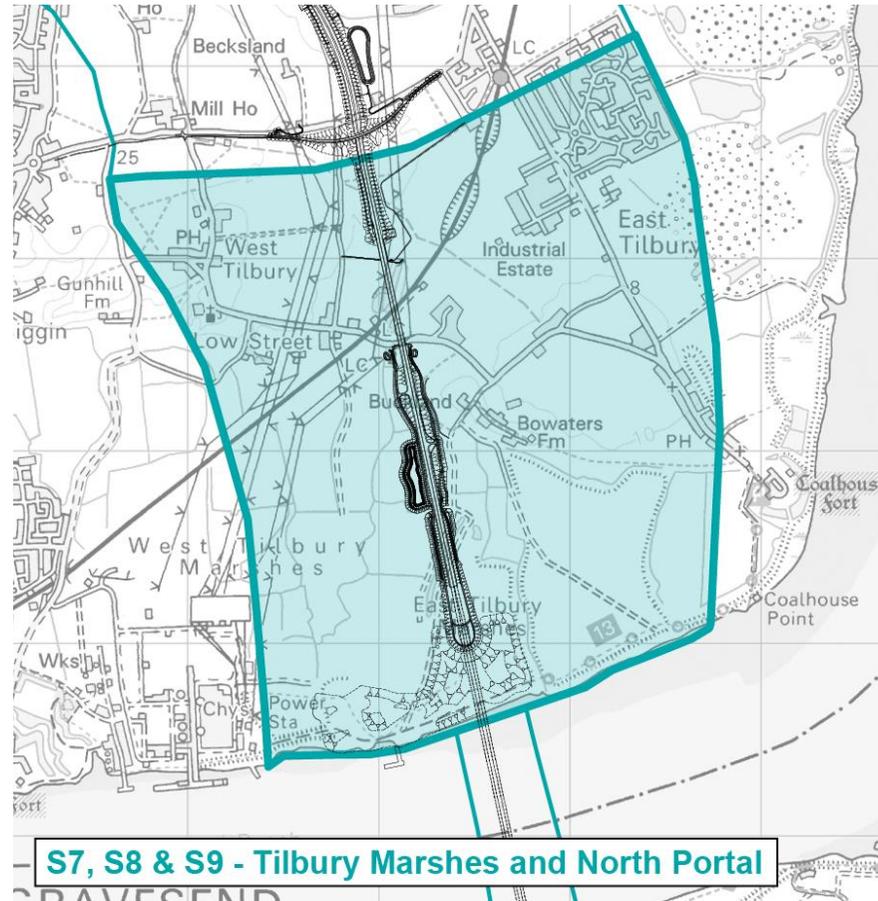
- 4.4.1 The Project route will be within a twin bored tunnel within this sector. The principles in Table 4.4 apply to all works in the Environmental Masterplan (REF TBC), and shown approximately by the teal area in Plate 4.5 above for reference subject to the Order Limits.

Table 4.4 Section specific principles: Section 6 – Tunnel

Clause no.	Design principle name	Design principle
S6.01	Not used	-
S6.02	Not used	-

4.5 S7, S8 & S9 – Tilbury Marshes and North Portal

Plate 4.6 Section 7, 8 & 9 – Tilbury Marshes and North Portal



4.5.1 The principles in Table 4.5 apply to all works in the Environmental Masterplan (REF TBC), and shown approximately by the teal area in Plate 4.6 above for reference subject to the Order Limits.

Table 4.5 Section specific principles: Section 7, 8 & 9 – Tilbury Marshes and North Portal

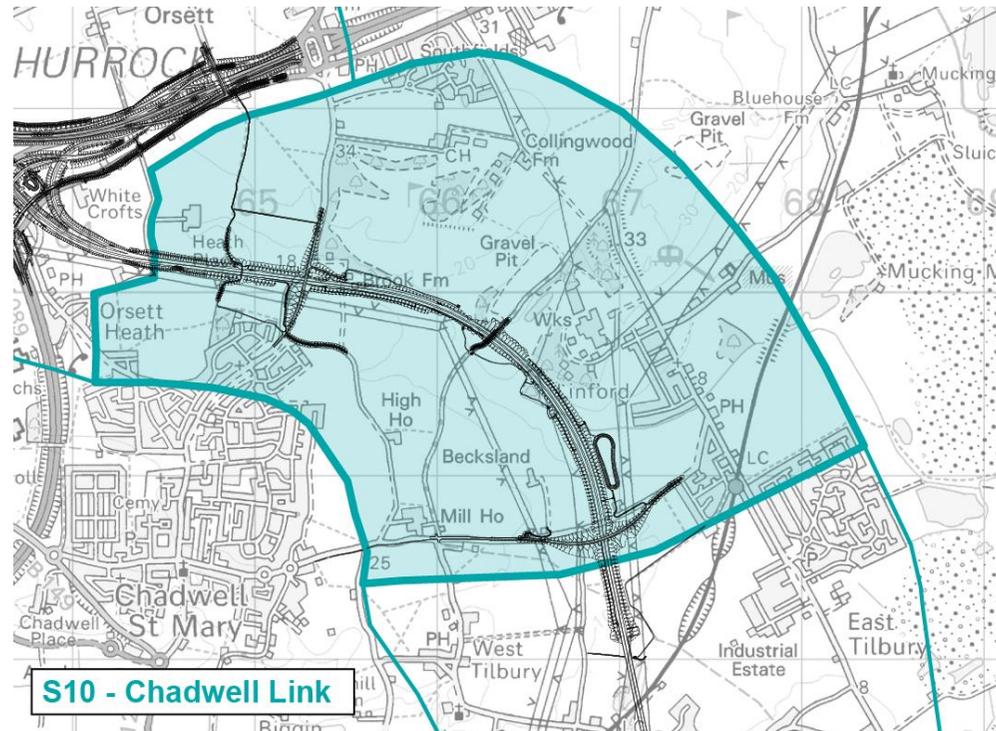
Clause no.	Design principle name	Design principle
S9.01	Approach to marshland landscape	In order to distinguish new landscape proposals from the original (no longer present) marshland character of the area, landscape designs shall avoid design approaches that seek to blend artificial features into the landscape. Where it is possible to recognise the original landscape character, open views across the flat landscape north of the portal shall be maintained.
S9.02	Tilbury Fields	<p>New sculptural landscape earthworks of over 35 hectares on Goshems Farm shall be designed with elevated areas to create vistas (above the surrounding landfill) across the Thames Estuary and guide views to features such as Tilbury Fort and Coalhouse Fort that reflect the military history of the Thames.</p> <p>The earthworks shall be designed to be capable of a return to pastoral agriculture with suitable gradients. They shall be publicly accessible, via the Two Forts Way, from informal footpaths through the landforms that shall follow historic routes and allow users to reach the elevated areas. Placemaking features shall be located at the top of the earthworks, to create a focal point and landmark.</p>
S9.03	Portal security structures	All fencing and other safety measures required for the Project for the safety of pedestrians in publicly accessible areas around the portal and its associated structures shall be integrated into the wider landscape.
S9.05	Heritage interpretation along Two Forts Way	Interpretation boards and signage, coordinated with those for Tilbury Fields, shall be provided along Two Forts Way, highlighting the local heritage features and directions to the new placemaking features. No other enhancement shall be carried out to Two Forts Way.
S9.06	Integration of tunnel control facilities	To minimise the impact on the landscape of required tunnel operations and facilities buildings, the portal shall be designed to integrate all required buildings/uses into the portal structure shown in the Environmental Masterplan (REF TBC) and a single building as far as reasonably practicable.

Clause no.	Design principle name	Design principle
S9.07	Flood protection of tunnels & buildings	Protective earthworks shall be provided between the Project and the access road and Tunnel Services Buildings at a level that protects against a flood event (including provision for the impact of future climate change) to ensure the tunnel and associated buildings are protected and emergency access can be maintained.. At the approach to the North Portal, flood protection (for example, in the form of a bund with an integral cut-off wall or a clay core) would flank both sides of the Project, starting where the ground level around the portal meets the design protection level and extending north until the road level reaches the design protection level.
S9.08	Transition to the portal	To maintain a sense of openness and light for users of the Project, the structural concrete walls required for the cutting shall be kept at a minimal height and the earth embankments of the cutting shall be tapered away from the road.
S9.09	Access roads	To minimise the land required north of the portal and the length of the Tilbury Main culvert, the detailed design of the operational access roads shall be kept as close to the Project route as reasonably practicable subject to the constraints of the powers in the DCO (REF TBC).
S9.10	Watercourses	Culverting of the Tilbury Main shall be reduced as far as practicable to minimise detrimental effects on the channel biodiversity. The culvert shall be designed to allow natural 'bed' features to form and provide a ledge to allow mammal passage. Where appropriate, new watercourses and diversions shall be naturalised and follow historic ditch patterns. Scattered wetland trees and scrub are to be reinstated along the existing watercourse network and to connect into existing features and patterns.
S9.11	Strengthen wooded ridgeline	Woodland planting shall follow the existing wooded ridge and shall not follow the Project route. Within lower-lying areas to the south of the ridge, wet woodland shall be planted following watercourse alignments and link into existing features and connect into woodland planting on the earthworks adjacent to the Project. Where possible, existing vegetation shall be retained as far as reasonably practicable on the wooded ridge.
S9.12	Protective earthworks	Earthworks to the mainline carriageway shall be designed to provide appropriate flood resilience to support the functioning of the tunnel. The earthworks shall be protected by additional earthworks designed to allow Ingrebourne Valley Ltd to resume its spoil placement activities following the completion of the Project, without any impact on the Project's earthworks.

Clause no.	Design principle name	Design principle
S9.13	Water vole habitat	The land parcel adjacent to Coalhouse Fort shall be used for water vole mitigation in the form of new watercourse creation. New watercourses shall follow historic ditch patterns and remaining land is to be managed as wet grassland habitat (Planting Palette Appendix – LE6.4 Wet Grassland).
S9.14	Drainage attenuation pond form	Drainage attenuation ponds will be designed in a long linear pattern along the Project route to take account of the existing landscape character.
S9.15	Views from the Tilbury Viaduct	To promote a sense of place on their journey, views towards West Tilbury Church and the chalk escarpment shall be retained for northbound users of the Project. Similarly, open views across the marshes towards the River Thames for southbound users of the Project shall be provided as far as practicable.
S9.16	Tilbury Viaduct design	The form and structure of the Tilbury Viaduct shall be designed, so far as reasonably practicable and within the limits of the DCO powers, to maximise views through the viaduct structure and to minimise its intrusion into the wider landscape and visual impact on surrounding properties. Landscape earthworks and planting shall be used adjacent to the abutments and shall aid their integration into the landscape. The positioning of gantries and other infrastructure on the viaduct shall be designed to avoid accentuating the height and massing of the viaduct so far as reasonably practicable. The viaduct shall not be lit.
S9.17	Diversion of FP200	The existing alignment of FP200 is through common land and the re-aligned route shall be through replacement common land. The quality of the route shall not be inferior to the existing route, and areas of tree planting will screen this route from the road. The area of common land will not be diminished.

4.6 S10 – Chadwell Link

Plate 4.7 Section 10 – Chadwell Link



4.6.1 The principles in Table 4.6 apply to all works in the Environmental Masterplan (REF TBC), and shown approximately by the teal area in Plate 4.7 above for reference subject to the Order Limits.

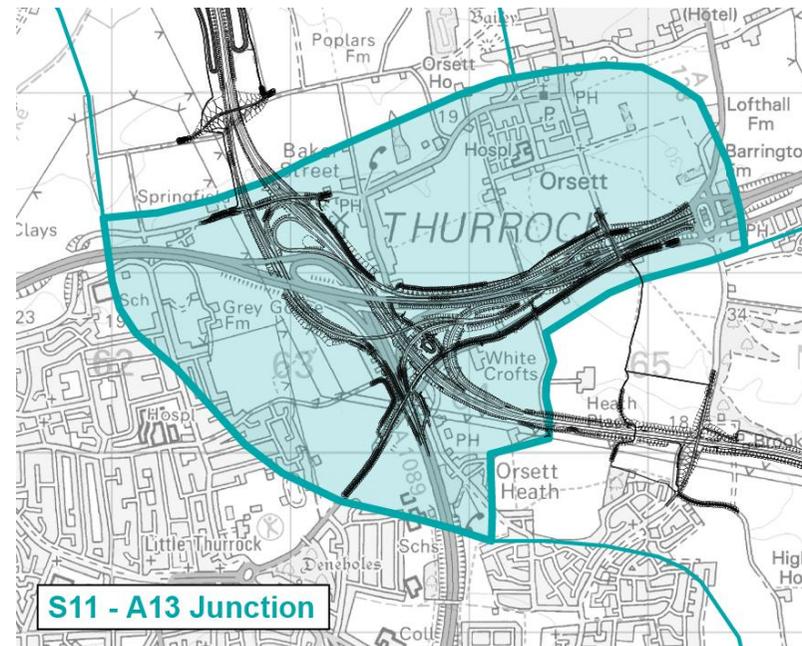
Table 4.6 Section specific principles: Section 10 – Chadwell Link

Clause no.	Design principle name	Design principle
S10.01	Landscape integration of Muckingford Road green bridge	<p>Continuous hedgerow shall be planted along the alignment of Muckingford Road Bridge (Ref. BRN0000030) to connect landscape either side of the Project route and to maintain existing character.</p> <p>In order to counter the isolation of Linford and East Tilbury, the east-west inter-urban connectivity for access to employment and services shall be improved for WCHs.</p> <p>There shall be a new shared track parallel to Muckingford Road to provide a better connection between residential areas and areas of employment. Where the realignment of Muckingford Road is necessary, this track shall be adjacent to the road. Where Muckingford Road is not realigned, this track shall avoid impacting on hedgerows as far as is reasonably practicable and shall be behind hedgerows if the existing verge width does not allow its construction without impacting trees and hedgerows. Earthwork slopes to bridges shall also incorporate shaping around the existing pylon to achieve the required clearance zones.</p>
S10.02	Planting to natural valley	<p>In accordance with the local landscape character and to make the Project route less prominent, woodland planting and grassland shall follow the natural valley topography rather than Project. Woodland shall be planted on top of earthworks to follow the current pattern and connect into existing features.</p>
S10.03	Landscape integration of Hoford Road green bridge	<p>The approaches to Hoford Road Bridge shall be retained as far as practicable along its existing route. Where vegetation is to be removed along the route, it shall be reinstated with hedgerow and tree planting where reasonably practicable to retain the historic character of a protected lane. Where Hoford Road crosses the Project, the green bridge shall be designed to be integrated within the landscape. It will reflect the existing character of the protected land, with a sunken lane character, and appropriate hedgerow and tree planting.</p>
S10.04	Screening planting	<p>Woodland planting shall link Hoford Road and Brentwood Road to provide visual mitigation for users of the golf course and footpath networks to the north, in the absence of false cut earthworks. Where appropriate and within the Order Limits, existing hedgerows shall be replanted and strengthened.</p>
S10.05	Acoustic mitigation to Brooks Farm	<p>Appropriate noise mitigation barriers are to be provided adjacent to Brooks Farm. The landscaping shall be planted to soften the visual impact of the noise mitigation proposals.</p>

Clause no.	Design principle name	Design principle
S10.06	Setting of the scheduled monument (causewayed enclosure and Anglo-Saxon cemetery)	Impacts on the scheduled monuments shall be avoided as far as reasonably practicable.
S10.07	Impact on Rainbow Shaw Local Wildlife Site	Vegetation removal within Rainbow Shaw Local Wildlife Site shall be kept to a minimum, and an area of land contiguous with the site (to its north) will be planted to offset woodland loss as defined in the Environmental Masterplan (REF TBC).
S10.08	CH Cole Irrigation reservoir	The existing reservoir and the associated bankside vegetation shall be remodelled and vegetation retained as far as practicable.
S10.09	WCH requirements	A bridleway connection shall be made between the A1013 and High House Lane by the re-designation of Footpath 79 to bridleway, the re-designation of the stretch of Footpath 95 between Footpath 79 and Brentwood Road and the designation of the realigned Footpath 78 between Brentwood Road and High House Lane as bridleway. This route shall be surfaced with an appropriate material for all permitted users and be appropriate to context. The existing route of FP79 shall be maintained up until bridge earthworks force it to be diverted in order to prevent impacts on existing hedgerows.

4.7 S11 – A13 Junction

Plate 4.8 Section 11 – A13 Junction



- 4.7.1 The principles in Table 4.7 apply to all works in the Environmental Masterplan (REF TBC) Section 11 sheets 1-22, and shown approximately by the teal area in Plate 4.8 above for reference subject to the Order Limits.

Table 4.7 Section specific principles: Section 11 – A13 Junction

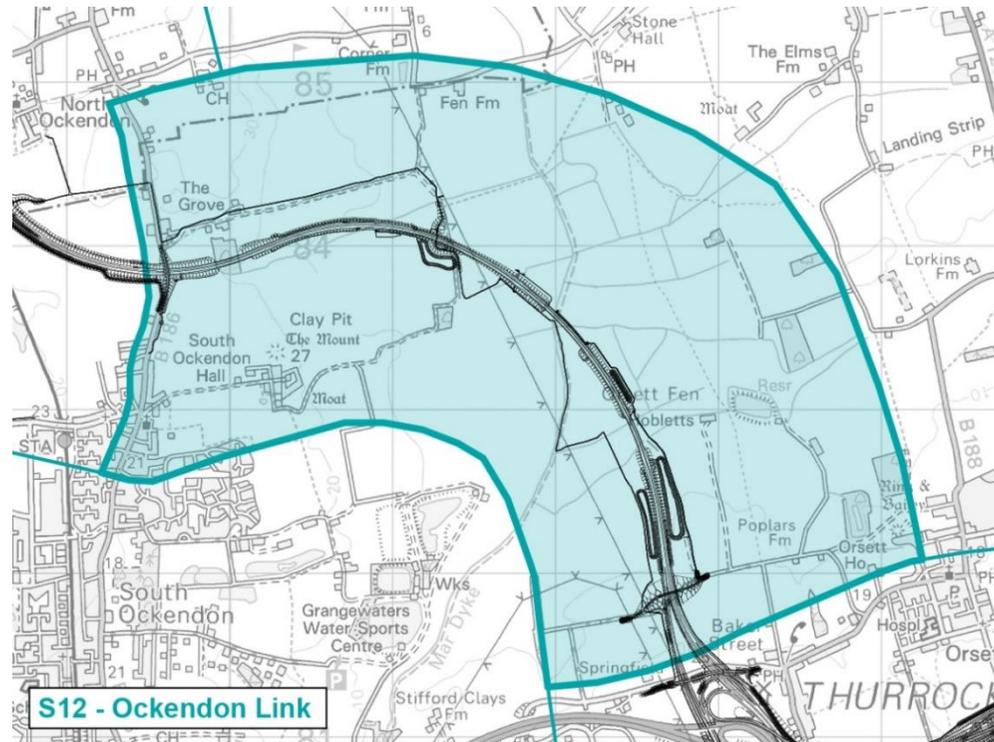
Clause no.	Design principle name	Design principle
S11.01	Planted earthworks within the Junction	All areas within the A13 junction are to be woodland planted to create a wooded character and enclose views in accordance with the overarching design principle. Within the islands of the A13 junction, earthworks shall be softened and modulated to appear more naturalistic and integrated into the landscape. Hard engineered edges to earthworks shall be avoided and softened and planted with woodland. Exceptions shall be made where woodland planting and/or earthworks impact on visibility splays within the highway. Land parcels between Project slip roads that cannot be easily accessed for return to agriculture shall be grassland planted with linear belts of trees and scrub to reflect the historic landscape character.
S11.02	Not used	-
S11.03	Reducing light pollution	The design of the lighting on the elevated slip roads shall seek to minimise light pollution, subject to relevant standards.
S11.04	Scheduled monument (Crop mark complex, Orsett)	The detailed design of structures in the junction and the landscape scheme shall seek to minimise as far as reasonably practicable the impact on buried archaeology, specifically the scheduled monument.
S11.05	Baker Street and Orsett conservation area	Earthworks associated with A13 southbound slip road shall be carefully planted to reduce visual impacts on the Baker Street and Orsett conservation area and integrate the design of acoustic fencing on the embankment, acoustic screens on the bridge and the reinforced acoustic bund adjacent to the windmill as far as is reasonably practicable.
S11.06	Ron Evans Memorial Community Field	The Ron Evans Memorial Field (Blackshots Nature Reserve) and its vegetation shall be retained as far as reasonably practicable. To integrate new areas of planting into its setting, scrub and species-rich grassland shall be planted on the earthworks slopes and within islands of the A13 junction within the existing boundary of Blackshots Nature Reserve. Replacement open space shall be designed to be of the same character and planting as Blackshots Nature Reserve.
S11.07	Hornsby Lane	Scattered trees and scrub planting shall be planted along the former alignment of Hornsby Lane, including on Project earthworks to connect the existing vegetation along the retained sections of Hornsby Lane.

Clause no.	Design principle name	Design principle
S11.08	Landscape under overhead lines	Further to LSP.10, where woodland planting around the junction conflicts with overhead utilities (both existing and diverted), scrub planting of suitable species shall be planted to connect areas of woodland and provide a diversity of planting palettes. Any such planting will need to be agreed with the utility provider in accordance with LSP.02.
S11.09	Baker Street Mills	To limit the land required near the windmill on Baker Street, an earth bund shall be designed to provide visual and noise mitigation without impacting on access. Woodland planting shall be provided where reasonably practicable on the outward slope.
S11.11	Green Lane Bridge landscape integration	Green Lane Bridge is to have continuous hedgerow planting across the extents of the bridge to ensure continuity of route for bats, and appropriate grassland planting to connect habitats either side of the bridge.
S11.12	Gammonfield Travellers' site	<p>The residents of Gammonfield Travellers' site shall be relocated to a new purpose-built site nearby. The design of this replacement site shall be developed to meet current guidance including Designing Gypsy and Traveller Sites – Good Practice Guide (Department for Communities and Local Government, 2008).</p> <p>The residents shall be consulted regarding the design and layout of the site and on the process for relocating to the new site. Consultation shall meet the guidance laid out in Designing Gypsy and Traveller Sites – Good Practice Guide (Department for Communities and Local Government, 2008). See also Requirement 12 of the DCO (REF TBC).</p> <p>The new travellers' site shall be constructed in accordance with an indicative plan which will be consulted on with Thurrock Council and traveller representatives.</p> <p>Specifically, the new site shall include 21 pitches with associated hard standing and amenity blocks, a site manager's office and associated utilities. The current three groupings of pitches around separate accesses shall be maintained as far as practicable in the new site. The new site design shall be developed according to the principles of Secured by Design. The new travellers' site shall be constructed in accordance with a subsequently agreed indicative plan and developed by the Contractor with Thurrock Council and traveller representatives.</p>
S11.13	Stifford Clays Road shared walking/cycle track	In order to better connect the Baker Street area to William Edwards School, the existing shared walking/cycling track adjacent to Stifford Clays Road shall be extended from its present end at Springfield Farm as far as 6 Stifford Clays Road. This extended track shall be 3.5m wide and be separated from the highway by a strip of planting. The surface will be appropriate to cycle and pedestrian use.

Clause no.	Design principle name	Design principle
S11.14	A1013 shared walking/cycling route	The A1013 is a relatively busy cycle commuter route. There is an existing shared pedestrian-cycle route adjacent to it. In order to improve the cycle connection along the A1013, this facility shall be re-established where the A1013 is realigned, and replaced where it is not, with a 3.5m wide shared use facility. This new/replacement facility shall extend between Orsett Cock roundabout to 44 Stanford Road. There shall be a 2m separation between this track and the highway. A Pegasus crossing shall be provided in order to allow safe crossing from the south side of the A1013 to Rectory Road. Between this crossing and Footpath 79, a separate equestrian track shall also be provided parallel to the pedestrian-cycle track. The surface of the new shared route shall be asphalt. The adjacent equestrian track shall have a construction and surface finish appropriate to equestrian use.
S11.15	Baker Street shared walking/cycle track	Baker Street is a frequently used cycle route. In order to promote active travel where it is being realigned between the A1013 and the A13 underpass, a shared use pedestrian/cycle route shall be provided adjacent to the highway. This shared use facility shall have an asphalt finish.

4.8 S12 – Ockendon link

Plate 4.9 Section 12 – Ockendon link



4.8.1 The principles in Table 4.8 apply to all works in the Environmental Masterplan (REF TBC) Section 12 sheets 1-24, and shown approximately by the teal area in Plate 4.9 above for reference subject to the Order Limits.

Table 4.8 Section specific principles: Section 12 – Ockendon Link

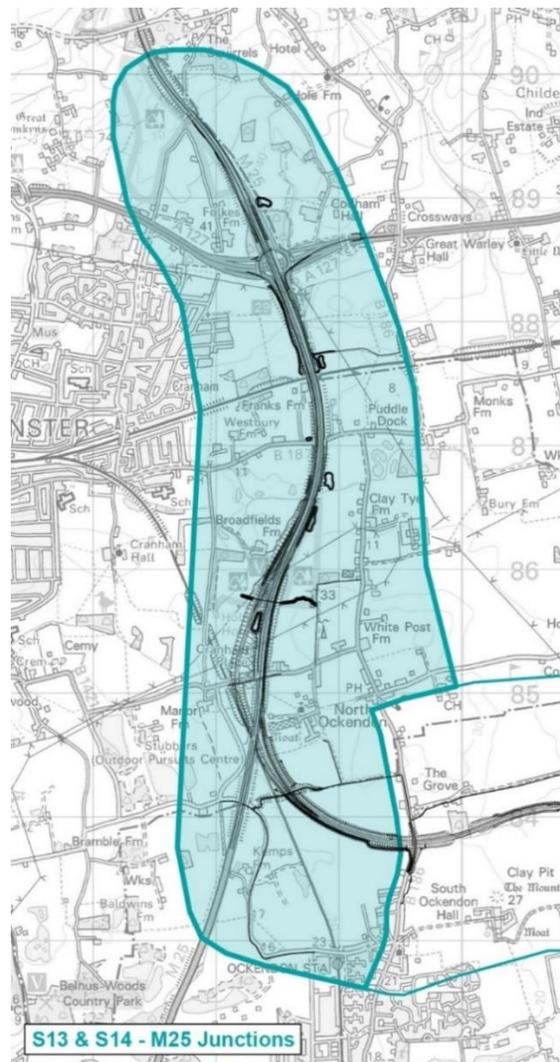
Clause no.	Design principle name	Design principle
S12.01	Mardyke Valley landscape approach	Given the landscape character of limited tree and hedgerow cover and flat topography, the footprint of earthworks shall be reduced in this area so far as reasonably practicable. Where earthworks cannot be avoided, woodland planting and creation of wetland shall be used to integrate the earthworks into the wider landscape of fenland character to soften their appearance.
S12.02	Woodland block planting	Planting of woodland blocks shall be provided to help break up long-distance views across the fenland and views of the embankments and viaducts. It shall follow historic and existing landscape patterns and be rectangular in nature or follow existing field boundaries. Woodland planting shall be positioned at the base of the earthworks and encroach up the earthwork slopes. Species at the base of earthworks and near watercourses and drainage ditches shall be suitable for wetland habitats and be reflective of the fenland character.
S12.03	Mardyke and Orsett Fen Viaduct design	The form and structure of Mardyke and Orsett Fen Viaducts shall be designed, so far as reasonably practicable and within the limits of the DCO powers, to maximise habitat and landscape connectivity, to minimise intrusion into the wider landscape and to maximise views through the viaduct structure that maintain the expansive views across the open, flat landscape. The positioning of gantries and other infrastructure on the viaduct shall be designed to avoid accentuating the height and massing of the viaduct so far as reasonably practicable. The viaduct shall not be lit.
S12.04	BR219: Mardyke Trail under the viaduct	To minimise the impact on users of BR219 and retain the open views across the fen, the viaduct shall be designed to seek to maximise space and clearance underneath.
S12.05	Height of the Mardyke and Orsett Fen Viaducts	Flood resilience shall be provided at the viaducts in Orsett Fen by elevating their soffits to a level that exceeds the potential flood level plus freeboard. To allow for easy movement of farm equipment, the Mardyke Viaduct shall be designed to be a suitable height to allow vehicles to pass safely underneath with adequate clearance. Where the Project crosses the statutory main rivers Mardyke, Orsett Fen Sewer and Golden Bridge Sewer, to protect river banks and facilitate access by the Environment Agency to these watercourses to undertake maintenance activities, a bankside access track would be incorporated into the design of the crossings, the width of which would be subject to consultation with the Environment Agency.

Clause no.	Design principle name	Design principle
S12.06	Wetland habitat creation	Subject to the constraints of the DCO, land between the Mardyke and the viaduct shall be restored to suitable wetland habitat to integrate the built structure into the wider fenland landscape.
S12.07	Watercourse enhancements	Where reasonably practicable, vegetation shall be retained along the Mardyke, and along tributary watercourses and ditches, to maintain the existing fenland landscape character.
S12.08	North Road WCH Route	A segregated pedestrian, cycle and equestrian track shall be provided parallel to North Road between eastern end of Footpath 151 and the junction of Wilsman Road and North Road in South Ockendon. This shared track shall be to the east of North Road and connect Footpath 151 with Footpath 135 and with South Ockendon in order to facilitate east-west WCH links that are prevented by the level of traffic on North Road. By linking the western end of Footpath 135 to South Ockendon, and the creation of a link between Footpaths 135 and 136, a circular route shall be formed. In conjunction with other improvements, this track shall further improve access to the PROW network for the residents of South Ockendon by providing access to Thames Chase Forest Centre via Footpath 151. A Pegasus crossing shall be provided where Footpath 151 terminates at North Road in order to allow PROW users to safely cross North Road directly onto this new track. This track shall be 3.5m wide, although local narrowing may be necessary at The Grove. Due to the frequent use of North Road by cyclists, the surface shall be an appropriate material, suitable for all users.
S12.09	Mardyke River Link	The Project shall include enhancements to surfaces and signage of Mardyke trail within the Order Limits and its connection into the PROW network, in accordance with 3.07 of The Thames Chase Plan (Thames Chase Trust, 2014).
S12.10	Linear woodland adjacent landfill site	North of the Mardyke Valley, woodland shall be planted along the Project route and the existing landfill, following the route of the existing and diverted watercourse.
S12.11	Hedgerow screening north of Project	Hedgerows shall be planted at the top of the cutting slopes between The Wilderness and the embankment to the FP136 Overbridge, screening the cutting and creating a link between the two. Slopes shall be seeded with species-rich grassland.

Clause no.	Design principle name	Design principle
S12.12	Wilderness vegetation retention	Existing woodland planting at The Wilderness shall be retained as far as practicable and the construction of retaining walls and watercourse diversions shall be optimised to reduce tree loss. New woodland will be provided adjacent to the retaining walls north and south of the Project route within the boundaries of the existing wood. Suitable set back distances shall be provided between the replanted woodland and the edge of the retaining wall for safe maintenance and to avoid trees falling onto the Project route.
S12.13	Landscape Integration of North Road green bridge	Hedgerows shall be planted to the top of the cutting between The Wilderness and North Road, connecting into hedgerow planting over North Road green bridge. Slopes to be grassland-planted with suitable buffer at top of slope for habitat connectivity.
S12.14	Landscape integration of FP136 Overbridge	Earthworks to the proposed FP136 Overbridge shall be woodland and scrub-planted and integrated into the surrounding planting to maintain ecological connectivity.

4.9 S13 & S14 – M25 junctions

Plate 4.10 Section 13 & 14 – M25 junctions



4.9.1 The principles in Table 4.9 apply to all works in the Environmental Masterplan (REF TBC) Section 13 sheets 1-14 and Section 14 sheets 1-14, and shown approximately by the teal area in Plate 4.10 above for reference subject to the Order Limits.

Table 4.9 Section specific principles: Section 13 & 14 – M25 Junctions

Clause no.	Design principle name	Design principle
S14.01	Woodland planting to junction	In accordance with LSP.10, existing woodland within islands created by the Project junction with the M25 shall be retained and infilled with woodland planting where indicated on the Environmental Masterplan (REF TBC), whilst maintaining visibility splays at all times. Further, woodland shall also be planted in parcels of land between the Project and the railway line, which cannot be meaningfully returned to previous land use.
S14.02	Woodland planting to field boundaries	Between FP151 and the B186, new woodland planting shall be provided along existing field boundaries as shown in the Environmental Masterplan (REF TBC) to strengthen the local rectilinear field pattern and to break up wider views.
S14.03	Planting to Thames Chase Community Forest	Where reasonably practicable, planting shall be undertaken early during the construction phase on the boundary with the Thames Chase Community Forest to screen the Project.
S14.04	Thames Chase Community Forest bridge	In order to meet the vision of Thames Chase Trust to create a connected network of links and accessible vibrant green spaces, the Project shall connect the Thames Chase Community Forest across the M25 with a new foot, cycle and equestrian bridge. The bridge shall be sympathetic to the local topography, it shall be approximately 220m long and span between the tops of the cutting so as not to visually constrain the view along the M25 cutting.
S14.05	Community engagement at Thames Chase Community Forest	The design of new areas of woodland planting south of the Thames Chase Community Forest, shall be developed in collaboration with Thames Chase Trust.
S14.06	Earthworks within Thames Chase Community Forest	Tree removal will be kept to a minimum within the Thames Chase Community Forest unless to create false cut earthworks for noise mitigation. To minimise tree loss adjacent to the visitor centre and close to existing Thames Chase assets, outward slopes are to be 1:4 to allow for woodland planting.
S14.07	Planting north of Ockendon Road	North of Ockenden Road, in the island created between the Project northbound and the M25, access shall be returned to the landowner to continue cultivation of the remaining field. The land shall be profiled at gradients suitable for a return to agricultural use, except around the existing pylon. In accordance with design principle LSP.10 of giving junctions a wooded character, appropriate woodland planting around the edge of the retained field shall be provided.

Clause no.	Design principle name	Design principle
S14.08	Path/water main diversion	The water main diversion shall be located to minimise the amount of vegetation removal within the Thames Chase Community Forest. A bridleway shall be designed over the top of the water main diversion, with suitable planting provided within the easement of the utilities corridor.
S14.09	Franks Farm retaining wall	To limit the land required adjacent to the Listed Franks Farm and the property of St Mary's Lane, a retaining wall rather than earthworks shall be provided. Either soft landscaping shall be provided to soften the visual impact of the structures or planted green walls shall be provided.
S14.10	A127 WCH route	A new WCH bridge over the A127 to the east of junction 29 of the M25 shall allow users of the A127 footway to cross between the north and south sides of the A127 in order to use new at-grade crossings through the north side of the junction. Combined with use of the existing at grade crossing at the junction of Front Lane and the A127, this will maintain connectivity. This new bridge shall be suitable for cyclists and pedestrians, with ramps at appropriate gradients. Where the existing roadside route is interrupted by the new slips to the south-east of the junction, this route will turn to the south to connect with an existing bridleway. This shall be diverted to follow the bottom of earthworks to the slips until it can resume on its existing alignment to the north of the rail line. Where this route diverges from the A127, the surface shall be appropriate for equestrian use.
S14.11	Dennis Road WCH track	Dennis Road is a frequently used cycle route with no existing WCH provision. A shared track for WCH shall be introduced to the north of Dennises Lane and Dennis Road from the junction of Pea Lane and Dennises Lane to the junction of Arisdale Ave and West Road in South Ockendon. This new route shall connect residents of South Ockendon to Little Belhus Country Park, a new country park. In conjunction with other improvements, this route shall also link Little Belhus Country Park to the Thames Chase Forest Centre. This track shall largely be behind an existing treeline/hedgerow along the field boundaries. It shall be surfaced in material appropriate for the rural character of the setting, whilst providing a robust enough surface for frequent cycle use.
S14.12	Open space and woodland compensation	The quantity and quality of the site, shown on the Environmental Masterplan (REF TBC shall match the existing land and existing use within the designated open space.

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Appendix A Planting Palettes

Planting Palette

LE1.3 SPECIES RICH GRASSLAND

Earth movement will form a large part of the works. This disturbance and stockpiling of materials gives the opportunity to create favourable conditions for species diverse wildflower grassland. Over the last 90 years 97% of wildflower habitat in the UK has been lost, often through a decision by landowners to increase soil fertility, which increases the land's productivity but also results in reduced biodiversity. Stress tolerant wildflowers are able to survive alongside competitive grass species providing the competitor species do not have the resources they need to dominate. A low fertility soil and an appropriate maintenance regime will facilitate this aim, creating a linear habitat that facilitates the movement of declining pollinators.



Achillea millefolium



Agrimonia eupatoria



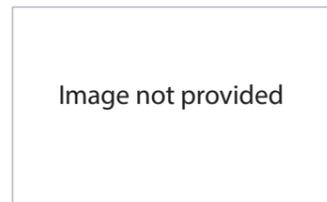
Anthyllis vulneraria



Centaurea nigra



Centaurea scabiosa



Cruciata laevipes



Daucus carota



Filipendula vulgaris



Galium verum



Knautia arvensis



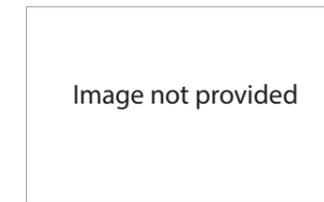
Leontodon hispidus



Leucanthemum vulgare



Malva moschata



Ononis spinosa



Origanum vulgare



Plantago media



Poterium sanguisorba



Primula veris



Prunella vulgaris



Scabiosa columbaria



Briza media



Carex flacca



Cynosurus cristatus



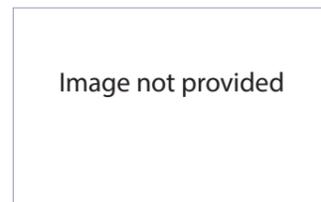
Festuca ovina



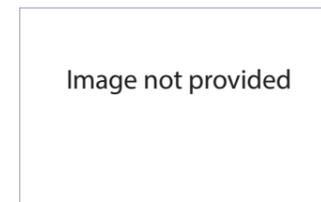
Festuca rubra



Koeleria macrantha



Phleum bertolonii



Trisetum flavescens

Planting Palette

LE1.3 SPECIES RICH - CHALK



Achillea millefolium



Agrimonia eupatoria



Centaurea nigra



Galium album



Galium verum



Geranium pratense



Knautia arvensis



Leontodon hispidus



Leucanthemum vulgare



Malva moschata



Plantago lanceolata



Primula veris



Prunella vulgaris



Ranunculus acris



Ranunculus bulbosus



Rhinanthus minor



Rumex acetosa



Silene vulgaris



Taraxacum officinale



Vicia sativa ssp. segetalis



Agrostis capillaris



Anthoxanthum odoratum



Briza media



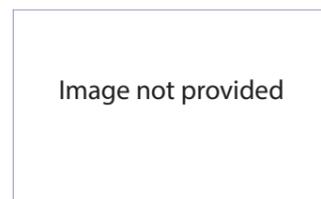
Cynosurus cristatus



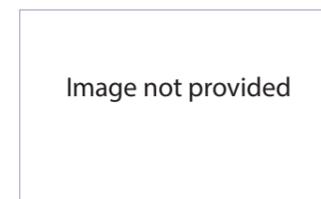
Festuca ovina



Festuca rubra



Phleum bertolonii



Trisetum flavescens

Planting Palette

LE 2.1 Woodland Innerstand

The planting of whips aims to accelerate the creation of woodland, by skipping the earlier phases of natural regeneration that would be experienced under natural colonisation. With appropriate management, the whips are able to fuse a low canopy that will help to suppress the germination and development of species that would have dominated the plantation in earlier phases of natural regeneration. The species include:-

- Nurse species: Fast growing pioneer trees that will start to form a taller canopy whilst offering a level of protection to slower growing species and in some instances improve soil productivity. A small proportion of Italian Alder (*Alnus cordata*) is included to help improve soil productivity and strengthen the resilience of the plantation against climate change through increased diversity. Can be gradually thinned to quicken the succession process.
- Ultimate canopy: Species that will form the dominant canopy of the mature woodland.
- Sub dominant canopy: Species that will form a layer just below the ultimate canopy of the mature woodland. The naturalised species, Sweet Chestnut (*Castanea sativa*) is included to mirror what is a prominent element within the adjacent ancient woodlands and to strengthen the resilience of the plantation against climate change through increased diversity. The native Wild Service Tree (*Sorbus torminalis*) has been included for its broad native range to the south, stretching into North Africa.
- Understorey shrubs: Shrub species that will be prominent in the early years when light exclusion is limited and will continue to form a lower storey within the developing woodland.

South

Nurse species



Alnus cordata 7.5%



Betula pendula 12.5%

Ultimate canopy



Fagus sylvatica 7.5%



Quercus robur 12.5%

Offering soil conditioning and quickly established shelter. To be gradually reduced in number as the plantation matures.

Sub dominant canopy



Carpinus betulus 4%



Castanea sativa 7%



Prunus avium 4%

Smaller trees



Acer campestre 3%



Sorbus torminalis 4%



Taxus baccata 3%

Understorey shrubs



Corylus avellana 15%



Crataegus monogyna 7.5%



Euonymus europaeus 2.5%



Ilex aquifolium 5%



Sambucus nigra 5%

Planting Palette

LE 2.1 Woodland - inc Non-native Species Innerstand

The species include:-

- Nurse species: Fast growing pioneer trees that will start to form a taller canopy whilst offering a level of protection to slower growing species and in some instances improve soil productivity. A proportion of Italian Alder (*Alnus cordata*) is included to help improve soil productivity and strengthen the resilience of the plantation against climate change through increased diversity. Can be gradually thinned to quicken the succession process.
- Ultimate canopy: Species that will form the dominant canopy of the mature woodland. Small proportions of Silver Lime (*Tilia tomentosa*) and Black Pine (*Pinus nigra*) are included to strengthen the resilience of the plantation against climate change through increased diversity.
- Sub dominant canopy: Species that will form a layer just below the ultimate canopy of the mature woodland. The native Wild Service Tree (*Sorbus torminalis*) has been included for its broad native range to the south, stretching into North Africa, which should help the tree adapt to the UK's changing climate.
- Understorey shrubs: Shrub species that will be prominent in the early years when light exclusion is limited and will continue to form a lower storey within the developing woodland.

South

Nurse species



Alnus cordata 7.5%



Betula pendula 12.5%

Ultimate canopy



Fagus sylvatica 12%



Quercus robur 7%



Tilia tomentosa 5%

Offering soil conditioning and quickly established shelter. To be gradually reduced in number as the plantation matures.

Sub dominant canopy



Carpinus betulus 5%



Prunus avium 5%

Smaller trees



Acer campestre 4%



Sorbus torminalis 4%



Taxus baccata 3%

Understorey shrubs



Corylus avellana 15%



Crataegus monogyna 7%



Euonymus europaeus 3%



Ilex aquifolium 5%



Sambucus nigra 5%

Planting Palette

LE 2.1 Woodland - inc Non-native Species Innerstand (cont)

North

Nurse species



Alnus cordata 7.5%



Betula pendula 12.5%

Offering soil conditioning and quickly established shelter. To be gradually reduced in number as the plantation matures.

Ultimate canopy



Fagus sylvatica 7.5%



Quercus robur 7.5%



Tilia tomentosa 5%

Sub dominant canopy



Carpinus betulus 5%



Pinus nigra 5%



Prunus avium 5%

Smaller trees



Acer campestre 3%



Sorbus torminalis 4%



Taxus baccata 3%

Understorey shrubs



Corylus avellana 15%



Crataegus monogyna 7.5%



Euonymus europaeus 2.5%



Ilex aquifolium 5%



Sambucus nigra 5%

Planting Palette

LE 2.1 Woodland - inc Non-native Species Land that has been heavily impacted by construction. i.e. construction compounds, embankment earthworks inc. false cuttings

The species include:-

- Nurse species: The nurse species make up 45-50% of the species composition within this mix. The development of mature woodland on poorer land can take much longer. A large proportion of nurse species that can more easily deal with the poor conditions will help to provide woodland cover sooner, whilst improving the soil condition which will improve growing conditions for other species. A large proportion of Italian Alder (*Alnus cordata*) is included to help improve soil productivity and strengthen the resilience of the plantation against climate change through increased diversity.
- Ultimate canopy: Species that will form the dominant canopy of the mature woodland. The species have been selected for their ability to adapt to poor soil conditions and a changing climate, rather than for their relationship to nearby woodlands. Small leaved Lime (*Tilia cordata*), Silver Lime (*Tilia tomentosa*), Black Pine (*Pinus nigra*) and Norway Maple (*Acer platanoides*) make up this group.
- Sub dominant canopy: Species that will form a layer just below the ultimate canopy of the mature woodland. The native Wild Service Tree (*Sorbus torminalis*) has been included for its broad native range to the south, stretching into North Africa, which should help the tree adapt to the UK's changing climate.
- Understorey shrubs: Shrub species that will be prominent in the early years when light exclusion is limited and will continue to form a lower storey within the developing woodland.

South				
Nurse species	Ultimate canopy	Sub dominant canopy	Smaller trees	Understorey shrubs
 <i>Alnus cordata</i> 35%	 <i>Acer platanoides</i> 4%	 <i>Prunus avium</i> 5%	 <i>Acer campestre</i> 3%	 <i>Corylus avellana</i> 13%
 <i>Betula pendula</i> 5%	 <i>Tilia cordata</i> 6%		 <i>Sorbus aucuparia</i> 3%	 <i>Crataegus monogyna</i> 5%
	 <i>Tilia tomentosa</i> 4%		 <i>Sorbus torminalis</i> 3%	 <i>Ilex aquifolium</i> 5%
			 <i>Taxus baccata</i> 4%	 <i>Sambucus nigra</i> 5%

Offering soil conditioning and quickly established shelter. To be gradually reduced in number as the plantation matures.

Planting Palette

LE 2.1 Woodland - inc Non-native Species
Land that has been heavily impacted by construction. i.e. construction compounds, embankment earthworks inc. false cuttings (cont)

North				
Nurse species	Ultimate canopy	Sub dominant canopy	Smaller trees	Understorey shrubs
 Alnus cordata 40%	 Acer platanoides 3.5%	 Pinus nigra 5%	 Acer campestre 2.5%	 Corylus avellana 10%
 Betula pendula 10%	 Tilia cordata 3.5%	 Prunus avium 2.5%	 Sorbus torminalis 2.5%	 Crataegus monogyna 5%
Offering soil conditioning and quickly established shelter. To be gradually reduced in number as the plantation matures.	 Tilia tomentosa 3.5%		 Sorbus aucuparia 2%	 Ilex aquifolium 5%
				 Sambucus nigra 5%

Planting Palette

LE 2.1 Woodland - inc Non-native Species Green bridges

Only used on Thong Lane Heavyweight Green Bridge

All the green bridge mixes have been built around plants capable of withstanding a higher level of water stress that will be created by the bridge's limited soil depth and raised soil level as well as climate change. The general arrangement over Thong Lane Heavyweight Green Bridge aims to create a woodland corridor across the bridge that also creates a sense of separation between LTC and local road and active travel routes. The shrub mix has been selected to continue the feeling of woodland across green bridge. The shrub mix will limit plantation height and their multi-stemmed structure is less susceptible to wind blow, a potentially serious issue on a narrow bridge. Where space allows, this taller mix will be specified on Thong Lane Heavyweight Green Bridge, with 25% tree species it will emphasise the feeling that the woodland is continuous. As the planting mix develops, its height will help to reduce people's perception of crossing a bridge.

Species



Acer negundo 2.5%



Betula pendula 7.5%



Castanea sativa 2.5%



Cornus sanguinea 15%



Corylus avellana 10%



Crataegus monogyna 25%



Ilex aquifolium 5%



Quercus petraea 10%



Rhamnus cathartica 10%



Taxus baccata 2.5%



Viburnum lantana 10%

Planting Palette

LE2.2 Woodland edge

In addition to a light demanding edge for woodland, woodland edge species have also been used over wider areas where a lower level plantation is required (ie. under overhead power lines) that still gives the impression of woodland when viewed from outside the plantation. Ongoing maintenance will need to limit the development of taller tree species, which may self seed and start to colonise the plantation.

South



Buxus sempervirens 10%



Corylus avellana 10%



Crataegus monogyna 35%



Euonymus europaeus 5%



Ilex aquifolium 10%



Ligustrum vulgare 5%



Malus Sylvestris 5%



Sambucus nigra 10%



Viburnum opulus 10%

Planting Palette

LE2.2 Woodland edge (cont)

North



Corylus avellana 10%



Crataegus monogyna 20%



Euonymus europaeus 5%



Ilex aquifolium 5%



Prunus cerasifera 10%



Prunus spinosa 15%



Rosa arvensis 5%



Rosa canina 15%



Sambucus nigra 10%



Ulex europaeus 5%

Planting Palette

LE 2.2 Woodland Edge - Low LE 2.8 Scrub

This mix includes low growing species typically found in a woodland edge. It has been composed to fulfill an aesthetic function, capable of softening the appearance of engineered earthworks without highlighting the alignment of the route from the surrounding landscape. These low growing pioneer species have a higher stress tolerance and will better suited to deal with the growing conditions on a partially compacted steep bank, especially on a false cutting. Therefore these species may be most appropriate to the growing conditions along much of the route even if they are not a dominant species growing within the more natural soil profiles surrounding the route.

North



Cornus sanguinea 27.5%



Ilex aquifolium 5%



Malus sylvestris 2.5%



Prunus spinosa 35%



Rosa arvensis 15%



Rosa canina 15%

Planting Palette

LE.2.2 Woodland Edge - Use on Green bridges

The green bridge low mix has been selected to continue the feeling of woodland and/or untrimmed hedgerows (depending on planting area) across green bridges. The low mix will limit plantation height and their multi-stemmed structure is less susceptible to wind blow, a potentially serious issue on a narrow bridge. As the planting mix develops, its dense edge will help to reduce people's perception of crossing a bridge.

Species



Cornus sanguinea 15%



Corylus avellana 12.5%



Crataegus monogyna 30%



Euonymus europaeus 5%



Ilex aquifolium 7.5%



Prunus spinosa 10%



Rhamnus cathartica 7.5%



Ulex europaeus 5%



Viburnum lantana 7.5%

Planting Palette

LE 2.2 Woodland Edge - Scrub

Scrub woodland aims to replicate the early stages of scrub transitioning into woodland. It is an effective way of establishing woodland on more challenging sites over a longer period. It includes pioneer tree species and other tree species that would typically form part of a sub dominant canopy layer in mature woodland. Slow growing ultimate canopy trees are not included within the mix at time of planting.

South



Acer campestre 5%



Cornus sanguinea 25%



Corylus avellana 5%



Crataegus monogyna 20%



Ilex aquifolium 5%



Juniperus communis 15%



Ligustrum vulgare 5%



Prunus avium 5%



Sambucus nigra 5%



Viburnum lantana 5%



Viburnum opulus 5%

Planting Palette

LE 2.2 Woodland Edge - Scrub (cont)

North



Acer campestre 5%



Betula pendula 2.5%



Corylus avellana 5%



Crataegus monogyna 20%



Ilex aquifolium 5%



Prunus avium 5%



Prunus cerasifera 10%



Prunus spinosa 15%



Rosa arvensis 5%



Rosa canina 15%



Sambucus nigra 5%



Sorbus aucuparia 2.5%



Ulex europaeus 5%

Planting Palette

LE 2.4 Linear Belt Of Shrubs And Trees

South				
Nurse species	Ultimate canopy	Sub dominant canopy	Smaller trees	Understorey shrubs
 Alnus cordata 7.5%	 Fagus sylvatica 12%	 Carpinus betulus 5%	 Acer campestre 4%	 Corylus avellana 15%
 Betula pendula 12.5%	 Quercus robur 7%	 Prunus avium 5%	 Sorbus torminalis 4%	 Crataegus monogyna 7%
<p>Offering soil conditioning and quickly established shelter. To be gradually reduced in number as the plantation matures.</p>	 Tilia tomentosa 5%		 Taxus baccata 3%	 Euonymus europaeus 3%
				 Ilex aquifolium 5%
				 Sambucus nigra 5%

Planting Palette

LE 2.4 Linear Belt Of Shrubs And Trees (cont)

North				
Nurse species	Ultimate canopy	Sub dominant canopy	Smaller trees	Understorey shrubs
 <p><i>Alnus cordata</i> 7.5%</p>	 <p><i>Fagus sylvatica</i> 7.5%</p>	 <p><i>Carpinus betulus</i> 5%</p>	 <p><i>Acer campestre</i> 3%</p>	 <p><i>Corylus avellana</i> 15%</p>
 <p><i>Betula pendula</i> 12.5%</p>	 <p><i>Quercus robur</i> 7.5%</p>	 <p><i>Pinus nigra</i> 5%</p>	 <p><i>Sorbus torminalis</i> 4%</p>	 <p><i>Crataegus monogyna</i> 7.5%</p>
<p>Offering soil conditioning and quickly established shelter. To be gradually reduced in number as the plantation matures.</p>	 <p><i>Tilia tomentosa</i> 5%</p>	 <p><i>Prunus avium</i> 5%</p>	 <p><i>Taxus baccata</i> 3%</p>	 <p><i>Euonymus europaeus</i> 2.5%</p>
				 <p><i>Ilex aquifolium</i> 5%</p>
				 <p><i>Sambucus nigra</i> 5%</p>

Planting Palette

LE 2.5 Shrubs With Intermittent Trees

South



Acer campestre 5%



Cornus sanguinea 25%



Corylus avellana 5%



Crataegus monogyna 20%



Ilex aquifolium 5%



Juniperus communis 15%



Ligustrum vulgare 5%



Prunus avium 5%



Sambucus nigra 5%



Viburnum lantana 5%



Viburnum opulus 5%

Planting Palette

LE 2.5 Shrubs With Intermittent Trees (cont)

North



Acer campestre 5%



Betula pendula 2.5%



Corylus avellana 5%



Crataegus monogyna 20%



Ilex aquifolium 5%



Prunus avium 5%



Prunus cerasifera 10%



Prunus spinosa 15%



Rosa arvensis 5%



Rosa canina 15%



Sambucus nigra 5%



Sorbus aucuparia 2.5%



Ulex europaeus 5%

Planting Palette

LE 2.7 Scattered Trees

South



Carpinus betulus 25%



Fagus sylvatica 15%



Prunus avium 20%



Quercus robur 15%



Sorbus torminalis 10%



Tilia tomentosa 15%

Planting Palette

LE 2.8 Scrub



Cornus sanguinea 27.5%



Ilex aquifolium 5%



Malus sylvestris 2.5%



Prunus spinosa 35%



Rosa arvensis 15%



Rosa canina 15%

Planting Palette

LE 4.2 Native Species Hedge (trimmed)

LE 4.3 Native Species Hedge (untrimmed)

LE 4.4 Native Hedgerow With Trees

The hedge composition will be influenced by species present in the local vicinity and diversified where required with appropriate species that are capable of contributing to a strong dense hedge whilst providing resilience through diversity, a central theme to all the mixes. The climate change resilience of the north mix is further diversified by the inclusion of a small proportion of the naturalised species Cherry Plum (*Prunus cerasifera*). With the aim of creating a dense strong hedge, hedges will be planted in a trench with a triple staggered lines offset by 0.5m at 0.3m centres.

South



Carpinus betulus 15%



Cornus sanguinea 10%



Crataegus monogyna 35%



Ilex aquifolium 10%



Ligustrum vulgare 5%



Malus sylvestris 5%



Taxus baccata 5%



Viburnum lantana 15%

North



Acer campestre 15%



Carpinus betulus 15%



Crataegus monogyna 35%



Ilex aquifolium 10%



Malus sylvestris 5%



Prunus cerasifera 5%



Prunus spinosa 10%



Rosa canina 5%

Planting Palette

LE 4.2 Native Species Hedge (trimmed)

LE 4.3 Native Species Hedge (untrimmed)

LE 4.4 Native Hedgerow With Trees

Land that has been heavily impacted by construction. i.e. construction compounds, embankment earthworks inc. false cuttings

On poor land, the hedge composition will still be influenced by species present in the local vicinity. Species that have been found to tolerate poorer growing conditions have been introduced to the mix or make up a greater proportion of the mix in comparison with the standard hedge mix. As with the standard north hedge mix this mix includes a small proportion of the naturalised species Cherry Plum (*Prunus cerasifera*) to increase climate change resilience through diversity.

South



Acer campestre 35%



Cornus sanguinea 10%



Crataegus monogyna 25%



Ilex aquifolium 10%



Malus sylvestris 5%



Prunus cerasifera 5%



Viburnum lantana 10%

North



Acer campestre 35%



Crataegus monogyna 15%



Ilex aquifolium 10%



Prunus cerasifera 5%



Prunus spinosa 10%



Rosa canina 5%



Sorbus aucuparia 20%

Planting Palette

LE 4.2 Native Species Hedge (trimmed) Green bridges

The proposed green bridge hedgerow plant mix has been influenced by vegetation found in the surrounding area. However the mix and proportions have been altered to take account of the higher water stress created by the limited soil depth and raised soil profiling on the green bridge. The mix and proportions favour:-

- Drought tolerant plants
- Ability to contribute to a dense hedge with good form
- Fruiting species as a valuable food source for small mammals
- Presence in the local landscape

Species



Cornus sanguinea 20%



Corylus avellana 10%



Crataegus monogyna 45%



Ilex aquifolium 5%



Prunus spinosa 10%



Rhamnus cathartica 5%



Viburnum lantana 5%

Planting Palette

LE 6.2 Banks And Ditches

Expected flows and capacity usage through the year will help influence where these mixes, suited to wetter conditions are deployed. Seeding a broad range of species, many of which have a broad tolerance, will allow species to find appropriate growing conditions as part of a semi stable plant community requiring annual maintenance.

Banks and ditches



Achillea ptarmica



Angelica sylvestris



Caltha palustris



Centaurea nigra



Eupatorium cannabinum



Filipendula ulmaria



Geum rivale



Hypericum tetrapterum



Iris pseudacorus



Lotus pedunculatus



Lycopus europaeus



Lythrum salicaria



Mentha aquatica



Pulicaria dysenterica



Ranunculus acris



Sanguisorba officinalis



Silene flos-cuculi



Succisa pratensis



Vicia cracca



Agrostis capillaris



Alopecurus pratensis



Anthoxanthum odoratum



Briza media



Cynosurus cristatus



Deschampsia cespitosa



Festuca rubra



Hordeum secalinum

Planting Palette

LE 6.2 Banks And Ditches

Expected flows and capacity usage through the year will help influence where these mixes, suited to wetter conditions are deployed. Seeding a broad range of species, many of which have a broad tolerance, will allow species to find appropriate growing conditions as part of a semi stable plant community requiring annual maintenance.

Detention basin bases



Achillea millefolium



Achillea ptarmica



Betonica officinalis



Centaurea nigra



Filipendula ulmaria



Galium verum



Geranium pratense



Leontodon hispidus



Leucanthemum vulgare



Lotus pedunculatus



Plantago lanceolata



Primula veris



Prunella vulgaris



Ranunculus acris



Rhinanthus minor



Rumex acetosa



Sanguisorba officinalis



Silaum silaus



Taraxacum officinale



Vicia cracca



Agrostis capillaris



Alopecurus pratensis



Anthoxanthum odoratum



Briza media



Cynosurus cristatus



Deschampsia cespitosa



Festuca rubra



Hordeum secalinum

Appendix B Project Enhanced structures, Bridge Diagram

Project Enhanced Structures

1. Integrated abutments

- terraced gabion baskets using local stone

2. Common material palette

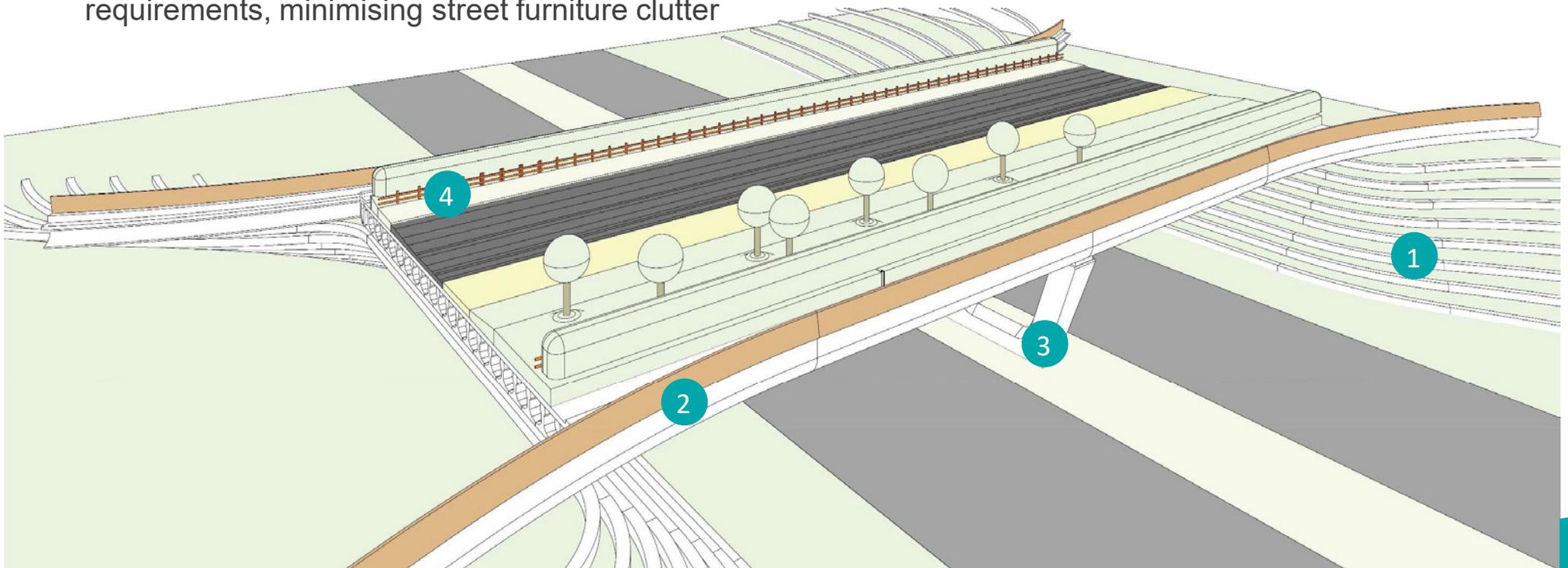
- use of weathered steel, consistent with tunnel portal design

3. Elegant structural forms

- use of equal spans, consistent deck depth, minimising pier and beam profiles, flared approaches

4. Design sympathetic to setting

- vehicle restraint system appropriate to context, coordinated with parapet and acoustic barrier requirements, minimising street furniture clutter



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Lower Thames Crossing

Wider Network Impacts Management and Monitoring Plan

DATE: June 2021

VERSION: 0.2

Lower Thames Crossing

Wider Network Impacts Management and Monitoring Plan

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DRAFT

Covering Note

This document is a draft of one of a series of Control Documents that will form part of our planned Development Consent Order (DCO) application. Following this consultation, we will carefully consider your feedback as we finalise the documents for our planned submission of the DCO application for the Lower Thames Crossing later this year.

The Wider Network Impacts Management and Monitoring Plan (WNIMMP) sets out a traffic impact monitoring scheme to be carried out a year prior to opening (to establish a baseline) and one and five years after the road opens. This is to identify delays and/or any worsening impact on the surrounding local, major and strategic road networks.

Updates may be made to this document to reflect feedback received from stakeholders ahead of submitting the document as part of the DCO application.

As this is a draft control document, there will be references to the upcoming DCO. Any documents referenced that will form the DCO will be mentioned with a (REF TBC).

DRAFT

1 Introduction

1.1 Purpose of the document

- 1.1.1 The road network across the south east of England carries a high volume of traffic on a daily basis, and is coming under increasing pressure due to economic growth across the region. As a result, there are a number of areas of severe existing congestion across the road networks. The A122 Lower Thames Crossing (the Project), by relieving the congested Dartford Crossing and approach roads, addresses a significant area of congestion, providing both a localised and regional benefit. In doing so, the traffic flows across the region will change. This will lead to some improvements and some worsening of other areas of existing congestion across the region.
- 1.1.2 Following the opening of the Project there will be changes in traffic flow on some roads across the strategic road network (SRN), the major road network (MRN), and the local road network (LRN). This is a result of some road users who currently cross the river at Dartford switching to use the Project and hence use different roads as they travel to and from the Project. In addition, some road users will change the destination of their trip, now there is an additional river crossing to a destination on the other side of the river. Much of their new journey will be on different roads than they previously used.
- 1.1.3 As a result there will be changes in traffic flows on many roads in the wider area, not just at the Dartford Crossing and the Project. These changes are shown in the modelled traffic forecasts for the wider area and described more fully in the Traffic Forecasting Report and the Traffic Forecasts Non-Technical Summary.
- 1.1.4 Whilst the Project is expected to provide wide-reaching benefits to the road network, it is recognised that some of the junctions and links which experience increased traffic flows do not currently have sufficient capacity to cater for this additional traffic without adversely affecting the network speeds experienced by others on these roads. The economic value of these adverse traffic impacts are included in the economic appraisal of the Project.
- 1.1.5 There are other parts of the network which will experience a reduction in traffic flows as a result of the opening of the Project.
- 1.1.6 Highways England has identified a number of areas where the increased traffic flows create conditions that could be suitable for interventions, and for some of these areas, some early studies have progressed to identify potential solutions. The interventions in each of these areas will need to be developed through the standard appraisal approach, considering both road-based solutions and alternative transport approaches. The final intervention at each location will be subject to full assessment of both the business case and the required consenting process. Any necessary consents would be obtained separately from the DCO application for the project.
- 1.1.7 These potential solutions may be suitable for delivery through separate route upgrade processes or through targeted interventions. This is a key focus for Highways England as the operator of the SRN, who are working with local and national government to identify necessary interventions, to strengthen capacity

of the wider road network beyond the immediate vicinity of the Project and potential funding sources for their delivery.

- 1.1.8 Following the opening of the A122 Lower Thames Crossing, traffic monitoring will be carried out to identify changes in performance on the surrounding local, major and strategic road networks, where interventions may be suitable.
- 1.1.9 This document details the work undertaken to date to identify and assess areas of the road network (in particular, on roads which are already close to or over capacity) where monitoring and potential intervention may be necessary to better manage additional traffic as a result of the Project. The document also describes how the work will progress relative to the timeline for the Project opening to traffic.

1.2 Position within the wider DCO application

- 1.2.1 This Management and Monitoring Plan should be read alongside the requirements in Schedule 2 to the draft DCO (REF TBC), namely Requirement 13 (Traffic Monitoring). This stipulates the need to produce a traffic impact monitoring scheme in accordance with the details set out in Chapter 3 below, which is secured as part of the DCO application. This is for approval by the Secretary of State before the tunnel which forms part of the Project opens for public use.
- 1.2.2 The following application documents set out a number of technical assessments which have been undertaken to determine the adverse impacts of the Project:
- a. Assessment of forecast traffic flows and traffic impacts on the wider network, as reported in the Transport Assessment (REF TBC)
 - b. Assessment of environmental impacts resulting from traffic, as reported in the Environmental Statement (REF TBC)
 - c. Assessment of the impacts against the economic benefits delivered by the Project, as reported in the Economic Appraisal Report as Appendix D of the Combined Modelling and Appraisal Report (REF TBC)
- 1.2.3 These documents have been used to inform the development of this Management and Monitoring Plan, which has been produced to demonstrate sufficient management of the impacts of the Project on the road network.

2 Wider network improvements

2.1 Background

- 2.1.1 The wider network impacts relate to the changes expected in traffic flows and the levels of congestion following the Project being open for public use, at various locations on the road network away from the immediate vicinity and order limits of the Project. This includes impacts on the strategic, major and local road networks.
- 2.1.2 This has resulted in a number of locations that have been identified by either Highways England or the local highway authority as being suitable for monitoring and, if suitable, intervention to better manage the forecast changes in traffic flow due to the Project.
- 2.1.3 Monitoring of the changes on the wider network will inform the continual assessment of possible interventions suitable to address the changes on the network as a result of the Project. The development of specific proposals will take into consideration the other changes in the area, such as Local Plans and changes in traffic levels for other reasons, such as changes in fuel prices and commuting patterns.

2.2 Identifying potential improvement areas

- 2.2.1 As set out in the Transport Assessment (REF TBC) the Lower Thames Area Model (LTAM) has been used to predict the traffic flows, speeds and journey times on the road network in the Lower Thames area in the future. The LTAM is a variable demand model which predicts how people's travel behaviour would respond to changes in the transport system, such as changes in the cost of motoring and the provision of more road capacity across the River Thames. The road network in the LTAM has been updated for the future years to include other new road schemes that have been completed, or are likely to be built, regardless of whether the Project is built or not.
- 2.2.2 The transport model is focussed on the strategic and major road network but does include more local roads closer to the Project. Using the traffic forecasts from LTAM the wider traffic impacts of the Project were assessed by comparing traffic flows with the capacity of each road and junction for all main roads within the influence of the Project stretching across Kent, Essex, Thurrock, Havering and London. The forecast opening year and 15 years after are assessed both with and without the Project.
- 2.2.3 On some roads traffic may increase, but the available capacity means that congestion is unlikely to occur. For other routes which are already close to or over capacity, a small uplift in traffic may result in it being considered for an intervention to address capacity issues.
- 2.2.4 An initial identification of areas of considered suitable for improvement on the wider road network was undertaken, giving consideration to areas across the road network as indicated by the change in traffic volumes relative to network capacity as forecast. These include but are not limited to:
- a. M25 north of the Project

- b. A13 east of the Project
- c. A1089
- d. M25 south of junction 2
- e. Gravesham local area
- f. Thurrock local area
- g. A2/M2 corridor, as the route from Dover

2.2.5 The local highway authorities have been provided with detailed information from the LTAM, as well as funding, to enable them to identify areas suitable for improvement across their local road networks. Through this exercise they have recommended additional locations for further detailed assessment. There will be continual dialogue with the local highway authorities on areas considered suitable for improvement on the networks in their area, in particular in combination with their Local Plans and monitoring of any changes in travel behaviour in the future.

2.3 Initial investigations

- 2.3.1 A study was undertaken by Highways England in 2019/2020 of the areas of increased traffic flow on the SRN. This study was the first stage (Stage 0) of the structured approach to develop an initial list of locations to be considered for investigation in accordance with the Highways England's Project Control Framework. The study reviewed the transport change in traffic flows in each area, considered the need for intervention, and set out a series of initial options for further consideration at each location.
- 2.3.2 Some of the local highway authorities also undertook their own initial assessment to identify areas considered suitable for improvement and/or priority upgrades on the LRN and MRN. Highways England supported this assessment by sharing the relevant sections of the LTAM with the local highway authorities.
- 2.3.3 This has resulted in an initial list of areas considered for intervention, which will be subject to further consideration and development for further investigation. Further work will be undertaken to identify potential interventions or policies for these areas.
- 2.3.4 Table 2.1 below sets out the current identified areas considered for further appraisal of possible interventions, alongside the associated delivery workstream, anticipated delivery stage and funding stream for intervention delivery, if a physical intervention is identified as the preferred option. Discussions with local highway authorities on areas considered suitable for improvement are continuing.

Table 2.1 Initial areas considered for intervention

Delivery workstream	Area for consideration	Anticipated delivery stage if approved	Anticipated funding stream if approved
Development projects within Road Investment Strategy (RIS) 2	<ul style="list-style-type: none"> • A2 Dover Access • Tilbury Link Road 	<ul style="list-style-type: none"> • During Project construction (RIS3 period 2025-2030) 	<ul style="list-style-type: none"> • Normal RIS funding process
Upgrades to the SRN developed by Highways England	<ul style="list-style-type: none"> • A1089 Asda Roundabout junction improvements 	<ul style="list-style-type: none"> • Prior to project construction 	<ul style="list-style-type: none"> • Currently under discussion
	<ul style="list-style-type: none"> • A2 E/B to A289 N/B merge changes 	<ul style="list-style-type: none"> • Post Project opening 	
Upgrades to the MRN/LRN developed by the local highway authorities with support from Highways England	<ul style="list-style-type: none"> • Kent & Medway Local Road Interventions <ul style="list-style-type: none"> – A227 Vigo Hill – A228 Peters Bridge – M2 Junction 2 (with the A228 Cuxton Road) – Valley Drive/Marling Way – Valley Drive/B261 Old Rd E – Springhead Road/Hall Road Roundabout – A227 Holborough Road, Snodland – Cobham Village Signage 	<ul style="list-style-type: none"> • Post Project opening 	<ul style="list-style-type: none"> • Currently under discussion

Delivery workstream	Area for consideration	Anticipated delivery stage if approved	Anticipated funding stream if approved
	<ul style="list-style-type: none"> • A229 Bluebell Hill M2 & M20 Junctions 	<ul style="list-style-type: none"> • During Project construction 	<ul style="list-style-type: none"> • MRN programme
	<ul style="list-style-type: none"> • Thurrock Local Road Interventions <ul style="list-style-type: none"> – A1013 Daneholes bus priority lane – A13 Manor Way Roundabout modifications – A13 Orsett Cock Roundabout modifications 	<ul style="list-style-type: none"> • Developed ready for implementation post Project opening 	<ul style="list-style-type: none"> • Currently under discussion
Normal RIS planning pipeline process managed by Highways England	<ul style="list-style-type: none"> • M25 junctions 2-3 • M25 junctions 27-29 • A13 east of the Project 	<ul style="list-style-type: none"> • Future RIS periods, post Project opening 	<ul style="list-style-type: none"> • Normal RIS funding process
Re-assessment of the extent of the SRN in response to the Project traffic re-distribution led by Department for Transport (DfT)	<ul style="list-style-type: none"> • A13/A1014 trunking 	<ul style="list-style-type: none"> • During RIS2 	<ul style="list-style-type: none"> • Normal RIS funding process
	<ul style="list-style-type: none"> • Network-wide review across the South East, assessing trunking or de-trunking options 	<ul style="list-style-type: none"> • Future RIS periods, post Project opening 	<ul style="list-style-type: none"> • Currently under discussion

- 2.3.5 At this stage in the appraisal process, the need for and the nature for a physical change to the network is not yet determined. Continued work will be undertaken, in collaboration with the local highway authorities to develop possible schemes, if these are identified as appropriate.
- 2.3.6 The preferred interventions will be highly sensitive to local developments, road network changes, policy changes and changes in other factors that affect the demand for travel on the highway network which will occur before the Project opening. It is therefore considered that the need and the timelines for these interventions and possible schemes will be monitored and managed separately from the Project. If interventions are suitable, the highways authority responsible for that part of the road network will be responsible for delivery (or Highways England would be responsible where potential interventions are located on the SRN).
- 2.3.7 Highways England is also working with DfT to align the areas for potential interventions with the appropriate government investment frameworks and processes to deliver investment decisions.
- 2.3.8 Because some of these impacts are forecast to arise in the Project opening year, Highways England is working with local highway authorities to investigate these impacts, and where appropriate deliver solutions within this timeline post DCO decision.
- 2.3.9 The delivery of any schemes identified through the appraisal process is subject to the provision of businesses cases being provided in line with standard government approaches and the availability of sufficient funding.

3 Monitoring strategy

3.1 Traffic impact monitoring scheme

Background

- 3.1.1 As set out above, Requirement 13 of the draft DCO (REF TBC) requires that before the tunnels comprising the Project are open for use, Highways England must submit a traffic impact monitoring scheme for the Secretary of State's approval. That monitoring scheme must be in accordance with this document, and must also contain the following information:
- a. A before-and-after survey to assess the changes in traffic
 - b. The locations to be monitored and the methodology to be used to collect the required data
 - c. The periods over which traffic is to be monitored
 - d. The method of assessment of traffic data
 - e. Baseline traffic levels

Before-and-after surveys

- 3.1.2 Surveys will be undertaken before and after the Project opening, using standard methodologies available at the time of data collection. This may include automatic traffic counters (ATCs), video surveys and/or Global Positioning System (GPS) data.
- 3.1.3 Traffic monitoring will be undertaken to identify localised delays and/or any worsening of network performance through the analysis of the following:
- a. Traffic flows/change in flows
 - b. Traffic routes
 - c. Journey times/journey time reliability
 - d. Junction performance
 - e. Traffic composition
 - f. Road safety
- 3.1.4 This traffic monitoring process will ensure that any potential solutions put forward remain effective and suitable for the traffic impacts being demonstrated over time, as illustrated through 'real time' traffic data collection.
- 3.1.5 The surveys, as part of the traffic impacts monitoring scheme, will also be supplemented through the use of existing data sources (where already available). This includes DfT datasets providing journey time data, Highways England traffic datasets, and any historical traffic datasets from relevant local

authorities within the local area of influence, subject to agreement with the data owners.

- 3.1.6 Highways England's online dataset platform 'WebTRIS' will be used to obtain traffic data at locations identified on the SRN. This platform provides datasets of average journey time, speed and traffic flow information for 15-minute periods since April 2015 on all motorways and 'A' roads managed by Highways England (the SRN). Journey times and speeds are estimated using a combination of sources, including Automatic Number Plate Recognition (ANPR) cameras, in-vehicle GPS and inductive loops built into the road surface.

Locations to be monitored

- 3.1.7 The locations to be monitored under the monitoring scheme will be:
- a. Those set out below as part of this Management and Monitoring Plan
 - b. Those selected following the consultation as set out in paragraphs 3.1.11 and 3.1.12 below.
- 3.1.8 Highways England have identified locations on the SRN that are geographically close to the A122 junctions. In addition, as one of the principal purposes of the SRN is to enable journeys between major ports, links to the two ports located closest to the A122 have been included. The identified junctions constitute the nearest and second nearest junctions on the SRN and MRN located adjacent to the junctions with the A122, the A2, the A13 and the M25.
- 3.1.9 The locations identified below as part of this assessment process will be included in the traffic impact monitoring scheme submitted for approval to the Secretary of State under Requirement 13 of Schedule 2 to the draft DCO.
- 3.1.10 These junctions are as follows:
- a. M2/A2/A122 Lower Thames Crossing junction
 - i. M2/A2/A122 Lower Thames Crossing junction
 - ii. M2 junction 1 (A2/M2/A289)
 - iii. M2 junction 2 (M2/A228)
 - iv. Gravesend East junction / Marling Cross (A2)
 - v. Tollgate junction (A2)
 - b. A13/A1089/A122 Lower Thames Crossing junction
 - i. A13/A1089/A122 Lower Thames Crossing junction
 - ii. Orsett Cock junction (A13/A128/A1013)
 - iii. Manorway junction (A13/A1013/A1014)
 - iv. Manorway/Port Access Road Roundabout (A1014)

- v. Baker Street Interchange (A13/A1089)
- vi. Stifford Interchange (A13/A1012)
- vii. Marshfoot Interchange (A1089)
- viii. Asda Roundabout (A1089)
- c. A122 Lower Thames Crossing/M25 junction
 - i. A122 junction with the M25
 - ii. M25 junction 30 (M25/A13)
 - iii. A282 junction 31 (A282/A1306)
 - iv. M25 junction 29 (M25/A127)
 - v. M25 junction 28 (M25/A12/A1023)

3.1.11 In addition to the monitoring locations identified above, consultation with the following local highway authorities will take place:

- a. London Borough of Havering
- b. Transport for London
- c. Thurrock Council
- d. Medway Council
- e. Kent County Council (incorporating the Gravesham and Dartford, Sevenoaks, Tonbridge & Malling, and Maidstone local authority areas)
- f. Essex County Council (incorporating the Brentwood, Epping and Basildon local authority areas)

3.1.12 Additional monitoring locations proposed through this consultation will be considered against criteria that include:

- a. The forecast changes to traffic flows, and the volume/capacity ratio as set out in the Transport Assessment (REF TBC)
- b. The impact of any local and regional developments on traffic flows at that location

3.1.13 Highways England will consider and have due regard to any representations from local highway authorities before submitting the monitoring scheme to the Secretary of State for approval. Representations from local authorities will be included in the submission to the Secretary of State.

Periods of traffic monitoring

Pre-opening

- 3.1.14 Traffic monitoring will be undertaken for a maximum of one-year pre-opening to establish the baseline. This is currently expected to take place in 2028. However, if there are any delays to the Project opening date, the pre-opening traffic monitoring will be realigned to be collected across the last year of construction. The data collected will be reviewed against other data sets to allow for the impacts of construction activity on the data collected.

Post opening

- 3.1.15 Data collection will take place at one year and five years post-opening, to align with the standard timescales set out for the Post Opening Project Evaluation (POPE), undertaken by Highways England. Monitoring five years post-opening is considered appropriate to capture the expected staggered change in traffic patterns over time. This is currently expected to take place in 2030 and 2034, respectively. However, as with the pre-opening phase, these dates will be realigned if there are any delays to the Project opening date.
- 3.1.16 The surveys undertaken as part of the traffic impacts monitoring scheme will be supplemented with the use of existing data sources. This data sources will provide information across the full period of traffic monitoring (2028 to 2034), including years two, three and four post-opening, where be-spoke surveys are not proposed as part of the traffic impact monitoring scheme.

Method of assessment

- 3.1.17 Highways England would collate, analyse and summarise the data in monitoring reports, at one year post-opening and five years post-opening (to align with the standard timescales set out under Highways England's POPE). These reports will be made available to the general public, the local highway authorities (noted above in paragraph 3.1.11) and DfT. They would identify any impacts likely to be as a direct result of the Project in operation as well as provide analysis on any wider network changes that aren't as a result of the Project. It would consider the suitability of and type of interventions that may be suitable where appropriate, and review highway conditions at locations where any interventions have already been implemented.
- 3.1.18 To ensure the monitoring process continues to adequately capture the relevant data required, the monitoring scheme would be reviewed in line with the standard timescales set out for the POPE and updated where appropriate. Proposals put forward for changes from key stakeholders would also be considered, in the interest of enabling the impacts of the Project to be fully captured.

Baseline traffic

- 3.1.19 In order to establish a baseline, data collection would be undertaken one year prior to the opening of the Project, as noted above. This period will align with the last year of construction. Data would be obtained from the Contractors appointed to build the Project regarding construction traffic activity and traffic management measures, to ensure that a fair and representative baseline is used.

3.1.20 As noted above, the baseline data collection will also be supplemented through the use of existing data sources (where available to the Project).

3.2 Criteria for intervention

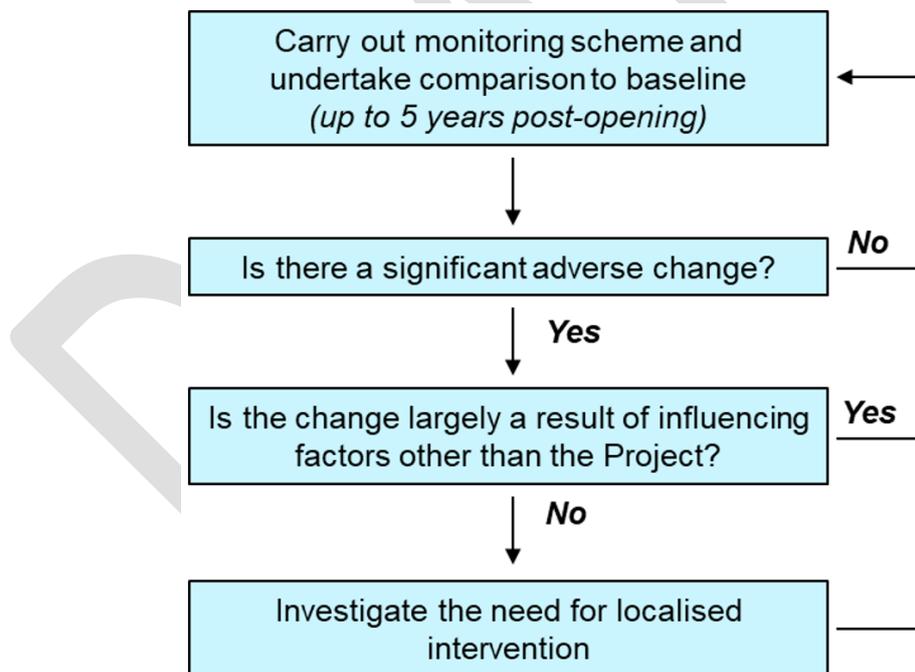
Introduction

3.2.1 Following the opening of the Project, the results of the traffic impact monitoring would be used to identify where physical interventions may be suitable as a result of the Project. This would be where any significant worsening of traffic conditions is largely attributable to the impact of the Project on the wider network.

3.2.2 The assessment of the changes in highway performance would be reviewed prior to engaging with DfT and local highway authorities, and assessments would consider other factors that may have changed since the traffic forecasts were prepared, such as new developments and fuel prices.

3.2.3 This framework, as shown in Plate 3.1, sets out the criteria which Highways England would use to consider the impact of changing traffic flows, and enter into discussions regarding suitable interventions on the wider network. Each element of the criteria is discussed in further detail below.

Plate 3.1 Framework for considering changing traffic flows



Identifying a significant adverse change

3.2.4 The monitoring reports will be reviewed by Highways England to identify whether there is a significant level of change in traffic conditions compared to the observed baseline (as described in paragraphs 3.1.19 and 3.1.20).

Other influencing factors

3.2.5 In determining whether any change in traffic conditions from the baseline -will be investigated further, Highways England will consider whether the change is

largely a result of other influencing factors. This includes various non-Project-related impacts such as changes in traffic flows due to changes in economic growth, income, fuel prices, fuel efficiency of vehicles, and new build developments which will have an impact on the background changes and regional trends of traffic growth.

Investigate suitability for intervention

- 3.2.6 If it has been established that a location would be suitable for further investigation to determine the need for a potential intervention, this would be done through an assessment proportionate assessment and appraisal process. Highways England would invite the relevant local highway authorities and DfT to participate in the appraisal process regarding possible interventions on the wider network.

3.3 Potential funding options

- 3.3.1 Funding for future interventions on the SRN, MRN and wider LRN must come through the standard funding frameworks led by DfT. These funding frameworks currently include the following:
- a. The RIS framework for investment in and management of the SRN
 - b. Funding for local road improvements, such as the MRN programme and Large Local Majors programme
 - c. Funding to local highway authorities to operate and maintain existing road networks
- 3.3.2 The RIS framework was first launched by the Government in 2014 and allows for the formal SRN investment processes required by the Infrastructure Act 2015. The RIS framework provides a stable, long-term plan for improving England's motorways and trunk roads. It requires Highways England to work alongside DfT, Office of Rail and Road, and Transport Focus to deliver on the commitments set out for the current period, whilst also looking ahead to the next period to continue improving the SRN's performance for road users, local communities and the environment. Work on developing RIS3, which is expected to set out plans for the period from 2025 to 2030, is due to commence shortly.
- 3.3.3 The MRN programme provides a specific funding stream dedicated to improvements on MRN roads. The MRN was set up to form a middle tier of the country's busiest and most economically important local authority 'A' roads, sitting between the national SRN and the rest of the LRN. The Large Local Majors programme is currently the mechanism for funding exceptionally large local highway authority transport schemes that cannot be funded through the other available routes, such as the Local Growth Fund or other devolved allocations.
- 3.3.4 The Government and DfT also provide funding to local highway authorities for routine maintenance and significant renewal of assets on existing road networks.
- 3.3.5 In the event that the traffic impact monitoring and the review of its findings identifies that future investment would be suitable, Highways England would

work in partnership with the relevant local authorities and DfT to seek funding to develop and bring forward potential solutions. Assessment and prioritisation of those schemes must be properly dealt with through the relevant investment approval processes. In addition, any intervention that required its own consent (e.g. DCO) would be subject to it obtaining its consent.

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Glossary

Term	Explanation
2029 opening year	A modelled year in the Project's LTAM traffic model in which traffic flows and costs are estimated when the Project is opened
A122 Lower Thames Crossing (the Project)	Lower Thames Crossing: a proposed new crossing of the Thames estuary linking the county of Kent with the county of Essex, at or east of the existing Dartford Crossing
ANPR	Automatic Number Plate Recognition
Appraisal	The process of defining objectives, examining options and weighing up the relevant costs, benefits, risks and uncertainties
ATC	Automatic Traffic Count
Benefit	An increase in the welfare of society from a project, programme or policy
DCO	Development Consent Order
DfT	Department for Transport
GPS	Global Positioning System
LTAM	Lower Thames Area Model
LRN	Local Road Network
MRN	Major Road Network
PCF	Project Control Framework
POPE	Post Opening Project Evaluation
RIS	Road Investment Strategy
RIS2	Road Investment Strategy 2
RIS3	Road Investment Strategy 3
SoS	Secretary of State
SRN	Strategic Road Network
TRIS	Highways England Traffic Count Database

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Lower Thames Crossing

Outline Landscape and Ecology Management Plan

DATE: June 2021

VERSION: 0.1

Lower Thames Crossing

Outline Landscape and Ecology Management Plan

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Covering Note

This document is a draft version of the Outline Landscape and Ecological Management Plan (OLEMP) that is proposed for inclusion within our Development Consent Order (DCO) application.

This version is a work in progress and reflects our proposals at the time of our DCO application in October 2020.

A small number of areas are being revised and supplemented to reflect our latest proposals, as set out in this consultation. As a result, there are some elements of this document which are superseded by the information set out in the rest of the consultation materials. This includes the precise extent of each mitigation area set out in the document, which are based on our Order Limits in the October submission, and do not reflect the changes set out in this consultation.

This version was issued for comment to a number of stakeholders in February 2021, and we are currently working to incorporate their feedback. In addition, we will consider the response to this consultation as we finalise this document for inclusion into our DCO application later this year.

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1 Introduction

1.1 Scope of this document

- 1.1.1 This outline Landscape and Ecology Management Plan (LEMP) outlines the proposed management of the landscape and ecological elements of the A122 Lower Thames Crossing (the Project). Highways England's Design Manual for Roads and Bridges (DMRB) standards GM 701 Series 3000 and GS 801 Series 3000 documents establish the general maintenance and inspection requirements for motorways and all-purpose trunk roads.
- 1.1.2 This outline LEMP focuses on the management requirements for the land parcels that perform specific landscape and ecological mitigation functions for the Project. It details the management regimes, management expectations and monitoring requirements for each of those land parcels and the typologies contained within. It should be read in conjunction with the Environmental Masterplan (REF TBC).
- 1.1.3 The LEMP would be further developed by the Principal Contractor for approval by the Secretary of State (SoS) in consultation with relevant stakeholders, including:
- a. Natural England
 - b. Relevant local planning authorities.
- 1.1.4 The LEMP submitted to the SoS for approval must be substantially in accordance with the outline LEMP, including the habitat management requirements, targets and prescriptions set out in the outline LEMP.
- 1.1.5 This outline LEMP sets out the long-term goals and the outline landscape and ecology management practices for the Project. The key objectives of this outline LEMP are to provide details of the habitat creation, ecological enhancement, visual screening, and landscape integration of the Project for those parcels identified outside of the highways operational boundary that require a bespoke approach.
- 1.1.6 This outline LEMP does not include routine vegetation management activities required for safety, such as maintaining visibility splays; or routine maintenance tasks such as rubbish removal, repair to fences, or reinstatement of habitat following incidents or incursions to the verge.

1.2 Context of this document

- 1.2.1 This outline LEMP has been developed in support of Highways England's application for a Development Consent Order (DCO).
- 1.2.2 The outline LEMP is part of a suite of documents that capture the Project's landscape and ecology design and environmental commitments. These documents include:
- a. The draft DCO (REF TBC)
 - b. The Environmental Statement (REF TBC), including:

- i. The Environmental Masterplan (REF TBC), which defines the spatial layout of physical mitigation proposals.
 - ii. The Register of Environmental Actions and Commitments (REAC), which defines commitments on the processes that need to be used in the delivery, management, monitoring and maintenance of the works.
- c. The Code of Construction Practice (CoCP) which covers commitments pertaining to the processes of construction only.
 - d. The Design Principles that capture the key principles that have shaped the design thus far and make a commitment that these will be maintained and developed in the future detailed design and delivery phases of the Project.

1.3 Structure of this document

1.3.1 This document is structured as follows:

- a. **Chapter 1** – Introduces the outline LEMP.
- b. **Chapter 2** – Describes the high-level design objectives and vision for the Project. These are Highways England's overarching objectives for the design of permanent works.
- c. **Chapter 3** – Provides an overview of how the outline LEMP will be implemented, including identifying roles and responsibilities of identified parties.
- d. **Chapters 4, 5 and 6** – Describes each of the identified management areas along the Project route. Each area contains the outline management requirements, lists the habitat typologies contained within that area, and describes any potential management and access issues.
- e. **Chapter 7** – Describes the outline management prescriptions for habitat creation and/or management actions, timescales and measures of success for each of the proposed typologies contained within the management areas.
- f. **Chapter 8** – Contains the list of guidance documents and material referenced in the outline LEMP.
- g. **Chapter 9** – Contains a glossary of the technical terms and acronyms used within this outline LEMP.

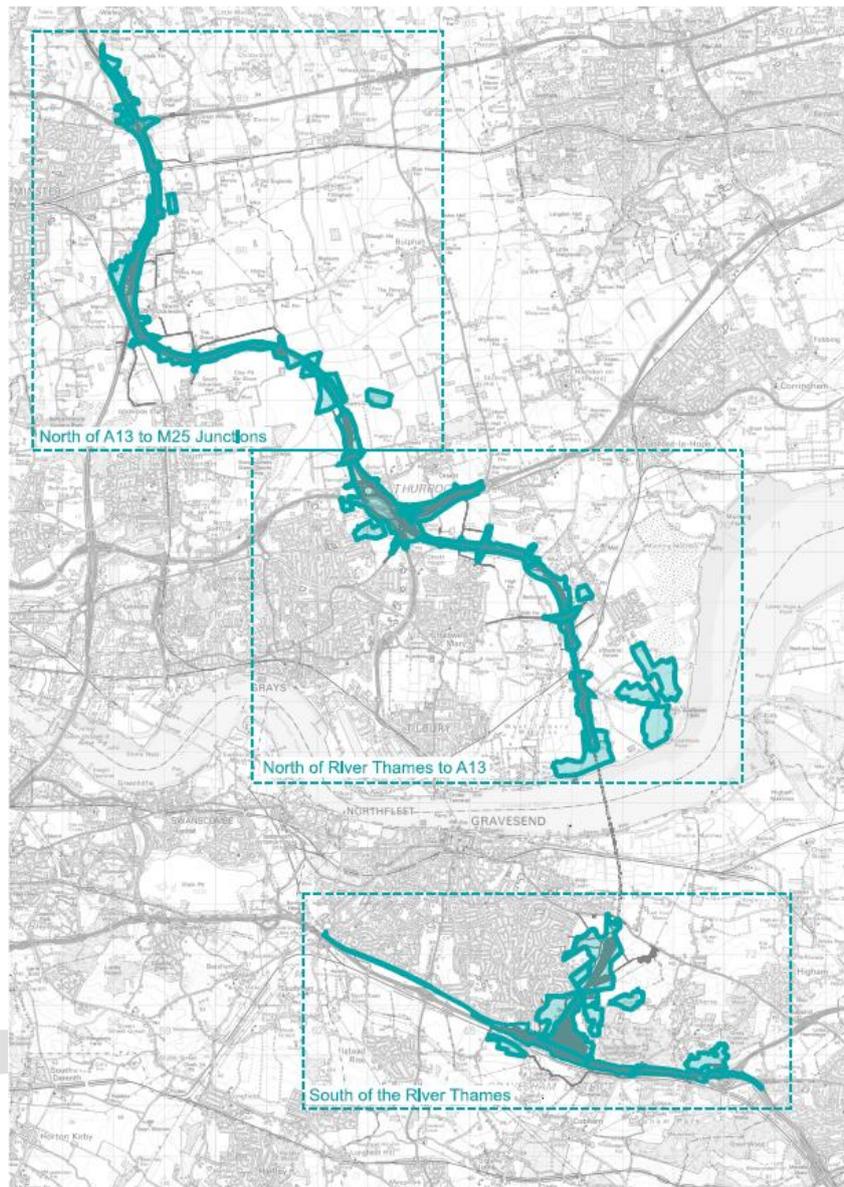
1.4 How to read this document

1.4.1 Due to the large-scale nature of the Project, the structure of this this outline LEMP has been broken down geographically into three regional areas. The three regional areas are:

- a. South of the River Thames (Chapter 4)
- b. North of the River Thames to the A13 junction (Chapter 5)
- c. North of the A13 junction to the M25 junction 29 (Chapter 6)

1.4.2 The regional areas are illustrated in Plate 1.1 below.

Plate 1.1 Location of regional areas



- 1.4.3 Each regional area has been further broken down into a number of management areas. These management areas comprise land parcels grouped into areas that perform similar landscape and ecological functions.
- 1.4.4 For completeness, this outline LEMP also contains management areas that describe the design proposals within, and adjacent to, the Project route and the proposed junctions. These land parcels will be covered by DMRB standards GM 701 Series 3000 and GS 801 Series 3000 for their management and inspection. However, this outline LEMP describes the outline management requirements of these parcels, informed by the local character and providing further information on the form and function of the landscape proposals contained within.
- 1.4.5 Chapter 7 provides a description of each of the individual typologies that form the proposed Environmental Masterplan (REF TBC).
- 1.4.6 As a number of the planting typologies can be found in various locations along the Project route, to avoid repetition and duplication, each management area

contains a list of the typologies contained within them. These typologies are further described in Chapter 7. This has been summarised in the management matrix table (Table 1.1).

- 1.4.7 This enables the document to be structured in a way that allows the document to be sub-divided in the future to reflect different contractors/land management agents. The table below will assist in extracting the relevant typologies needed for either an individual management area or regional areas.
- 1.4.8 Where relevant Chapter 7 includes references to relevant priority habitats. These habitats are listed in accordance with the provisions of section 41 of the Natural Environment and Rural Communities Act 2006, as being of principal importance for the conservation of biodiversity in England. They are therefore considered to be a sound basis for developing habitat objectives within typologies and the wider management areas. Where a priority habitat is referenced, a link to the relevant priority habitat description document and a link to the relevant Joint Nature Conservation Committee (JNCC), is provided. These provide additional information such as the National Vegetation Classifications (NVC) that the bulk of a given priority habitat may align with.
- 1.4.9 The methodologies employed for creating the proposed habitat typologies, including the detailed requirements for site preparation prior to any planting, would follow published guidance, including but not limited to:
- a. CIRIA Habitat Translocation – A Best Practice Guide: C600 (Anderson and Groutage, 2003)
 - b. Grassland Restoration and Management (Blakesley et al., 2016)
 - c. Great Crested Newt Mitigation Guidelines (English Nature, 2001)
 - d. Habitat Creation and Repair (Gilbert and Anderson, 1998)
 - e. Major Project Instruction Low Nutrient Grasslands. MPI-85-102020 (Highways England, 2020)

Table 1.1 Management matrix table

	LE1.3 Species Rich Grassland	LE1.3 Species Rich - Chalk	LE1.3 Species Rich - Wildflower Annual Grassland	LE1.4 Rock and Scree	LE2.1 Woodland	LE2.1 Woodland - inc Non-Native Species	LE2.1 Woodland - Edible Species	LE2.2 Woodland Edge	LE2.2 Woodland Edge - Scrub	LE2.4 Linear Belt of Shrubs and Trees	LE2.5 Shrubs with Intermittent Trees	LE2.7 Scattered Trees	LE2.8 Scrub	LE3.1 Amenity Tree and Shrub Planting - Orchard	LE4.3 Native Species Hedge (untrimmed)	LE4.4 Native Hedgerow with Trees	LE5.1 Individual Trees	LE6.1 Water Bodies (Standing Water)	LE6.1 Water Bodies and Associated Plants (Swamp)	LE6.2 Banks and Ditches	LE6.4 Marsh and Wet Grassland - Fen	LE6.4 Marsh and Wet Grassland	LE7.2 Green Roofs	E3.2 Proposed Ancient Woodland Compensation	E3.2 Open Mosaic Habitat	E3.2 Translocated Acidic Grassland	
4.0 South of the River																											
4.1	A2 / M2 Corridor																										
4.2	Land East of Brewers Wood (AWC)																										
4.3	Land West of Jeskyns (AWC)																										
4.4	Green Bridges																										
4.5	Chalk Park South (Land North of Claylane Wood including AWC)																										
4.6	A2 / M2 / Lower Thames Crossing Junction																										
4.7	Thong Open Mosaic Habitat																										
4.8	Land North of Brummelhill Wood (AWC)																										
4.9	Gateway to Shorne Woods Country Park																										
4.10	Chalk Park North																										
4.11	Replacement Pitch and Putt																										
5.0 North of the River to A13 Junction																											
5.1	Tilbury Fields																										
5.2	Coalhouse Fort Water Vole Habitat																										
5.3	Coalhouse Fort Open Mosaic Habitat Area																										
5.4	Tilbury Link																										
5.5	Chadwell Link																										
5.6	Green Bridges																										
5.7	Linford Open Mosaic Habitat																										
5.8	Rainbow Shaw (AWC)																										
5.9	Baker Street Community Woodland																										
5.10	Ron Evans Replacement Land																										
5.11	A13 Junction																										
6.0 North of the A13 Junction to the M25 Junctions																											
6.1	Ockenden Link																										
6.2	Orsett Fen - Wetland Mitigation																										
6.3	Coles Reservoir Open Mosaic Habitat Area																										
6.4	Green Bridges																										
6.5	M25 Junction																										
6.6	Thames Chase Compensation Land																										
6.7	Folkes Lane Woodland Compensation																										

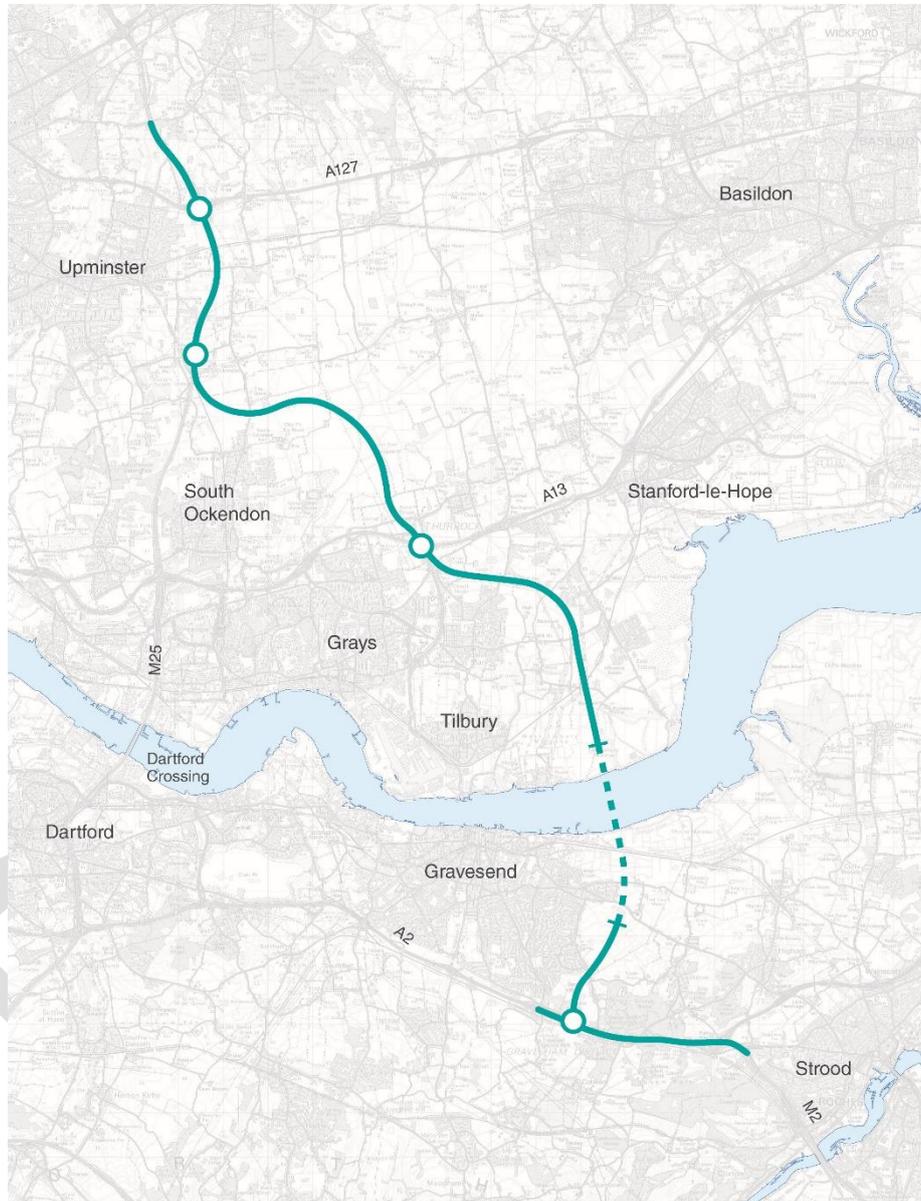
2 Project aims and objectives

2.1 Project Description

- 2.1.1 The A122 Lower Thames Crossing (the Project) would provide a connection between the A2 and M2 in Kent, east of Gravesend, crossing under the River Thames through a tunnel, before joining the M25 south of junction 29. The Project route is presented in Plate 2.1.
- 2.1.2 The A122 road would be approximately 23km long, 4.25km of which would be in tunnel. On the south side of the River Thames, the Project route would link the tunnel to the A2 and M2. On the north side, it would link to the A13 and junction 29 of the M25. The tunnel entrances would be located to the east of the village of Chalk on the south of the River Thames and to the west of East Tilbury on the north side.
- 2.1.3 Junctions are proposed at the following locations:
- a. New junction with the A2 to the south-east of Gravesend
 - b. Modified junction with the A13/A1089 in Thurrock
 - c. New junction with the M25 between junctions 29 and 30
- 2.1.4 To align with NPSNN policy and to help the Project meet the Scheme Objectives, it is proposed that road user charges would be levied. Vehicles would be charged for using the new tunnel.
- 2.1.5 The Project route would be three lanes in both directions, except for:
- a. link roads
 - b. stretches of the carriageway through junctions
 - c. the southbound carriageway from the M25 to the junction with the A13/A1089, which would be two lanes
- 2.1.6 In common with other A-roads, the A122 would operate with no hard shoulder but would feature a 1m hard strip on either side of the carriageway. It would also feature technology including stopped vehicle and incident detection, lane control, variable speed limits and electronic signage and signalling. Our A122 road design outside of the tunnel includes emergency areas spaced at intervals between 800 metres and 1.6km (less than one mile). The tunnel would include a range of enhanced systems and response measures instead of emergency areas.
- 2.1.7 The A122 would be classified as an 'all-purpose trunk road' with green signs. For the benefit of safety, walkers, cyclists, horse-riders and slow-moving vehicles would be prohibited from using it.
- 2.1.8 The Project would include adjustment to a number of side roads. There would also be changes to a number of public rights of way, used by walkers, cyclists and horse riders. Construction of the Project would also require the installation and diversion of a number of utilities, including gas pipelines, overhead power lines and underground electricity cables, as well as water supplies and telecommunications assets and associated infrastructure.

- 2.1.9 The Project has been developed to avoid or minimise significant effects on the environment. Some of the measures adopted include landscaping, noise mitigation, green bridges, floodplain compensation, new areas of ecological habitat and two new parks.

Plate 2.1 Lower Thames Crossing route



2.2 Scheme Objectives

- 2.2.1 Highways England has worked with the Department for Transport to agree the following objectives that the Project is to achieve. Further information on the Scheme Objectives is set out in Need for the Project (REF TBC).
- To support sustainable local development and regional economic growth in the medium to long term
 - To be affordable to government and users.

- c. To achieve value for money
- d. To minimise adverse impacts on health and the environment
- e. To relieve the congested Dartford Crossing and approach roads, and improve their performance by providing free-flowing, north-south capacity
- f. To improve resilience of the Thames crossings and the major road network
- g. To improve safety.

2.2.2 In addition to the objectives above, the Project is being developed in line with the National Policy Statement for National Networks (NPSNN), which sets out government policies for nationally significant infrastructure road projects for England.

2.2.3 As the Project includes both gas pipeline and overhead electric line Nationally Significant Infrastructure Projects, the Overarching National Policy Statement for Energy (EN-1) (NPS EN-1), National Policy Statement for Gas Supply Infrastructure and Gas and Oil Pipelines (EN-4) (NPS EN-4) and National Policy Statement for Electricity Networks Infrastructure (EN-5) (NPS EN-5) have effect and have therefore also been considered.

2.3 Design Principles

2.3.1 This outline LEMP has been created to help ensure the Project can achieve and is in keeping with principles set out in the Design Principles.

2.3.2 In addition to the Design Principles, this outline LEMP has been produced to ensure the new features meet the following broad objectives:

- a. Nature conservation and biodiversity – to provide new biodiverse habitats throughout the Project which connect to each other and to existing retained habitat, forming a green corridor along the length of the Project.
- b. Landscape integration – to reflect the surrounding landscape character that the Project route passes through.
- c. Visual screening – to screen views of the Project route and infrastructure from existing (and future) visual receptors.

3 Implementation of the Landscape and Ecology Management Plan

3.1 Roles and Responsibilities

Highways England maintains the responsibility to ensure that the landscape and ecological mitigation as described in the outline LEMP can be successfully delivered, managed and maintained and that the necessary monitoring is undertaken. Establishment of the mitigation will be a contractual requirement, but ongoing (long-term) management, maintenance and monitoring, beyond initial establishment periods, may be delivered by Highways England's Operational and Maintenance Teams or through agreement with third parties and landowners (to be confirmed). These details will be discussed with all stakeholders in the development of the detailed LEMP in accordance with DCO Requirement 5.

Advisory Group

The intention is for an advisory group to be set up to help inform decision making throughout the duration of this LEMP.

3.2 Habitat management duration

3.2.1 Table 3.1 below describes the duration of establishment required for each of the landscape / ecology habitat types provided within this outline LEMP.

Table 3.1 Establishment Duration Table

Habitat Type	Duration of Establishment
Grassland management	20 years
Rock and Scree	5 years
Woodland (created)	20 years
Amenity tree planting	20 years
Shrub and tree planting	5 years
Hedgerow planting	5 years
Water bodies and marginal / emergent planting	5 years
Ancient Woodland Compensation Areas including soil and material salvage	25 years
Open Mosaic Habitat Areas	20 years
Acidic grassland soil salvage	20 years

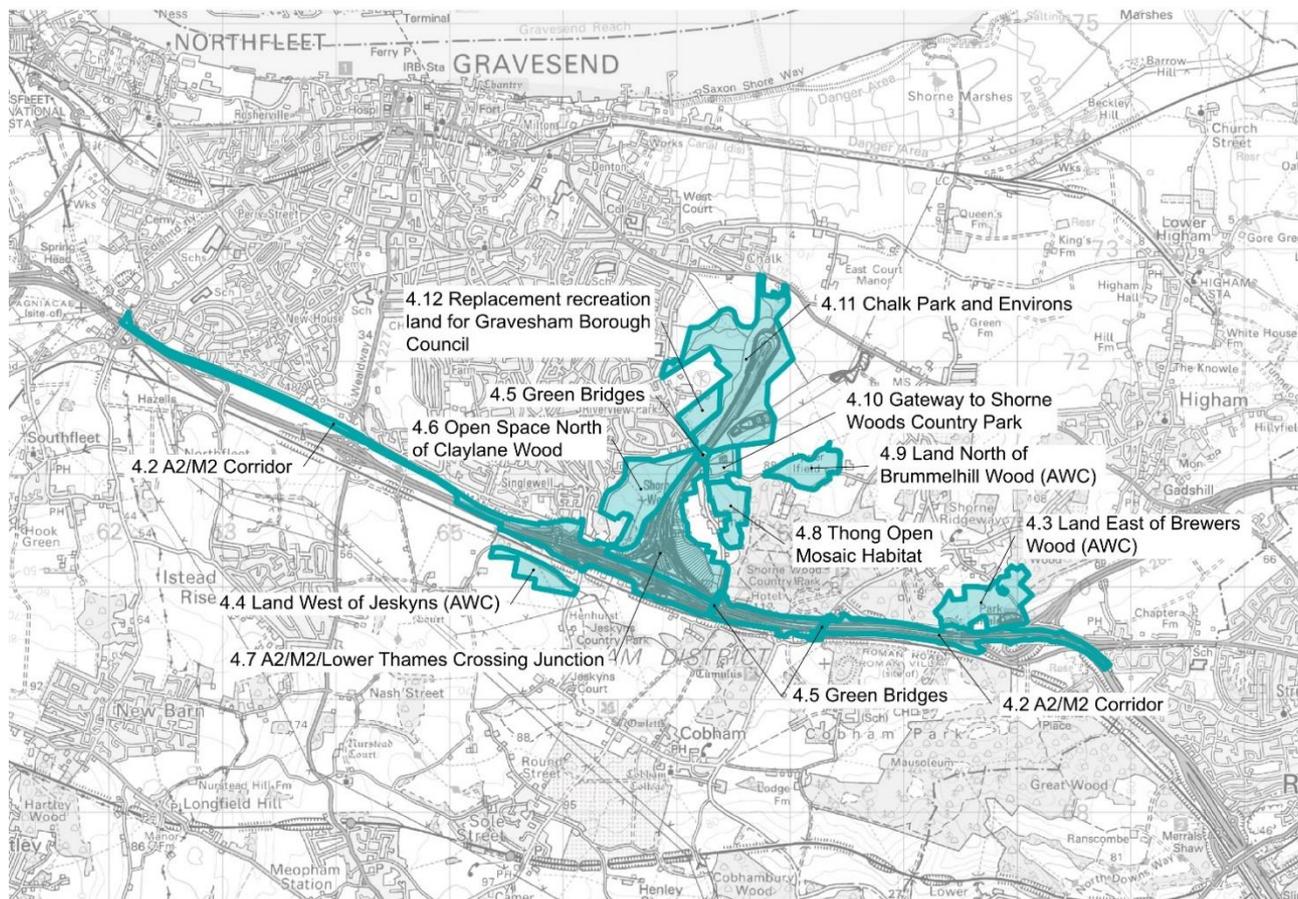
3.3 Securing Mechanism

- 3.3.1 This outline LEMP describes the management requirements for the identified landscape and ecological typologies identified in each management area as described in Chapters 4, 5 and 6. When the LEMP is developed in accordance with the outline LEMP, the management requirements will develop into specific smart objectives and targets for each area in discussion with appropriate stakeholders.
- 3.3.2 The LEMP would be secured through Schedule 2 Requirement 5 of the draft DCO. The LEMP must be prepared substantially in accordance with this outline LEMP submitted as part of the application.
- 3.3.3 The LEMP would be submitted to and approved in writing by the Secretary of State, following consultation by Highways England with the relevant planning authority and Natural England. Commitments in the LEMP that apply during operation of the Project (such as long-term management and maintenance of landscape/ecology typologies specified in the LEMP) would be carried over into the Handover EMP (EMP3).

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4 Management Areas – South of the River Thames

Plate 4.1 Location of management areas within the South of the River Thames regional area



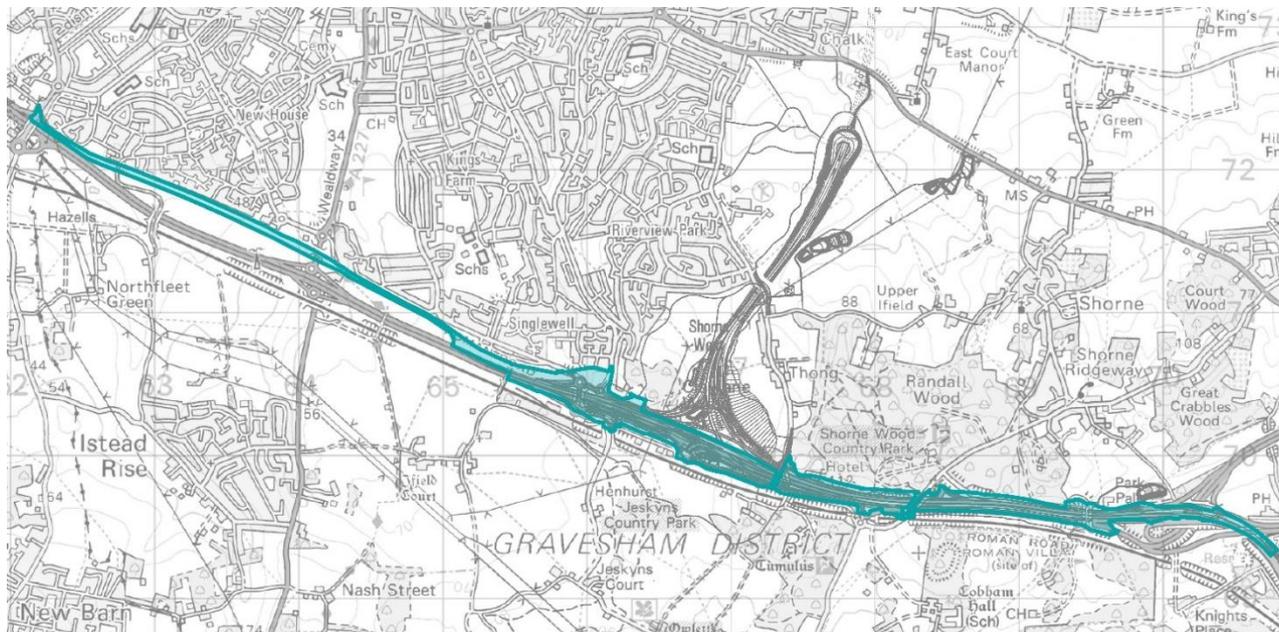
4.1.1 The management areas within the South of the River Thames regional area shown in Plate 4.2. This chapter provides a description of the management area, and the outline management requirements for each area.

4.1.2 The following management areas within this chapter describe the sectional areas of the route (REF TBC). These management areas focus on the landscape parcels located adjacent to or within the Project route and the junctions. As such, the management and inspections of these areas will be covered by DMRB standards GM 701 Series 3000 and GS801 Series 3000 documents. For completeness, the outline management requirements and a list of typologies for these management areas are included for each of these management areas:

- a. 4.1 A2/M2 Corridor
- b. 4.6 A2/M2/Lower Thames Crossing junction

4.2 A2/M2 Corridor

Plate 4.2 A2/M2 Corridor



Description of Management Area

- 4.2.1 This management area is located along the existing A2/M2 corridor, extending from the A2/M2 junction in the east to the Pepper Hill junction in the west. The corridor passes through the Kent Downs Area of Outstanding Natural Beauty (AONB) and has a heavily wooded character, particularly in the eastern extents of the management area.
- 4.2.2 The existing A2 dual carriageway is heavily trafficked and is a dominant feature in the landscape, and the separation it creates is reinforced by the High Speed 1 (HS1) corridor that lies to the south of the road. The corridor has woodland planting along the edge, with more recent woodland mitigation planting adjacent the HS1 corridor.
- 4.2.3 A Site of Special Scientific Interest (SSSI) designation covers much of the woodland east of Thong with an ecology that includes species of fungi, lichens and bryophytes vulnerable to increased levels of pollution. Protected species are also present. The area forms Shorne Woods Country Park, a popular and well used area of public open space. Shorne Woods Country Park also contains areas of ancient woodland.
- 4.2.4 This management area is shown in the Environmental Masterplan (REF TBC), Section 1, Sheets 1-4 and Sheets 7-17.

Management Requirements

- 4.2.5 The management requirements of this area are:
- a. To provide suitable woodland to screen views from within the Kent Downs AONB.

- b. To provide appropriate native woodland to offset the loss of woodland along the northern and southern edge of the corridor and extend the range of protected and notable species supported by retained adjacent woodland.
- c. To provide woodland, scrub and hedgerow planting that reflects the surrounding landscape character in terms of the existing deciduous woodland surrounding arable fields, thick deciduous shaws and hedgerows.
- d. To establish a diverse palette of local provenance native tree and shrub species that will be reflective of the key characteristics of the West Kent Downs character area.
- e. To provide woodland edge where woodland has been removed and where other constraints, such as the presence of diverted utilities and lack of space, means woodland planting cannot be achieved. Woodland edge to be managed to retain character of the woodland.
- f. To ensure inclusion of species with prominent flowering and fruiting within the woodland edge mix, and to dominate the woodland edge, creating a visually diverse roadside and a long season food source for invertebrates, birds and small mammals.

Typologies Present

4.2.6 The planting and habitat typologies present within this area are listed below:

- a. LE1.3 Species rich grassland
- b. LE2.1 Native woodland
- c. LE2.2 Woodland edge
- d. LE2.4 Linear belt of shrubs and trees
- e. LE2.5 Shrubs with intermittent trees
- f. LE2.7 Scattered trees
- g. LE4.4 Native hedgerow with trees
- h. LE6.1 Water bodies
- i. LE6.4 Wet grassland.

4.3 Land East of Brewers Wood (Ancient Woodland Compensation)

Plate 4.3 Land east of Brewers Wood



Description of Management Area

- 4.3.1 This management area is located north of the existing A2/M2 corridor and is located between Brewers Wood to the west and Great Crabbles Wood to the east. The management area is approximately XX ha in size.
- 4.3.2 The existing landscape is predominately open grassland with several individual mature trees located on the sloping ground down to the A2 corridor.
- 4.3.3 This management area is shown in the Environmental Masterplan (REF TBC) Section 2, Sheets 5-6.

Management Requirements

- 4.3.4 The management requirements of this area are:
 - a. To provide compensation planting for the loss of ancient woodland, along the A2/M2 corridor and within Shorne Woods Country Park.
 - b. To ensure replacement open space for that lost within Shorne Woods Country Park would be landscaped to complement the existing site and use, linking together and functioning as one. The open space would be limited to the walking, cycling and horse riding (WCH) routes and open rides and glades, to allow the ancient woodland time to mature.
 - c. New woodland will be protected by means of appropriate fencing until established.

- d. To provide woodland linking Shorne Woods SSSI with Great Crabbles Wood SSSI. This would provide strong connectivity between two areas of ancient woodland, and provide shelter and foraging for woodland fauna, specifically for dormouse, although beneficial to great crested newt (GCN) and bat species too. The NVC community recorded in Shorne Woods was W10 (*Quercus robur* – *Pteridium aquilinum* – *Rubus fruticosus* woodland), so this newly planted management area should develop into that NVC community.
- e. To provide woodland for screening of the Project route whilst retaining key views from the upper slopes of new woodland across to the Darnley Mausoleum.
- f. Open rides and glades to be established along utility diversion routes and proposed footpath routes for public access.
- g. To provide a structurally diverse and graduated woodland edge to the rides.
- h. To establish and maintain wildlife ponds with a range of depths, macrophyte cover, and shading, in line with published guidance such as the GCN mitigation guidelines (English Nature, 2001).
- i. Understorey and groundcover planting to be managed to deter public access from the formal routes into the woodland to protect the establishment of the ancient woodland and provide security to neighbouring land and properties.

Typologies Present

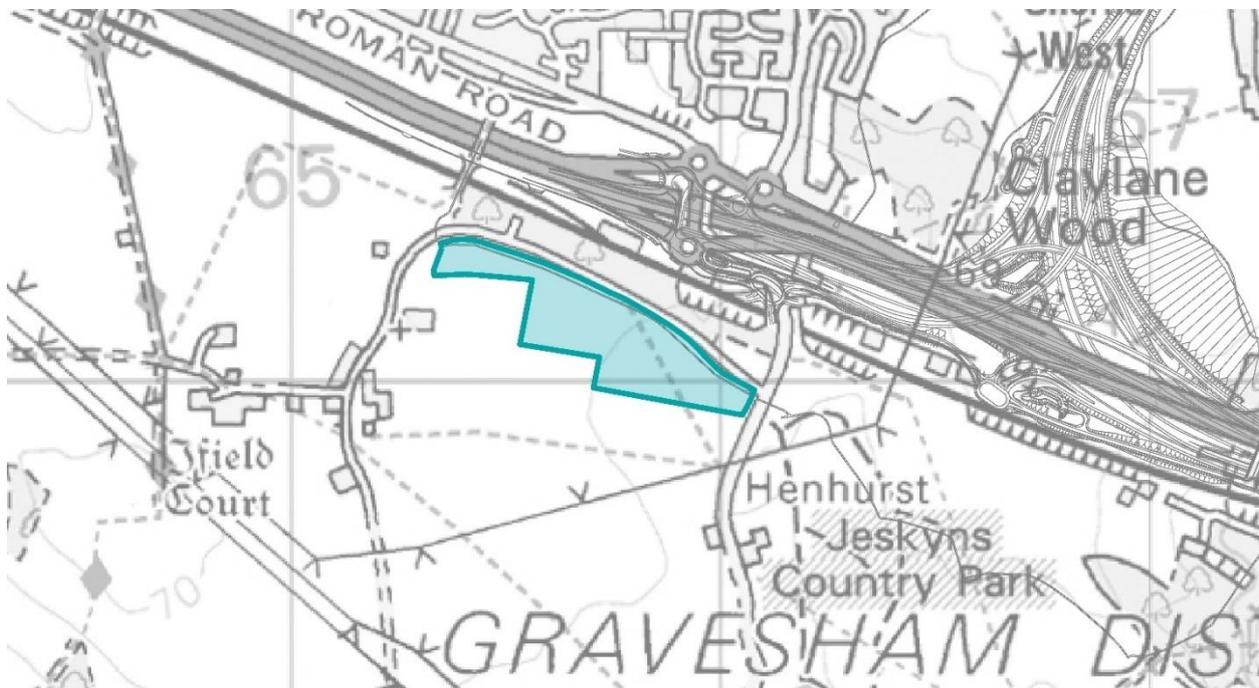
4.3.5 The planting and habitat typologies present within this area are listed below:

- a. LE 1.3 Species Rich Grassland
- b. LE 6.1 Water Bodies
- c. E3.2 Ancient Woodland Compensation

4.3.6 The outline management prescriptions and programmes for the typologies listed above are detailed in Chapter 7 of this document.

4.4 Land West of Jeskyns (Ancient Woodland Compensation)

Plate 4.4 Land West of Jeskyns



Description of Management Area

- 4.4.1 This management area is located to the west of Jeskyns Community Woodland. The area lies to the south of the A2/M2 corridor and HS1 corridor and lies adjacent to Church Road. The management area is approximately XXm² in size.
- 4.4.2 Saint Margaret's Church of England is located approximately XX ha to the west of the management area.
- 4.4.3 The existing area is comprised mainly of arable fields with a vegetated boundary to Church Road.
- 4.4.4 This management area is shown in the Environmental Masterplan (REF TBC), Section 2, Sheets 5-6.

Management Requirements

- 4.4.5 The management requirements of this area are:
 - a. To provide compensation planting for the loss of ancient woodland along the A2/M2 corridor, extending the woodland present in Jeskyns Country Park, and providing additional habitat for dormouse, bats and GCN present in habitats south of HS1.
 - b. To create habitat communities which develop into those of local woodlands: W10, and W8b (*Fraxinus excelsior* – *Acer campestre* – *Mercurialis perennis* woodland).

- c. To retain the existing footpaths that run through the management area.
- d. To reinstate the historic field patterns by use of hedgerow boundary planting.
- e. To retain the setting of St Margaret's Church of England.
- f. To establish and maintain wildlife ponds with a range of depths, macrophyte cover, and shading, in line with published guidance.

Typologies Present

4.4.6 The planting and habitat typologies present within this area are listed below:

- a. LE1.3 Species Rich Grassland
- b. LE4.4 Native Hedgerow with trees
- c. LE6.1 Water Bodies
- d. E.2 Ancient Woodland Compensation.

4.4.7 The outline management prescriptions and programmes for the typologies listed above are detailed in Chapter 7 of this document.

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4.5 Green Bridges (Brewers Road, Thong Lane over A2, Thong Lane over LTC)

Plate 4.5 Green bridges



Description of Management Area

- 4.5.1 This management area contains the green bridges located at Brewers Road bridge and Thong Lane bridge over the existing A2 and the proposed green bridge at Thong Lane over the A122.
- 4.5.2 The green bridges at Brewers Road and Thong Lane over the existing A2 are proposed as 'lightweight' green bridges, with the green bridge at Thong Lane over the A122 defined as a heavyweight green bridge with tree planting.

Management Requirements

- 4.5.3 The management requirements for the green bridges in this management area are:
- To provide habitat connectivity for species including a range of protected and notable species between Shorne Woods and Ashenbank Woods, Jeskyns and Cobham Park. Habitat would be managed to provide strong green corridors providing shelter, foraging and linear features allowing easy detection within the landscape.

- b. To provide a high-quality experience for users crossing the bridge through vegetation and woodland planting. The green bridge should improve recreation access across the A2/M2/Lower Thames Crossing corridor, locating WCH routes away from the alignment of Thong Lane.
- c. To provide a visual connection between the woodlands north and south of the A2/M2/Lower Thames Crossing corridor through planting on the green bridge. Planting on, and adjacent to, the green bridge to retain and reinforce the wooded character of the landscape as far as reasonably practicable.
- d. To provide tree planting on the green bridge that links into woodland planting to the edge of Gravesend in the west and the gateway to Shorne Woods Country Park in the east as part of a wider 'wooded circle' connecting Shorne Woods and Claylane Wood. Woodland should be managed to retain a sense of openness and intervisibility at eye level to make people feel safe when crossing the bridge, and not fully enclosed.
- e. To provide focal points on the Project route for road users and act as local landmarks, creating a wooded skyline, visually linking either side of the bridge.
- f. To manage shrub and tree planting towards the edge of the bridge structure to ensure branches and trees do not fall onto the carriageway below but retain a connection into habitats adjacent to the ends of each bridge. Tree planting and vegetation to be managed to retain the character of a vegetated rural land over the green bridge and tie into the existing Thong Lane character.
- g. To establish and manage species that are suitable to the constrained growing conditions and soil depth on the green bridge. Variations in soil depth on the bridge can provide diversity in planting species and heights.
- h. To consider a drought tolerant species make-up which leads to a diverse grassland and shrub mix to resemble a woodland edge crossing the bridge.
- i. To provide open grassland areas managed to provide a sheltered corridor across the Project route.

Typologies Present

4.5.4 The planting and habitat typologies present within this area are listed below:

- a. LE1.3 Species Rich Grassland
- b. LE2.1 Woodland – Including Non-Native Species
- c. LE2.2 Woodland Edge
- d. LE2.5 Shrubs with intermittent trees

- e. LE2.7 Scattered trees
- f. LE4.4 Native hedgerow with trees

4.5.5 The outline management prescriptions and programmes for the typologies listed above are detailed in Chapter 7 of this document.

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4.6 Open Space North of Claylane Wood

Plate 4.6 Open Space North of Claylane Wood



Description of Management Area

- 4.6.1 This management area is located to the north-west of the A2/M2/Lower Thames Crossing junction, between the Project route and the edge of Gravesend. The area extends from the edge of the existing Claylane Wood in the south up to the new Thong Lane green bridge over the A122 in the north.
- 4.6.2 The land is currently used for agriculture, with overhead high voltage powerlines running through the middle of the area. A hard surfaced track (NS169) runs through the management area, from Michael Gardens play area on the eastern edge of Gravesend, connecting to footpath NGS167.
- 4.6.3 The existing land adjoins the village of Thong to the west, which is designated as a Conservation Area, and is characterised by its open, rural setting.
- 4.6.4 This management area is shown in the Environmental Masterplan (REF TBC), Section 2, Sheets 5-6.

Management Requirements

- 4.6.5 The management requirements of this area are:
 - a. To provide woodland planting to the eastern edge of Gravesend, to compensate for the loss of ancient woodland within Claylane Wood. Woodland planting would link into the NVC community W8b at Claylane Wood, so new habitat should tend towards this community.
 - b. To provide woodland planting on the eastern edge of Gravesend to link Claylane Wood and the proposed planting over Thong Lane green bridge over the A122 as part of a wider 'wooded circle' around the A2/M2/Lower

Thames Crossing junction. This would strengthen connectivity between existing and retained blocked of woodland, providing shelter, foraging and commuting habitats for a range of species, particularly dormice and bats.

- c. To provide woodland planting of suitable depth and quality to provide visual screening for receptors at the eastern edge of Gravesend.
- d. To retain an open aspect around the village of Thong, as far as reasonably practicable, by the use of species-rich chalk grassland and wildflower meadow planting. The creation of a diverse grassland sward would provide resource for pollinating insects and the range of bird, amphibian, reptile and bat species which prey on them. This area, together with Chalk Park North, also links the marshes along the banks of the Thames with the woodlands along the A2/M2 corridor which reach further east and south into the wider landscape. The provision of wildlife ponds will further enhance this management area.
- e. To manage the open grassland areas so that they reference the historic layout and runways of the former RAF Gravesend.

Typologies Present

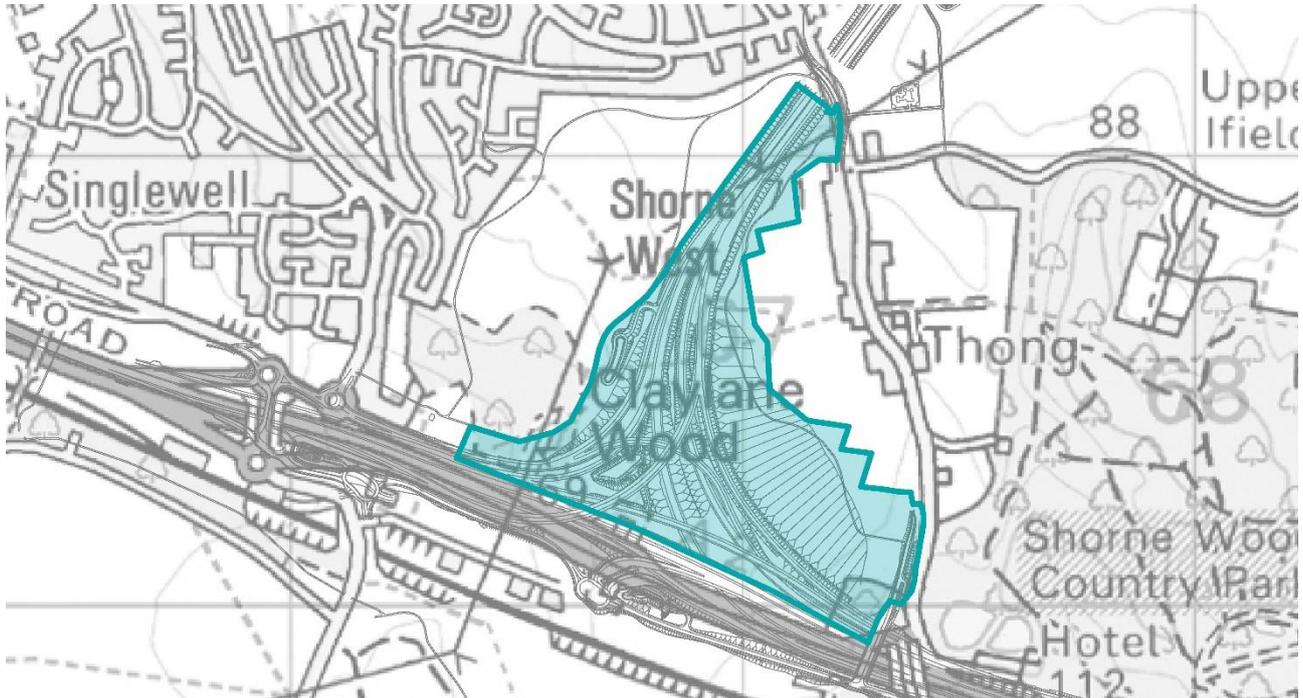
4.6.6 The planting and habitat typologies present within this area are listed below:

- a. LE1.3 Species Rich Chalk Grassland
- b. LE1.3 Species Rich – Annual Wildflower Grassland
- c. LE2.8 Scrub
- d. LE4.3 Native Species Hedge – Untrimmed
- e. LE6.1 Water Bodies
- f. E.2 Ancient Woodland Compensation

4.6.7 The outline management prescriptions and programmes for the typologies listed above are detailed in Chapter 7 of this document.

4.7 A2/M2/Lower Thames Crossing junction

Plate 4.7 A2/M2/Lower Thames Crossing junction



Description of Management Area

- 4.7.1 This management area is located to the north of the existing A2/M2 corridor, between the eastern edge of Gravesend and the village of Thong.
- 4.7.2 The existing landscape is mainly comprised of existing arable fields, with some vegetation adjacent the existing A2 carriageway and paddocks and vegetation around the edge of the village of Thong.
- 4.7.3 The management area is approximately XXha in size and includes the proposed A2/M2/Lower Thames Crossing and associated structures.
- 4.7.4 This management area is shown in the Environmental Masterplan (REF TBC), Section 2, Sheets xx.

Management Requirements

- 4.7.5 The management requirements of this area are:
 - a. To provide woodland planting within the junction and adjacent slip roads, to provide connectivity between Claylane Woods and Shorne Woods as part of the 'wooded circle' around the junction, enhancing habitat connectivity for a range of species. The woodland being removed from Claylane Wood is NVC community W8b, and the woodland from Shorne Woods Country Park is W10, so planting would be representative of these NVC communities.
 - b. The woodland planting shall be managed to screen views of the junction, vehicles, and associated structures, including gantries, bridges and overpasses from the wider landscape. Enclosing the junction within

woodland planting shall also help ensure views out of the junction are limited and allow drivers to focus on navigating the complex junction.

- c. Drainage ponds within the junction to be designed and managed with suitable planting and species and layout to integrate into the surrounding landscape.
- d. Woodland planting between the junction and the village of Thong on false cut earthworks to provide visual screening for residents. The woodland to provide visual screening as well as softening the appearance of the earthworks.
- e. Reinststate woodland planting, and vegetation lost, to integrate the new realigned Thong Lane into the surrounding landscape, replace features lost during construction and to re-establish the woodland edge along the road.
- f. No woodland or scrub planting to be planted within visibility splays within the junction. Nearby woodland and scrub planting to be managed to ensure there is no impact on visibility splays.
- g. To screen and integrate the proposed substation located to the west of Thong Lane.

Typologies Present

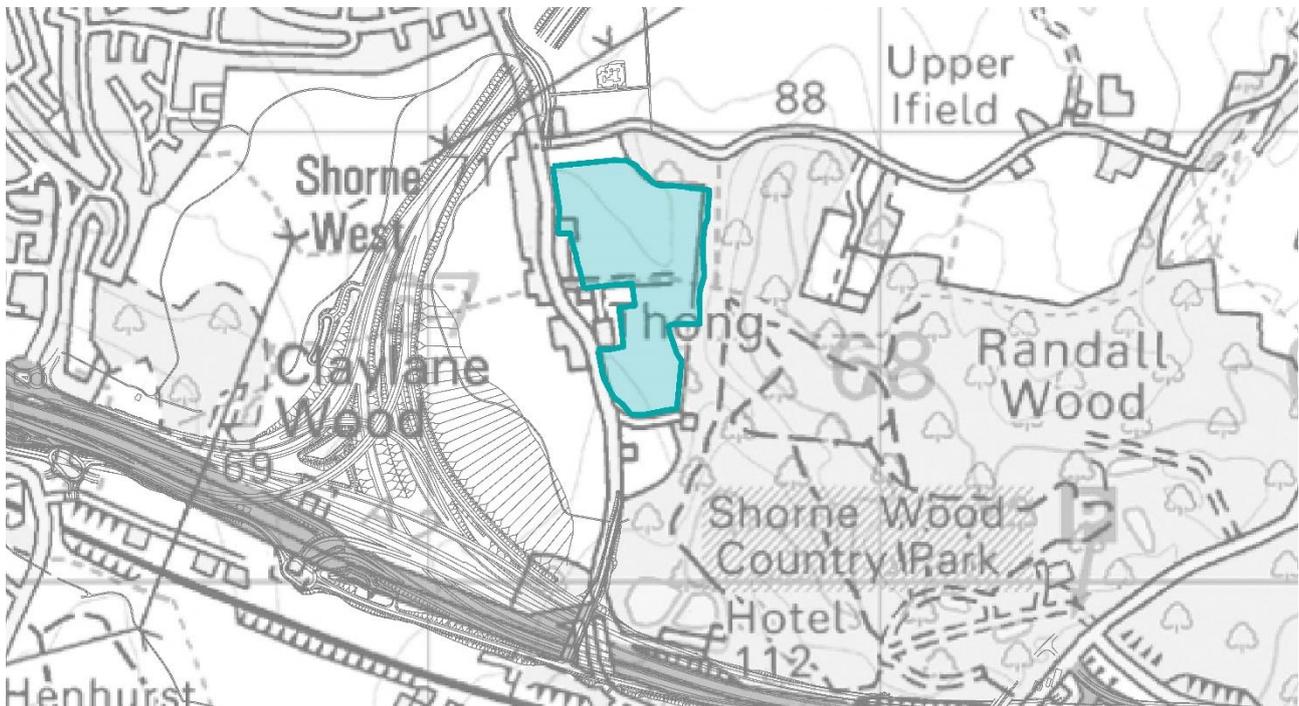
4.7.6 The planting and habitat typologies present within this area are listed below:

- a. LE1.3 Species Rich Grassland
- b. LE2.1 Native Woodland
- c. LE2.2 Woodland Edge
- d. LE2.7 Scattered trees
- e. LE2.8 Scrub
- f. LE4.4 Native species hedgerow with trees
- g. LE6.1 Water bodies (standing water)
- h. LE6.4 Marsh and wet grassland

4.7.7 The outline management prescriptions and programmes for the typologies listed above are detailed in Chapter 7 of this document.

4.8 Thong Open Mosaic Habitat

Plate 4.8 Thong Open Mosaic Habitat



Description of Management Area

- 4.8.1 This management area is located between the village of Thong and the western extents of Shorne Woods Country Park. The existing land is predominately used for grazing and paddock enclosure, with fencing and small tree and scrub at boundaries.
- 4.8.2 The management area is approximately XXha in size.
- 4.8.3 This management area is shown in the Environmental Masterplan (REF TBC), Section 2, Sheets xx.

Management Requirements

- 4.8.4 The management requirements of this area are:
- To establish a mosaic of open habitat which would provide suitable habitat for the translocation of species including amphibians (notably GCN), and reptiles.
 - Habitat present would be rough grassland, ponds, and patches of bare earth, with scrub blending into the adjacent woodland of Shorne Wood. Habitat would be planted as a patchwork rather than large areas of similar habitat.
 - Hibernacula and refuges for translocated species would also be provided around the site, based on good practice guidance designs (English Nature, 2001).

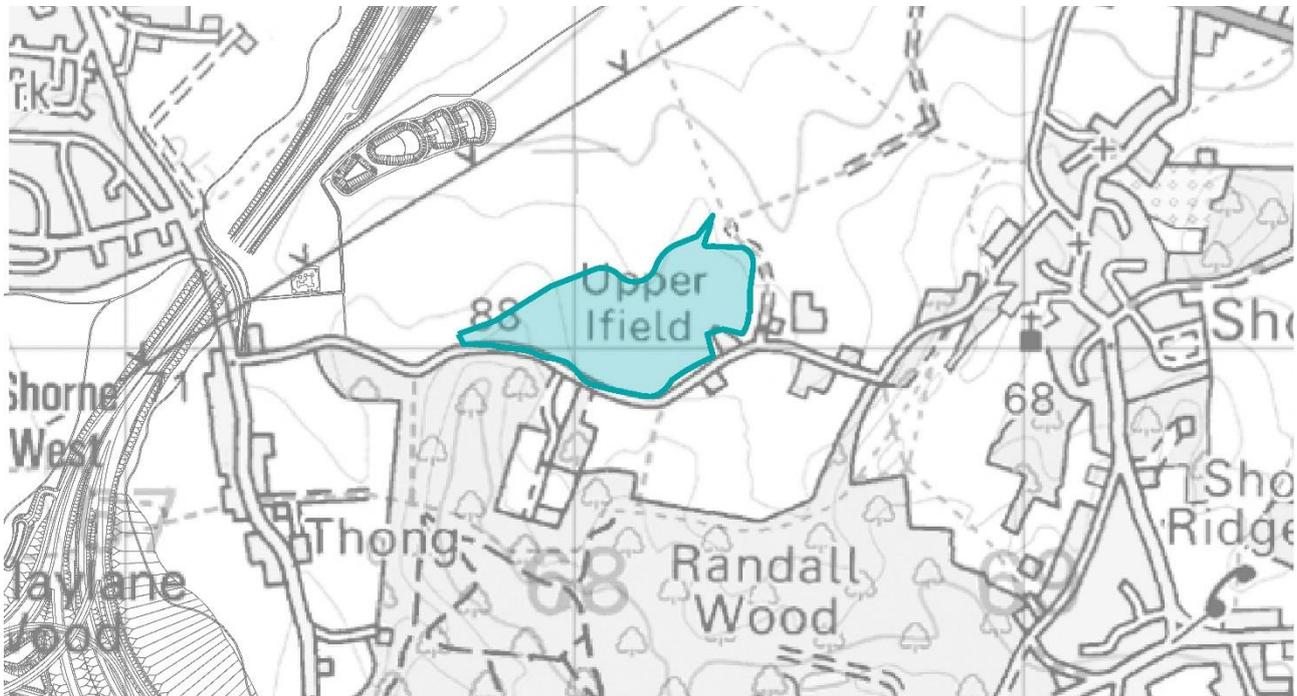
Typologies Present

- 4.8.5 The planting and habitat typologies present within this area are listed below:
- a. LE6.1 Water Bodies
 - b. E.2 Open Mosaic Habitat
- 4.8.6 The outline management prescriptions and programmes for the typologies listed above are detailed in Chapter 7 of this document.

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4.9 Land North of Brummelhill Wood (Ancient Woodland Compensation)

Plate 4.9 Land north of Brummelhill Wood



Description of Management Area

- 4.9.1 This management area is located within two land parcels to the north of Shorne Ifield Road and the existing Brummelhill Wood.
- 4.9.2 The existing land is currently used for agriculture, with intermittent scrub and tree planting along the boundary to Shorne Ifield Way.
- 4.9.3 The management area is approximately XXha in size.
- 4.9.4 This management area is shown in the Environmental Masterplan (REF TBC), Section 2, Sheets xx.

Management Requirements

- 4.9.5 The management requirements of this area are:
 - a. To provide woodland planting to the eastern edge of Gravesend, to compensate for the loss of ancient woodland along the A2/M2 corridor and within Shorne Woods Country Park. Woodland planting will link into the NVC community W10 at Shorne Woods, so new habitat should develop into this community. Woodland planting, once established, would provide shelter and foraging for woodland fauna, specifically for dormouse, although beneficial to GCN and bat species too. Wildlife ponds would be provided which would further enhance the biodiversity value of the area.
 - b. To create a native woodland of appropriate species mix suitable to the locale, with a variable light environment to benefit ground flora species.

- c. To retain and enhance the existing wooded character of Shorne Woods, the woodland has been designed to be on the upper slopes, reflective of the surrounding landscape character.
- d. Soil and other material where appropriate will be salvaged from the affected ancient woodland areas and redistributed at the receptor sites that would have been prepared in advance to offer similar ground conditions to that of the donor site.

Typologies Present

4.9.6 The planting and habitat typologies present within this area are listed below:

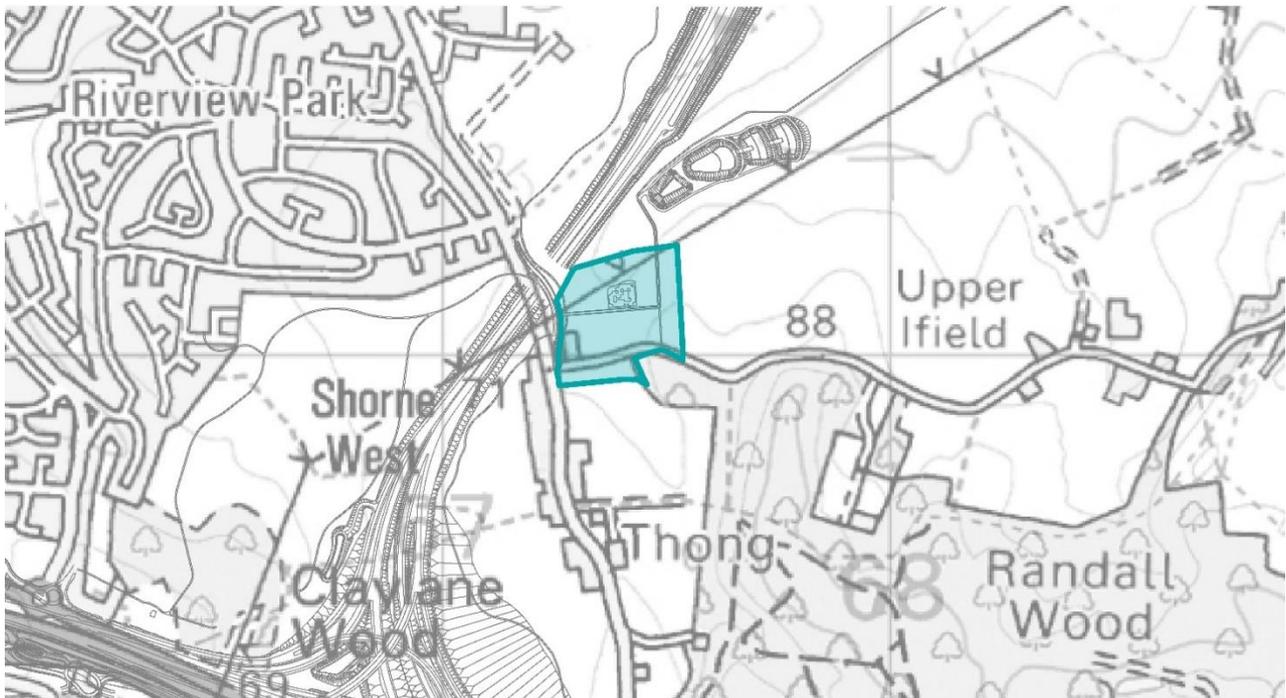
- a. LE6.1 Water Bodies
- b. E.2 Ancient Woodland Compensation

4.9.7 The outline management prescriptions and programmes for the typologies listed above are detailed in Chapter 7 of this document.

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4.10 Gateway to Shorne Woods Country Park

Plate 4.10 Gateway to Shorne Woods County Park



Description of Management Area

- 4.10.1 This management area is located to the north-east of the village of Thong and north of Shorne Ifield Road.
- 4.10.2 The existing land is currently utilised as a landscaping/nursery business with outbuildings and areas used to grow nursery stock. The business would be extinguished to accommodate the construction of the Thong Lane over A122 Lower Thames Crossing green bridge, Thong Lane realignment and utilities diversions taking place on the land.
- 4.10.3 A number of proposed and existing utilities run through the management area, including high voltage overhead powerline diversions and underground high-pressure gas diversions, constraining the planting within this area.
- 4.10.4 The management area is approximately XXha in size.
- 4.10.5 This management area is shown in the Environmental Masterplan (REF TBC).

Management Requirements

This management area is subject to change ahead of the finalisation of the outline LEMP. Placeholder text has been included above for the description of the management area. The outline management requirements for this area are currently being progressed.

4.11 Chalk Park and Environs

Plate 4.11 Chalk Park and Environs



Description of Management Area

- 4.11.1 This management area is located to the north of the proposed green bridge at Thong Lane over the A122 Lower Thames Crossing and extends towards the A226 Gravesend Road.
- 4.11.2 The management area adjoins the back of existing properties along Thong Lane on the eastern extents as well as adjoining the existing recreational facilities at Cascades Leisure Centre and football pitches adjacent to Thamesview School.
- 4.11.3 To the south of the management area and located just off Thong Lane is an existing 18-hole golf course named Southern Valley Golf Club. The golf course has been designed in the manner of a traditional links style with undulating topography and areas of open rough grassland, gorse, broom, and scrub planting.
- 4.11.4 The remaining land within this management area is used for agriculture, with vegetated boundaries and occasional trees. The Project route passes through the centre of the management area and is designed to be in deep cutting, within the underlying chalk geology. As a result, the Southern Valley Golf Course is to be extinguished.
- 4.11.5 The Project route enters the portal structure within this management area. The portal structure has been designed to accommodate the Tunnel Services Building and located within the cutting of the South Portal, to screen views of the structure from the surrounding landscape.

- 4.11.6 The Tunnel Services Building has been designed with an extensive green roof, to blend seamlessly into the adjacent grassed earthworks. Integrating the structure into the landscape.
- 4.11.7 An access road has been designed to connect the South Portal to the A226. The alignment and character of the access road has been designed to replicate that of a country lane, similar to those found within the local area.
- 4.11.8 A substation has been designed off the access road and has been located near the vicinity of existing barns and farm buildings. The substation will be integrated and screened from the wider landscape by a mixture of earthworks and woodland planting.
- 4.11.9 Within this management area, there are several historical boundaries, including the Parish boundary to the east of the South Portal. The boundaries contain gappy hedgerows and remnant hedgerow trees.
- 4.11.10 The management area is approximately XXha in size.
- 4.11.11 This management area is shown in the Environmental Masterplan (REF TBC)..

Management Requirements

- 4.11.12 The management requirements of this area are:
- a. To provide a semi-natural green space accessible to residents of Gravesend. A catchment gap has been identified for semi-natural green spaces within the area. The semi-natural space has been designed to contain a mixture of woodland creation, species rich grassland and scrub.
 - b. To provide a wooded hilltop, utilising excavated material from the portal and cutting in keeping with the character of nearby woodlands close to settlements. Woodland to be appropriate to the underlying excavated material used in the creation of the hilltop.
 - c. Woodland planting to soften the appearance of the excavated material hill and soften the edge of Gravesend and to create a desirable separation between the edge of the settlement and the South Portal.
 - d. Woodland and top of the hill to be managed to include open areas to provide long distance views across the estuary from the summit. Views to be focused towards the River Thames.
 - e. To provide open species rich grassland, including chalk grassland where appropriate over the underlying geology. Management of grassland to retain the open views current experienced within this management area, especially on the Public Right of Way (PRoW) network. The creation of a diverse grassland sward, together with scattered scrub and woodland blocks, would provide resources for pollinating insects and the range of bird, amphibian, reptile and bat species which prey on them. This area, together with Chalk Park South, also links the marshes along the banks of the Thames with the woodlands along the A2/M2 corridor which reach further east and south into

the wider landscape. The provision of wildlife ponds, established and maintained with a range of depths, macrophyte cover and shading, would further enhance this management area.

- f. Planting would look to follow historic patterns. Small blocks of scrub and woodland planting to screen views of the portal from footpaths and elevated areas where appropriate.
- g. To retain the sense of openness, the chalk cutting to be designed and managed to grade back at the top of the cutting to where it meets existing ground levels to allow a natural establishment of chalk grassland on the exposed chalk. Area to be managed to reduce views of bare chalk face and to blend the cutting into the surrounding landscape.
- h. To provide new hedgerows to reflect historic patterns and link into existing remnant groups of hedgerow trees. Hedgerow planting to reverse appearance of field aggregation and to screen and integrate the Project into the surrounding landscape.
- i. To provide woodland planting on earth bunds screening the proposed substation. Woodland planting to soften the appearance of the woodland, blend into existing woodland surrounding the farmstead and to further screen the substation building and security fencing.
- j. To integrate the portal structure into the landscape. The portal building would have an extensive green roof of species similar to those within the surrounding landscape.
- k. To provide hedgerow and hedgerow tree planting along the emergency access road from the A226 and the South Portal. The access road should appear as typical country land found throughout the local area. Access road follows an historic field boundary and planting should tie into existing remnant hedgerows along the route of the proposed access road.
- l. Drainage attenuation ponds to the east of the proposed alignment to be located within species rich grasslands and/or chalk grasslands as appropriate to the underlying geology.

Typologies Present

4.11.13 The planting and habitat typologies present within this area are listed below:

- a. LE1.3 Species Rich Grassland
- b. LE1.3 Species Rich Grassland – Chalk
- c. LE1.4 Rock and Scree
- d. LE2.1 Woodland – Inc Non-Native Species

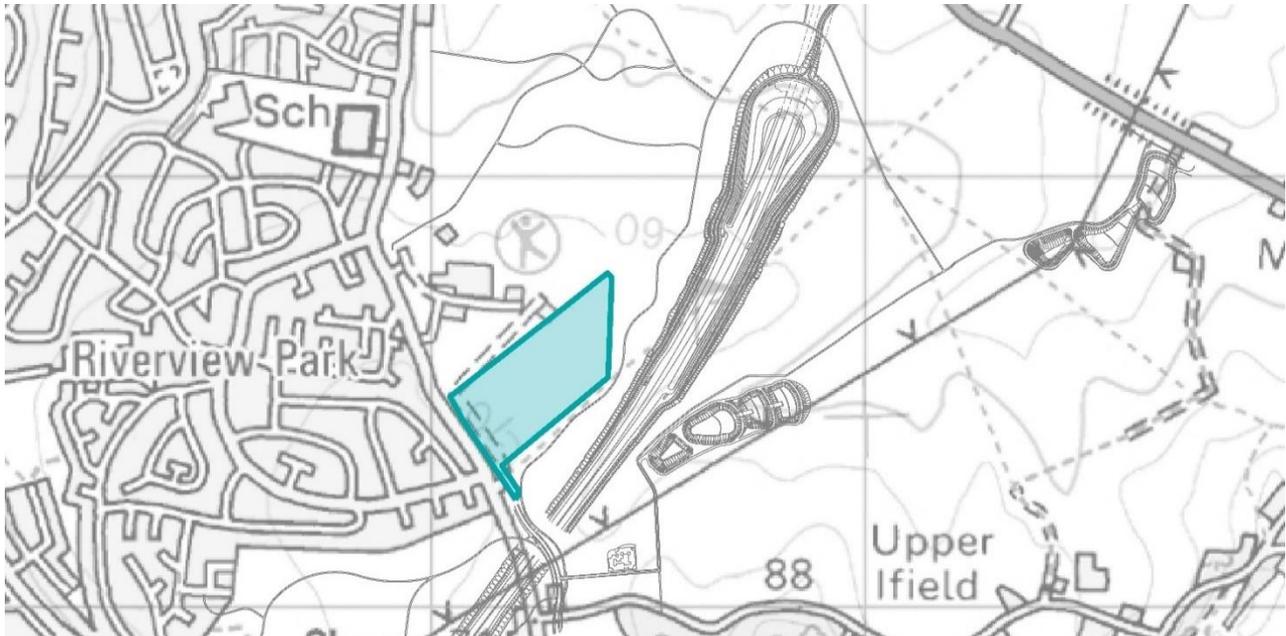
- e. LE2.2 Woodland Edge
- f. LE2.8 Scrub
- g. LE4.4 Native Hedgerow with Trees
- h. LE6.1 Water Bodies (Standing Water)
- i. LE6.4 Marsh and Wet Grassland
- j. LE7.2 Green Roofs

4.11.14 The outline management prescriptions and programmes for the typologies listed above are detailed in Chapter 7 of this document.

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4.12 Replacement recreation land for Gravesham Borough Council

Plate 4.12 Replacement recreation land for Gravesham Borough Council



Description of Management Area

- 4.12.1 This management area is located to the north-west of the proposed Thong Lane green bridge over the A122 Lower Thames Crossing, and adjoins onto the eastern boundary of the Cascades Leisure Centre site.
- 4.12.2 The management area is located on the existing Southern Valley Golf Club, and the golf course has been designed in the manner of a traditional links style with undulating topography and areas of open rough grassland, gorse, broom, and scrub planting.
- 4.12.3 The management area includes the existing clubhouse of Southern Valley Golf Club and the access road to the club from Thong Lane.
- 4.12.4 As part of the proposals, the existing pitch and putt golf course located within the northern extents of the Cascade facilities is to be relocated in this management area, utilising the existing landscape features, golf club and access road in the creation of a new pitch and putt course.
- 4.12.5 The management area is approximately XXha in size.
- 4.12.6 This management area is shown in the Environmental Masterplan (REF TBC)..

Management Requirements

This management area is subject to change ahead of the finalisation of the outline LEMP. Placeholder text has been included above for the description of the management area. The outline management requirements for this area are currently being progressed.

5 Management Areas – North of the River to A13 junction

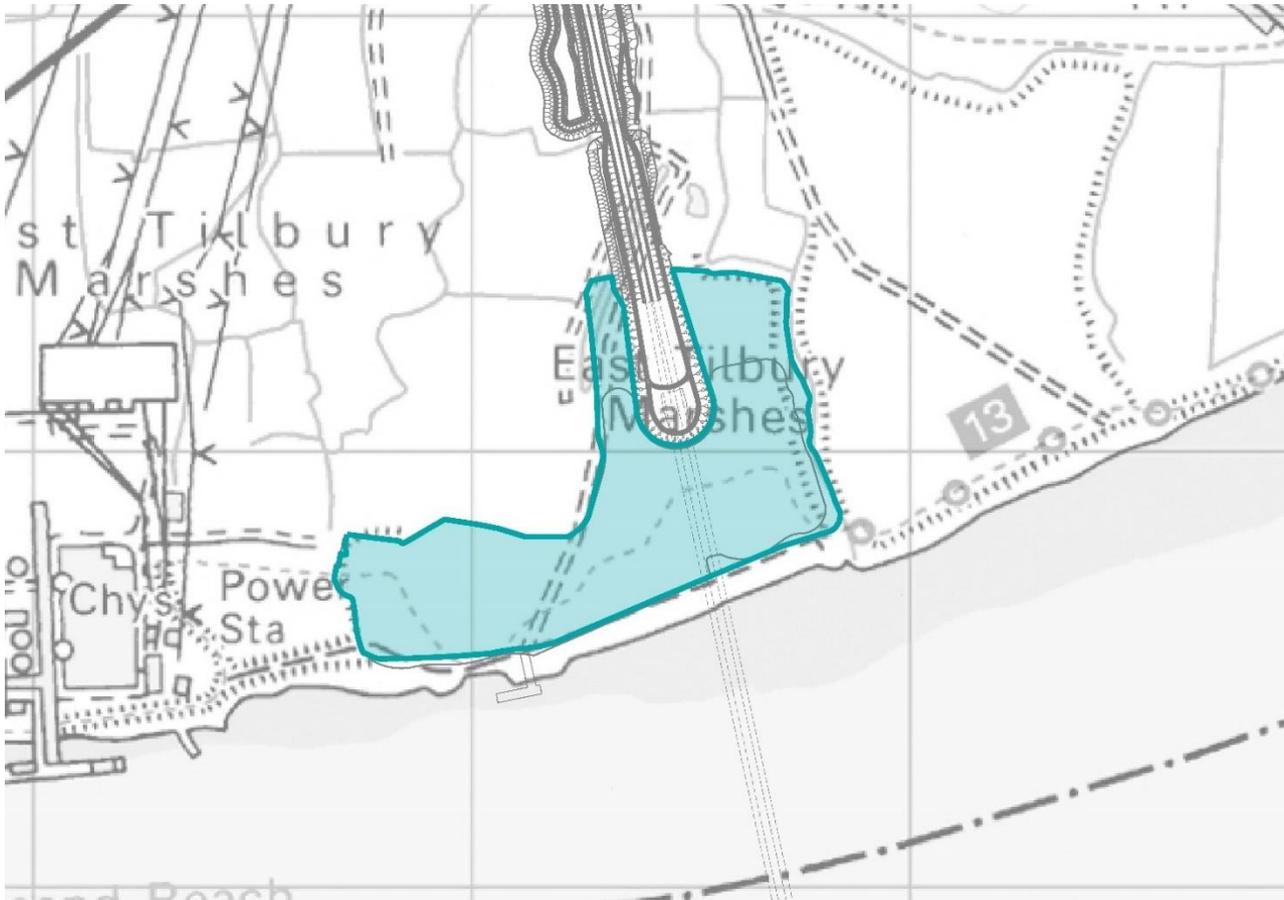
Plate 5.1 Location of management areas within the North of the River Thames to the A13 junction regional area



- 5.1.1 The management areas within the North of the River Thames to the A13 junction regional area are shown in Plate 5.1. This chapter provides a description of the management area, and the outline management requirements for each area
- 5.1.2 The following management areas within this chapter describe the sectional areas of the route (REF TBC). These management areas focus on the landscape parcels located adjacent to, or within the Project route and the junctions. As such the management and inspections of these areas will be covered by DMRB standards GM 701 Series 3000 and GS801 Series 3000 documents. For completeness, the outline management requirements and a list of typologies for these management areas are included for each of these management areas:
 - a. 5.4 Tilbury link
 - b. 5.5 Chadwell link
 - c. 5.11 A13 junction

5.2 Tilbury Fields

Plate 5.2 Tilbury Fields



Description of Management Area

- 5.2.1 This management area is located on the low-lying Tilbury marshes to the north of the River Thames and is located within the existing Goshems Farm.
- 5.2.2 The management area extends to the edge of the former Tilbury Power station to the west, and East Tilbury landfill to the east.
- 5.2.3 The northern boundary of the management area is adjacent to the proposed portal and Tunnel Services Building as the Project route emerges from the tunnel.
- 5.2.4 Goshems Farm is currently undergoing landfill and spoil placement activities and is a constantly evolving landscape. The spoil placement and landfill activities have resulted in the landscape being elevated several metres above existing and contrasts with the existing retained marshland within the surrounding landscape.
- 5.2.5 In addition to the ongoing landfill and spoil placement activities, Goshems Farm has been designed to accommodate the excavated material from the tunnel and portal.
- 5.2.6 The proposed design for the landscape earthworks utilising the excavated material have drawn inspiration from the landform of the nearby heritage assets such as Coalhouse Fort and Tilbury Fort, as well as the forts south of the River Thames. The proposed design has been provisionally named as Tilbury Fields.

- 5.2.7 The earthworks have been designed to create targeted views towards these nearby heritage assets, providing a vantage point above the surrounding raised landfill areas.
- 5.2.8 The management area is approximately XXha in size.
- 5.2.9 This management area is shown in the Environmental Masterplan (REF TBC).

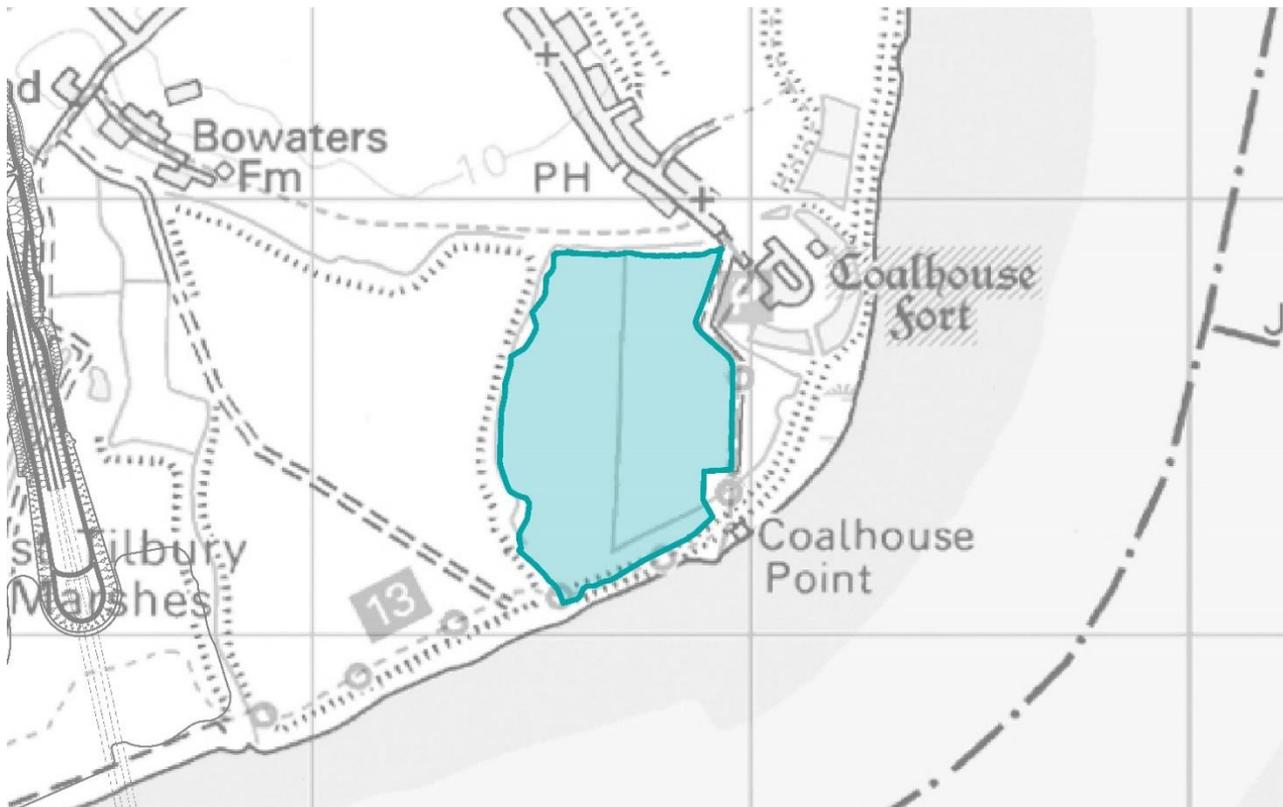
Management Requirements

This management area is subject to change ahead of the finalisation of the outline LEMP. Placeholder text has been included above for the description of the management area. The outline management requirements for this area are currently being progressed.

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5.3 Coalhouse Fort Water Vole Habitat

Plate 5.3 Coalhouse Fort water vole habitat



Description of Management Area

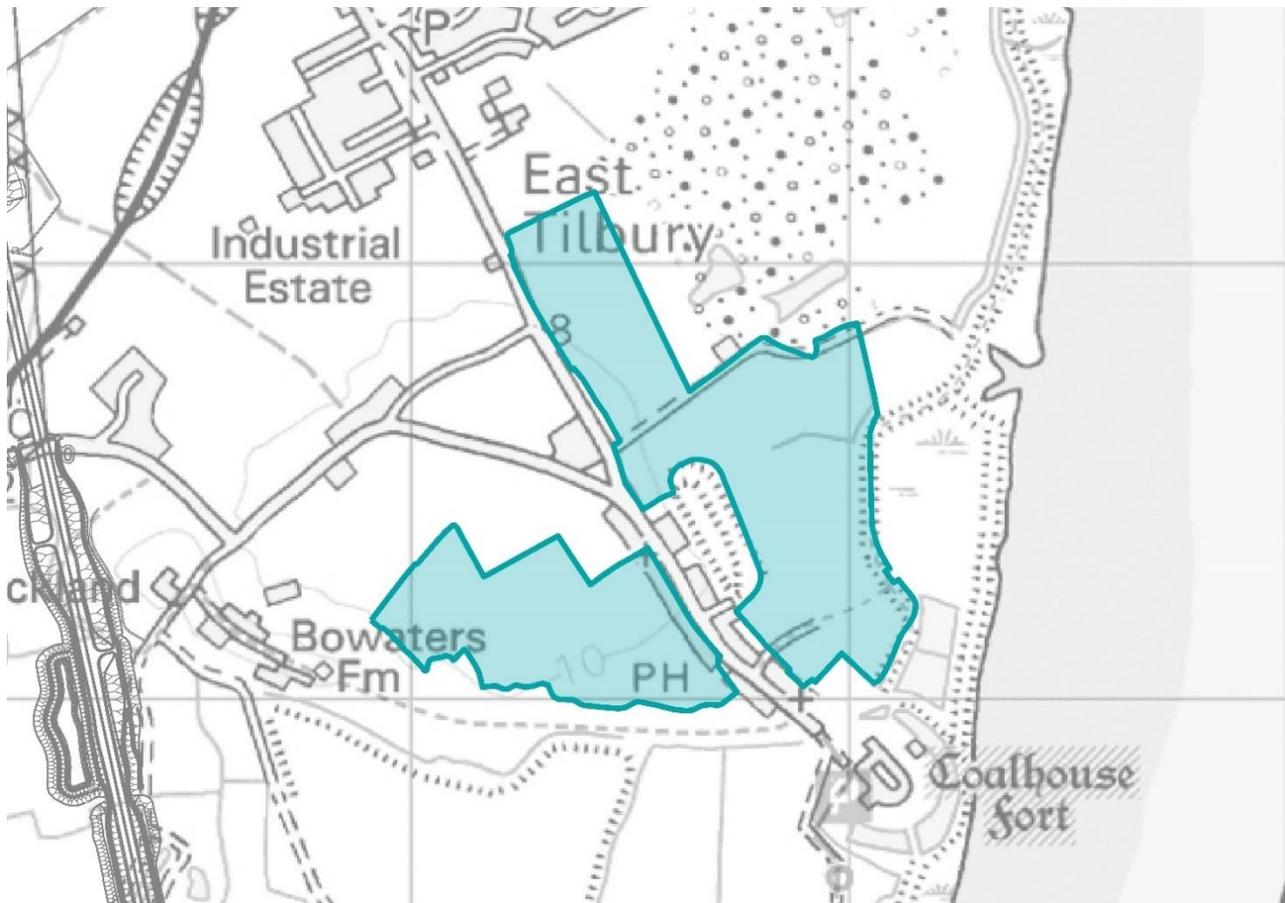
- 5.3.1 This management area is located to the west of Coalhouse Fort just to the North of the River Thames.
- 5.3.2 The management area extends west to a drainage ditch on the boundary to the East Tilbury landfill.
- 5.3.3 The existing landscape is comprised of arable, agricultural land, and is low-lying at its natural level in contrast to the surrounding land which has been raised as part of landfill activities.
- 5.3.4 An existing ditch runs through the middle of the management area, bisecting the area as it runs in a north-south alignment.
- 5.3.5 The management area is approximately XXha in size.
- 5.3.6 This management area is shown in the Environmental Masterplan (REF TBC).

Management Requirements

This management area is subject to change ahead of the finalisation of the outline LEMP. Placeholder text has been included above for the description of the management area. The outline management requirements for this area are currently being progressed.

5.4 Coalhouse Fort Open Mosaic Habitat Area

Plate 5.4 Coalhouse Fort Open Mosaic Habitat



Description of Management Area

- 5.4.1 This management area is located to the north of Coalhouse Fort and is comprised of 9 fields, totalling approximately XXha in size.
- 5.4.2 The fields lie both to the east and west of Princes Margaret Road, and on the eastern side, a number of fields adjoin onto the Coalhouse Battery Scheduled Ancient Monument that lies outside the Order Limits.
- 5.4.3 The land is currently used for agriculture with a number of vegetated field boundaries.
- 5.4.4 This management area is shown in the Environmental Masterplan (REF TBC), Section 9, Sheets 16-18 and 20-22.

Management Requirements

- 5.4.5 The management requirements of this area are:
 - a. To act as replacement habitat and a receptor site for translocated species including amphibians (notably GCN), and reptiles. This would also provide suitable invertebrate habitat to offset that lost as a result of the Project, notably around Low Street Pit Local Wildlife Site (LWS).

- b. To translocate acid grassland from Low Street Pit LWS to the southern section of the eastern parcel, as identified in the Environmental Masterplan (REF TBC), Section 9, Sheet 21. Translocation would follow published good practice guidance such as the CIRIA publication (Anderson and Groutage, 2003), and Blakesley et al. (2016).
- c. To establish grassland habitat which develops into NVC community U1 (*Festuca ovina* – *Agrostis capillaris* – *Rumex acetosella* grassland), currently present within Low Street Pit LWS. To establish an open mosaic habitat within all other areas of land within this management area, as identified in the Environmental Masterplan (REF TBC), Section 9, Sheets 16-18 and 20-22. The western land parcel area is designed primarily for GCN habitat and, following discussion with Natural England, the ratio of habitats in this area would be 70% grassland, 10% woodland, 10% bare ground and 10% scrub. This differs from the open mosaic description as found in Section 7.22.

Typologies Present

5.4.6 The planting and habitat typologies present within this area are listed below:

- a. LE6.1 Water Bodies
- b. E.2 Open Mosaic Habitat
- c. E.2 Translocated Acidic Grassland

5.4.7 The outline management prescriptions and programmes for the typologies listed above are detailed in Chapter 7 of this document.

5.5 Tilbury link

Plate 5.5 Tilbury link



Description of Management Area

- 5.5.1 This management area is located to the north of the River Thames and Goshems Farm. The area extends from the portal and Tunnel Services Building in the south and to Muckingford Road in the north.
- 5.5.2 The Tilbury Loop railway line passes through the middle of the management area running approximately in an east-west alignment.
- 5.5.3 The current landscape to the south of the Tilbury Loop railway line mainly comprises of existing arable agricultural land, within a long rectilinear field pattern with ditches and watercourses forming the field boundaries. The watercourses are aligned mainly north–south and follow historic drove routes towards the river. Further south the land is currently being used for spoil placement activities and pulverised fuel ash extraction activities.
- 5.5.4 North of the Tilbury Loop railway line, the existing landscape is used for agriculture, but with a more regular field pattern and vegetated boundaries.
- 5.5.5 Low Street Pit LWS is located to the east of the proposed Tilbury viaduct as it rises over the Tilbury Loop railway line.
- 5.5.6 Within this management area the Project route emerges from tunnel in the south and the tunnel ramp continues to embankment so that the proposed carriageway can cross above the Tilbury Loop railway line.
- 5.5.7 The management area is approximately XXha in size.
- 5.5.8 This management area is shown in the Environmental Masterplan (REF TBC).

Management Requirements

- 5.5.9 The management requirements of this area are:
- a. To the south of the Tilbury Loop railway line, to reinstate the watercourses in their former alignment with appropriate bank and ditch vegetation, including wetland trees and scrub. Bank profiles, and bankside and marginal planting would be designed to provide suitable water vole habitat.
 - b. To reflect the existing field pattern within the marshes, proposed drainage basins shall be designed and managed in a long linear form with suitable bank and ditch planting to integrate within the surrounding marshland landscape.
 - c. To reinstate the character of Low Street Pit for land lost to construction activities with suitable scrub, grassland and scattered trees reflective of the existing condition.
 - d. As the proposed carriageway rises above the Tilbury Loop railway line, woodland planting shall be managed to follow the existing wooded ridge and so as not to align with the Project route. The woodland shall be managed to create a contrast against the flat marshland landscape and accentuate the ridgeline.
 - e. To the north of the Tilbury Loop railway line, woodland planting on the embankment to be managed to provide visual screening of gantries and infrastructure on the Project Route for views from nearby residential properties.
 - f. Species-rich grassland along the road verge would create a diverse sward, which would provide resource for pollinating insects and the range of bird, amphibian, and reptile which prey on them. This would also provide a strong green corridor running north-south through the landscape, linking existing and retained habitats present along the route alignment.
 - g. To manage ditches at the base of proposed embankment and false cut earthworks.
 - h. To replace the Tilbury Green Common land and reconnect the two parts of the existing common land. With the use of a footpath which allows the public to enjoy the same rights and an improved characteristic of the setting, with woodland planting and WCH route being of a higher standard than the existing footpath.

Typologies Present

- 5.5.10 The planting and habitat typologies present within this area are listed below:
- a. LE1.3 Species Rich Grassland
 - b. LE2.1 Woodland

- c. LE2.2 Woodland Edge
- d. LE2.4 Linear Belt of Shrub and Trees
- e. LE2.5 Shrubs with Intermittent Trees
- f. LE2.7 Scattered Trees
- g. LE2.8 Scrub
- h. LE6.1 Water Bodies (Standing Water)
- i. LE6.2 Banks and Ditches
- j. LE6.4 Marsh and Wet Grassland

5.5.11 The outline management prescriptions and programmes for the typologies listed above are detailed in Chapter 7 of this document.

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5.6 Chadwell link

Plate 5.6 Chadwell link



Description of Management Area

- 5.6.1 This management area extends from Muckingford Road in the south to the A13 junction in the north. The existing landscape mainly comprises of arable agricultural fields in a medium sized irregular pattern. Field boundaries comprise of hedgerows with occasional woodland blocks.
- 5.6.2 Five lines of high voltage overhead powerlines traverse the management area and are dominant vertical features.
- 5.6.3 The Project route mainly follows the natural valley within the landscape running north and north-west from the Tilbury Marshes. In the base of the valley are a number of watercourses and water bodies including an existing irrigation reservoir with vegetated and wooded banks.
- 5.6.4 The Project route is within cutting as it passes beneath Horford Road and within false cut earthworks through the rest of the management area to provide visual screening.
- 5.6.5 To the north of the Project route and management area, and west of the Orsett Golf Course, are buried archaeological remains and a Scheduled Monument of a Neolithic causewayed enclosure and an Anglo-Saxon Cemetery.
- 5.6.6 Woodland areas are mainly located on the upper slopes of the valley and around the Orsett Golf Course and edge of the cement works at xx.
- 5.6.7 The management area is approximately XXha in size.
- 5.6.8 This management area is shown in the Environmental Masterplan (REF TBC).

Management Requirements

- 5.6.9 The management requirements of this area are:

- a. Woodland planting to be designed and managed to follow the alignment of the natural valley and not to follow the Project route. Woodland shall follow the current pattern and link into existing woodland areas.
- b. Woodland planting within the valley shall be managed so as not to obscure views of the existing woodland on the upper slopes from the opposite slopes. The woodland areas to be managed to be viewed as a layered effect of woodland areas.
- c. Areas of grassland shall follow the existing pattern on the lower portions of the slopes.
- d. Species-rich grassland along the road verge would create a diverse sward, which would provide resource for pollinating insects and the range of bird, amphibian, and reptile which prey on them. This would also provide a strong green corridor running north-south through the landscape, linking existing and retained habitats present along the route alignment.
- e. Banks and ditches to be managed at the toe of the proposed earthworks and hedgerow planting to form a natural boundary and soften the base of the earthworks into the surrounding landscape.
- f. Woodland planting between Hoford Road and the Orsett Golf Course to be designed and managed to provide visual screening for users of the PRow network north, and users of the gold course itself.
- g. The proposed woodland shall link into existing woodland around the Orsett Golf Course and the woodland around the cement works.
- h. Shrubs with intermittent tree planting shall be designed and managed around the embankments and approaches to the overbridges crossing the Project route. The planting would be managed so it does not obscure views to the woodland on the upper slopes from views for the opposite slope and the planting shall be managed to be viewed as a series of layered vegetated areas.

Typologies Present

5.6.10 The planting and habitat typologies present within this area are listed below:

- a. LE1.3 Species Rich Grassland
- b. LE2.1 Woodland
- c. LE2.2 Woodland Edge
- d. LE2.2 Woodland Edge - Scrub
- e. LE2.5 Shrubs with Intermittent Trees
- f. LE2.7 Scattered Trees
- g. LE2.8 Scrub
- h. LE4.4 Native hedgerow with trees
- i. LE6.1 Water Bodies (Standing Water)

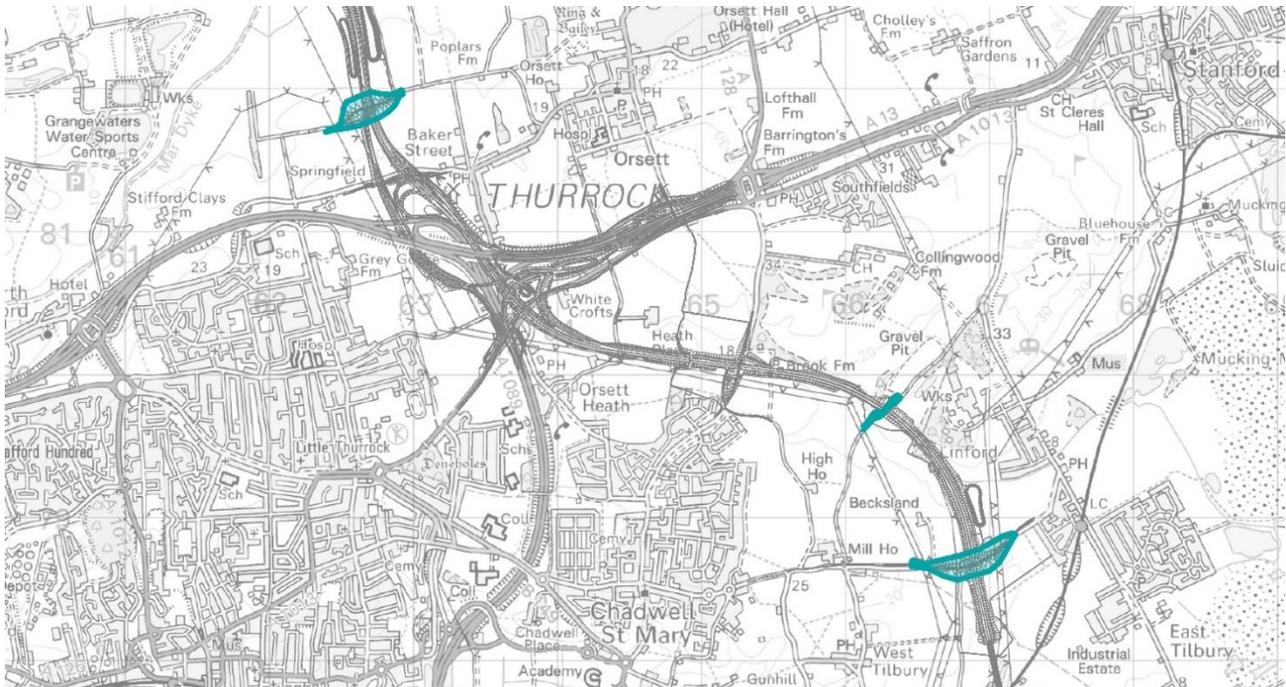
- j. LE6.2 Banks and Ditches
- k. LE6.4 Marsh and Wet Grassland

5.6.11 The outline management prescriptions and programmes for the typologies listed above are detailed in Chapter 7 of this document.

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5.7 Green Bridges (Muckingford Road, Hoford Road and Green Lane)

Plate 5.7 Green bridges



Description of Management Area

- 5.7.1 This management area contains the proposed green bridges over the A122 Lower Thames Crossing at Muckingford Road, Hoford Road and Green Lane.
- 5.7.2 This management area is shown in the Environmental Masterplan (REF TBC).
- 5.7.3 Management Requirements The management aim and requirements for all of the bridges are:
- To provide habitat connectivity across the Project route for a variety of protected and notable species including bats to existing habitats either side of the road alignment. Habitats on the bridges would be managed to provide strong green corridors providing shelter and foraging opportunities for invertebrates, reptiles and amphibians and small mammals, and tie into existing habitats allowing easy detection within the landscape.
 - To manage shrub and tree planting towards the edge of the bridge structures to ensure branches and trees do not fall onto the carriageway below but retain a connection into habitats adjacent to the ends of each bridge.
 - Establish and manage species that are suitable to the constrained growing conditions and soil depth on the green bridges. Variations in soil depth on the bridges can provide diversity in planting species and heights.

5.7.4 The individual management requirements for each bridge are:

Muckingford Road

- a. To manage a continuous hedgerow adjacent to Muckingford Road on both sides to connect the landscape either side of the Project route.
- b. Hedgerow planting to be managed to provide suitable wildlife connectivity. Embankments and earthworks to the green bridge to be managed as grassland and a suitable foraging habitat for terrestrial mammals, reptiles, amphibians, and bats.
- c. Open grassland areas, 7m wide, to be managed to provide a sheltered corridor across the Project route.

Hoford Road

- a. To manage a continuous hedgerow and tree planting along both sides of the alignment of Hoford Road to retain the existing character of the road which is designated as a protected lane by Thurrock Council in their Local Plan.
- b. Hedgerow planting to be managed to accommodate terrestrial mammals. and as a bat commuting corridor from the woodlands to the north of the Project to foraging areas south of the Project.

Green Lane

- a. To design and manage a continuous hedgerow and tree planting that connects the landscape either side of the Project route.
- b. The alignment of Green Lane to reflect the existing character of a rural lane.
- c. Hedgerow planting to be managed to provide a strong wildlife corridor for terrestrial mammals and particularly bats, following an existing bat commuting route.
- d. Shrubs and intermittent tree planting on the southern embankment slopes to the green bridge to be managed to provide visual screening to gantries and infrastructure on the Project route from nearby receptors.
- e. Open grassland areas to be managed to provide a sheltered corridor across the Project route.

Typologies Present

5.7.5 The planting and habitat typologies present within this area are listed below:

- a. LE1.3 Species Rich Grassland
- b. LE2.5 Shrubs and Intermittent Trees
- c. LE4.4 Native Hedgerow with Trees

5.7.6 The outline management prescriptions and programmes for the typologies listed above are detailed in Chapter 7 of this document.

5.8 Linford Open Mosaic Habitat

Plate 5.8 Linford Open Mosaic Habitat



Description of Management Area

- 5.8.1 This management area is located between the residential area of Linford and Muckingford Road, east of the Project route. King George V playing field lies adjacent to the management area on the eastern boundary.
- 5.8.2 The existing landscape comprises of an arable agricultural field with vegetated boundaries on the northern, western and eastern sides of the field.
- 5.8.3 The management area is approximately XXha in size.
- 5.8.4 This management area is shown in the Environmental Masterplan (REF TBC).

Management Requirements

- 5.8.5 The management requirements of this area are:
 - a. To establish a mosaic of open habitat which would provide suitable habitat for the translocation of species including amphibians (notably GCN), and reptiles.
 - b. Areas of open mosaic habitat would act as replacement habitat and a receptor site for translocated species including amphibians and reptiles, as well as the invertebrate population present within the grassland habitat currently found in this area.
 - c. Habitat present would be rough grassland, scrub, ponds and patches of bare earth, planted as a patchwork rather than large areas of similar habitat.
 - d. Hibernacula and refuges for translocated species would also be provided around the site, based on good practice guidance designs (English Nature, 2001).

Typologies Present

- 5.8.6 The planting and habitat typologies present within this area are listed below:
- a. E.2 Open Mosaic Habitat
- 5.8.7 The outline management prescriptions and programmes for the typologies listed above are detailed in Chapter 7 of this document.

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5.9 Rainbow Shaw Ancient Woodland Compensation

Plate 5.9 Rainbow Shaw



Description of Management Area

- 5.9.1 This management area is located to the north of Horford Road and the Project Road, and lies adjacent to the existing, retained woodland at Rainbow Shaw.
- 5.9.2 The existing landscape comprises of arable, agricultural fields.
- 5.9.3 The management area is approximately XXha in size.
- 5.9.4 This management area is shown in the Environmental Masterplan (REF TBC).

Management Requirements

- 5.9.5 The management requirements of this area are:
 - a. To provide woodland planting to offset the loss of ancient woodland and vegetation removal from Rainbow Shaw. The NVC communities recorded in Rainbow Shaw were W8 and W10 so this newly planted management area should develop into those NVC communities.
 - b. To create a habitat which ties into the retained areas of Rainbow Shaw and provides a variable light environment to benefit ground flora species.
 - c. To provide a woodland connection between the existing woodland around the cement works and the woodland surrounding Orsett Golf Course in addition to the woodland mitigation planting along the Chadwell link.
 - d. Soil and other material where appropriate will be salvaged from the affected ancient woodland areas and redistributed at the receptor sites that would have been prepared in advance to offer similar ground conditions to that of the donor site.

Typologies Present

- 5.9.6 The planting and habitat typologies present within this area are listed below:
- a. E.2 Ancient Woodland Compensation
- 5.9.7 The outline management prescriptions and programmes for the typologies listed above are detailed in Chapter 7 of this document.

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5.10 Baker Street Woodland

Plate 5.10 Baker Street Woodland



Description of Management Area

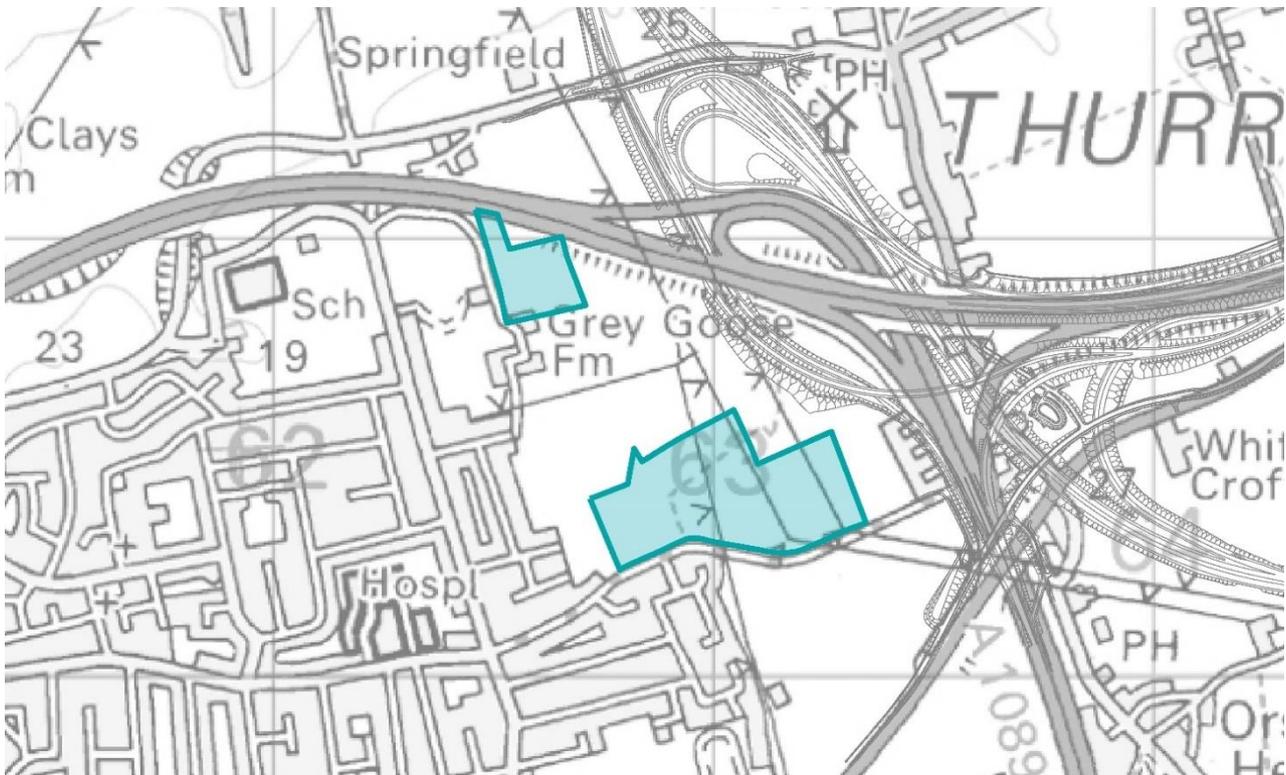
- 5.10.1 This management area is located to the south of the existing A13 junction.
- 5.10.2 The management area comprises of two land parcels that can be accessed for maintenance directly off the realigned Baker Street, at 'islands' located within the proposed slip roads and carriageways at the A13 junction.
- 5.10.3 The existing landscape mainly comprises of arable, agricultural fields in the southern parcel and woodland planting associated around the existing A13 to A1089 slip road. The slip road itself is to be realigned as part of the A13 junction works and the hardstanding within this management area is to be removed.
- 5.10.4 The management area is approximately XXha in size.
- 5.10.5 This management area is shown in the Environmental Masterplan (REF TBC).

Management Requirements

This management area is subject to change ahead of the finalisation of the outline LEMP. Placeholder text has been included above for the description of the management area. The outline management requirements for this area are currently being progressed.

5.11 Ron Evans Replacement Land

Plate 5.11 Ron Evans Replacement Land



Description of Management Area

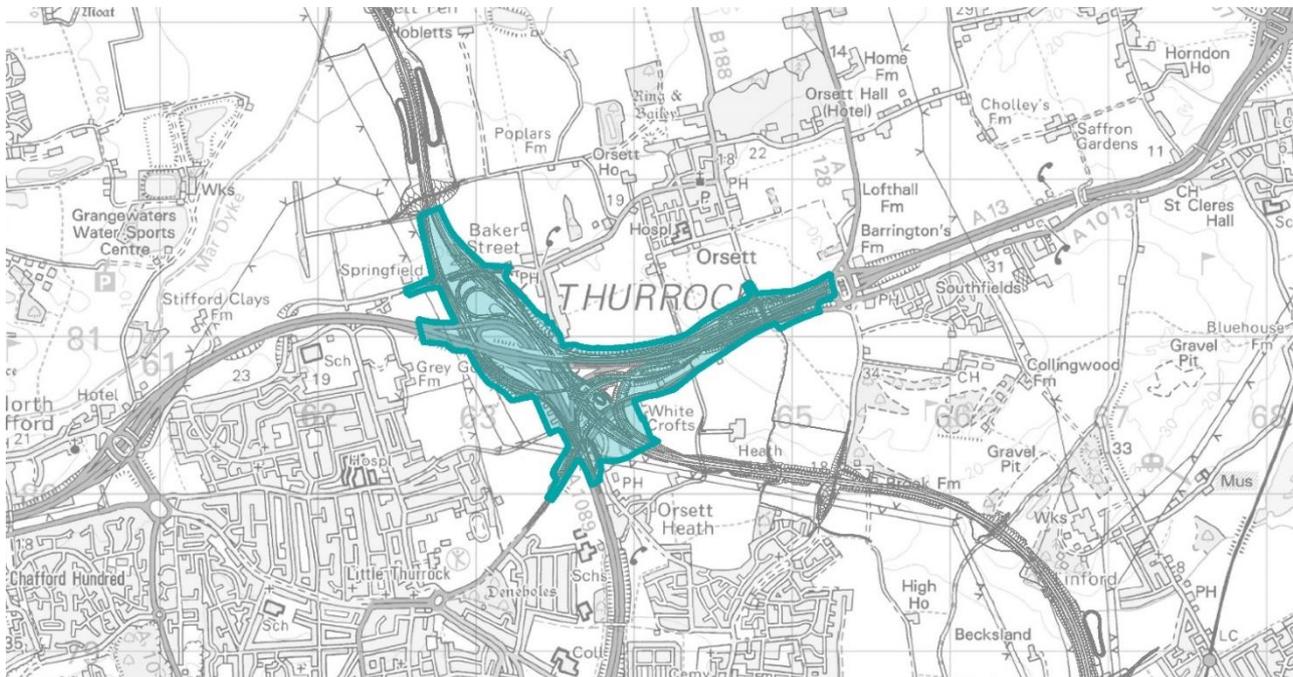
- 5.11.1 This management area is located to the south-west of the existing A13 junction between the existing Ron Evans Memorial land (also known as Blackshots Nature Reserve) and the edge of Chadwell St Mary.
- 5.11.2 The current landscape comprises of arable, agricultural land with vegetated boundaries to the existing Ron Evans Memorial land.
- 5.11.3 A number of high voltage overhead powerlines cross the management area.
- 5.11.4 To the north of the management area lies a crop mark complex, designated as a scheduled monument and listed on the Heritage at Risk Register.
- 5.11.5 The management area is approximately XXha in size.
- 5.11.6 This management area is shown in the Environmental Masterplan (REF TBC).

Management Requirements

This management area is subject to change ahead of the finalisation of the outline LEMP. Placeholder text has been included above for the description of the management area. The outline management requirements for this area are currently being progressed.

5.12 A13 junction

Plate 5.12 A13 junction



Description of Management Area

- 5.12.1 This management area is located within and around the existing A13 junction with the A1089.
- 5.12.2 The existing landscape is comprised of mainly arable agricultural fields within the northern, eastern and southern extents of the management area.
- 5.12.3 There are existing wooded areas associated with, and on the embankments to, the A13 junction and slip roads. The wooded planting on the raised earthworks gives the appearance of a wooded ridge viewed from the north and the south.
- 5.12.4 To the north-east of the management lies Baker Street and the village of Orsett which has a Conservation Area designation. Within Baker Street, and adjacent to the Project route is Baker Street Windmill, a Grade II listed building.
- 5.12.5 The management area also includes the existing A13 alignment as it heads east towards the Orsett Cock Roundabout, the A1013 road from the roundabout towards Chadwell St Mary and the A1089 as it heads south towards Tilbury.
- 5.12.6 Stifford Clays Road is located within the northern extents of the management area and is proposed to cross an overbridge structure as it crossed the Project route.
- 5.12.7 As part of the Project works, these routes have been realigned to tie in with the proposed A13 junction alignment and associated slip roads, resulting in a number of 'islanded' land parcels between slip roads.
- 5.12.8 The management area is approximately XXha in size.
- 5.12.9 This management area is shown in the Environmental Masterplan (REF TBC).

Management Requirements

- 5.12.10 The management requirements of this area are:
- a. The junction shall focus on woodland planting within the islands, and around the junction and associated earthworks itself.
 - b. The woodland planting shall be managed to screen views of the A13 junction, vehicles, and associated structures, including gantries, bridges and overpasses from the wider landscape. Enclosing the junction within woodland planting shall also help ensure views out of the junction are limited and allow drivers to focus on navigating the complex junction.
 - c. Woodland planting on earthworks to be managed to be reflective of the existing wooded ridgeline character.
 - d. Woodland planting to be managed to soften the appearance of any engineered earthworks associated within the A13 junction and slip roads.
 - e. No woodland or scrub planting to be planted within visibility splays at the junction. Nearby woodland and scrub planting to be managed to ensure there is no impact on visibility splays.
 - f. Planting within the 'islanded' parcels to require lower frequency of maintenance as there would be limitations on taking safe access to these parcels of land to manage them.
 - g. Native hedgerow planting with trees to form boundary to the earthworks of the A13 junction and slip roads and the surrounding landscape.

Typologies Present

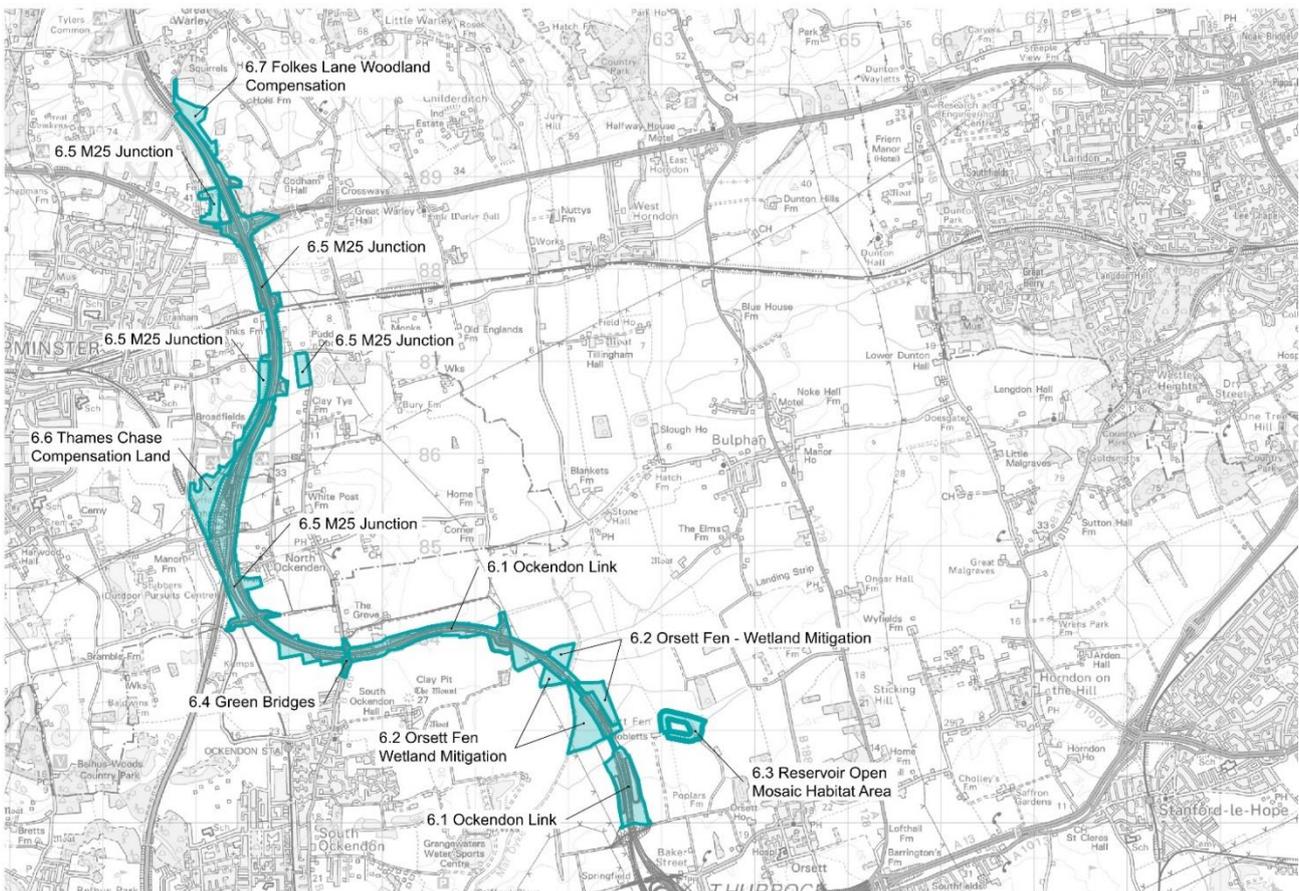
- 5.12.11 The planting and habitat typologies present within this area are listed below:
- a. LE1.3 Species Rich Grassland
 - b. LE2.1 Woodland – Including Non-Native species
 - c. LE2.2 Woodland Edge
 - d. LE2.4 Linear Belt of Shrubs and Trees
 - e. LE2.5 Shrubs with Intermittent Trees
 - f. LE4.4 Native Hedgerow with Trees
 - g. LE6.1 Water Bodies (Standing Water)
 - h. LE6.2 Banks and Ditches
 - i. LE6.4 Marsh and Wet Grassland

5.12.12 The outline management prescriptions and programmes for the typologies listed above are detailed in Chapter 7 of this document.

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6 Management Areas – North of A13 junction to M25

Plate 6.1 Location of management areas within the north of the A13 junction to the M25 junction 29 regional area.



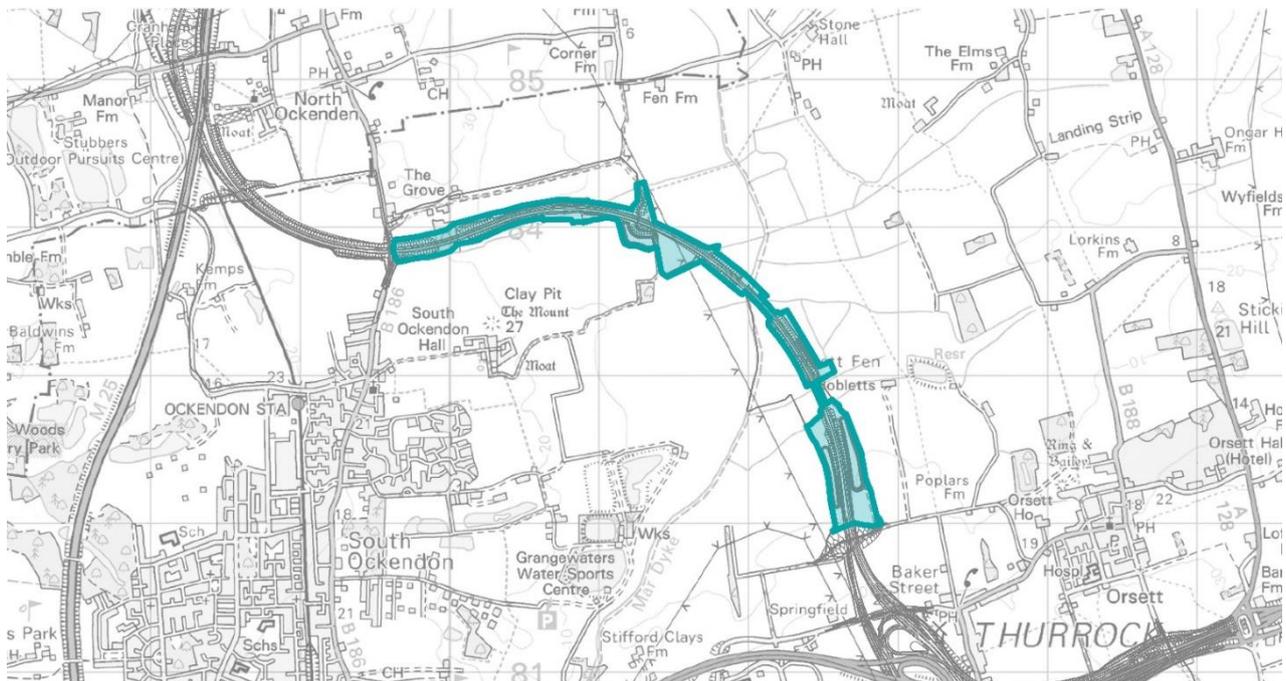
6.1.1 The management areas within the north of the A13 junction to the M25 junction 29 regional area shown in Plate 6.1. This chapter provides a description of the management area, and the outline management requirements for each area

6.1.2 The following management areas within this chapter describe the sectional areas of the route (REF TBC). These management areas focus on the landscape parcels located adjacent to, or within the Project route and the junctions. As such the management and inspections of these areas will be covered by DMRB standards GM701 3000 and GS801 3000 documents. For completeness, the outline management requirements, and a list of typologies for these management areas are included for each of these management areas:

- a. 6.1 Ockendon link
- b. 6.5 M25 junction

6.2 Ockendon link

Plate 6.2 Ockendon link



Description of Management Area

- 6.2.1 This management area extends from the A13 junction north and north-west towards the proposed junction with the M25.
- 6.2.2 The existing landscape within the management area is predominately flat and open and comprises areas of former fenland as a result of its low-lying topography and being located within a natural bowl surrounded by higher land.
- 6.2.3 The majority of the existing landscape is arable, agricultural land of large rectilinear fields with sparse hedgerows and occasional small woodland blocks.
- 6.2.4 The Mardyke river traverses the middle of the management area from the north-east to the south-west where it eventually discharges into the River Thames.
- 6.2.5 The management area contains Orsett Fen, an area designated as common land. The landscape at Orsett Fen is within Flood Zone 2 and 3 and comprises of agricultural land, with PRoW though the area designated as common land.
- 6.2.6 Towards the western extent of the management area, the landscape borders with areas of landfill and areas of landscape which have been raised as a result of the landfill activities.
- 6.2.7 Further west, the management area passes through an area of woodland planting known as The Wilderness.
- 6.2.8 The Project route from the south of the management area is mainly within cutting, as it passes beneath Green Lane, before it starts to rise on embankment towards Orsett Fen. Within Orsett Fen the Project route is on a combination of viaduct and embankment within the flood zone.

- 6.2.9 As the Project route moves west beyond the Mardyke River, the vertical alignment falls gradually until it is within cutting to provide a suitable clearance beneath North Road green bridge.
- 6.2.10 The management area is approximately XXha in size.
- 6.2.11 This management area is shown in the Environmental Masterplan (REF TBC).

Management Requirements

- 6.2.12 The management requirements of this area are:
- a. Between Green Lane and Orsett Fen, hedgerow planting to reinforce the existing field pattern and replanting and strengthening the existing gappy hedgerows within the area. The hedgerows to be managed to provide visual screening of the Project route.
 - b. Water bodies in this area to be designed and managed to be located within the existing field patterns and be softened to integrated into the surrounding landscape and not appear engineered.
 - c. As the Project route rises on embankment, blocks of woodland designed and managed to soften the appearance of engineered earthworks within the flat open landscape. Woodland blocks to comprise species and forms of the local woodland patterns found within the area.
 - d. Woodland blocks of appropriate species mix to the local character, local provenance and ground conditions to be managed to break up long distance views throughout the open landscape. Management to ensure the block pattern is retained and does not encroach further along the embankment slopes, further exacerbating the Project route.
 - e. Suitable species to be used and managed on the earthwork slopes and the existing wetter land on and around the proposed Mardyke embankment.
 - f. Between the Mardyke and North Road, woodland planting to the south of the Project route to be designed and managed to appear as a woodland following the existing and realigned watercourse.
 - g. On embankments and earthworks to overbridges, shrub and intermittent tree planting to soften the appearance of earthworks and integrate the structures into adjacent landscape.
 - h. Hedgerows to the north of the Project route, between the Mardyke and North road to follow existing field patterns and be managed to provide visual screening for users of the PRow network to the north.

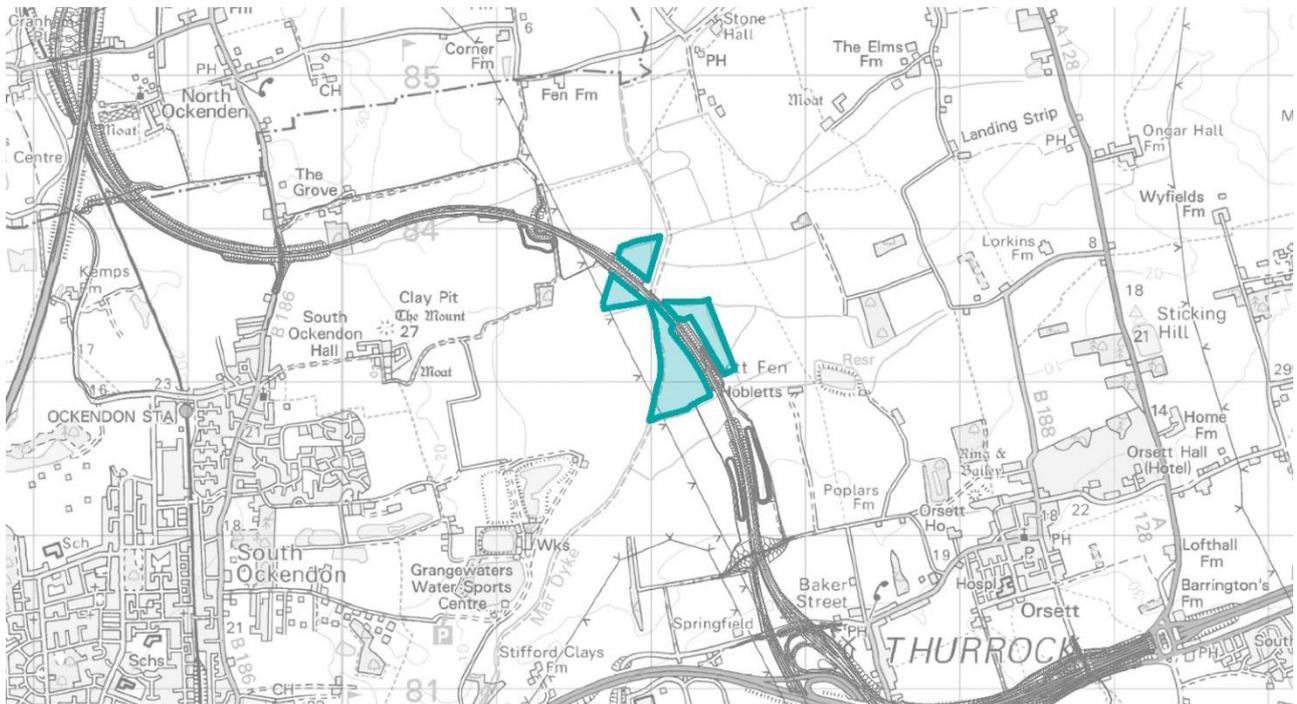
- i. Hedgerows to be managed to create strong green corridors, providing shelter, foraging and commuting opportunities for a variety of reptile, bird, invertebrate, amphibian and mammal species, and linking into the North Road green bridge and the landfill site.
- j. Replacement woodland and woodland edge planting within the Wilderness to be managed to reflect the species, form and pattern found within the existing woodland.

Typologies Present

- 6.2.13 The planting and habitat typologies present within this area are listed below:
- a. LE1.3 Species Rich Grassland
 - b. LE2.1 Woodland – Including Non-Native species
 - c. LE2.1 Woodland - Wet
 - d. LE2.2 Woodland Edge
 - e. LE2.5 Shrubs with Intermittent Trees
 - f. LE4.4 Native Hedgerow with Trees
 - g. LE6.1 Water Bodies (Standing Water)
 - h. LE6.2 Banks and Ditches
 - i. LE6.4 Marsh and Wet Grassland
- 6.2.14 The outline management prescriptions and programmes for the typologies listed above are detailed in Chapter 7 of this document.

6.3 Orsett Fen – Wetland Creation

Plate 6.3 Orsett Fen – Wetland Creation



Description of Management Area

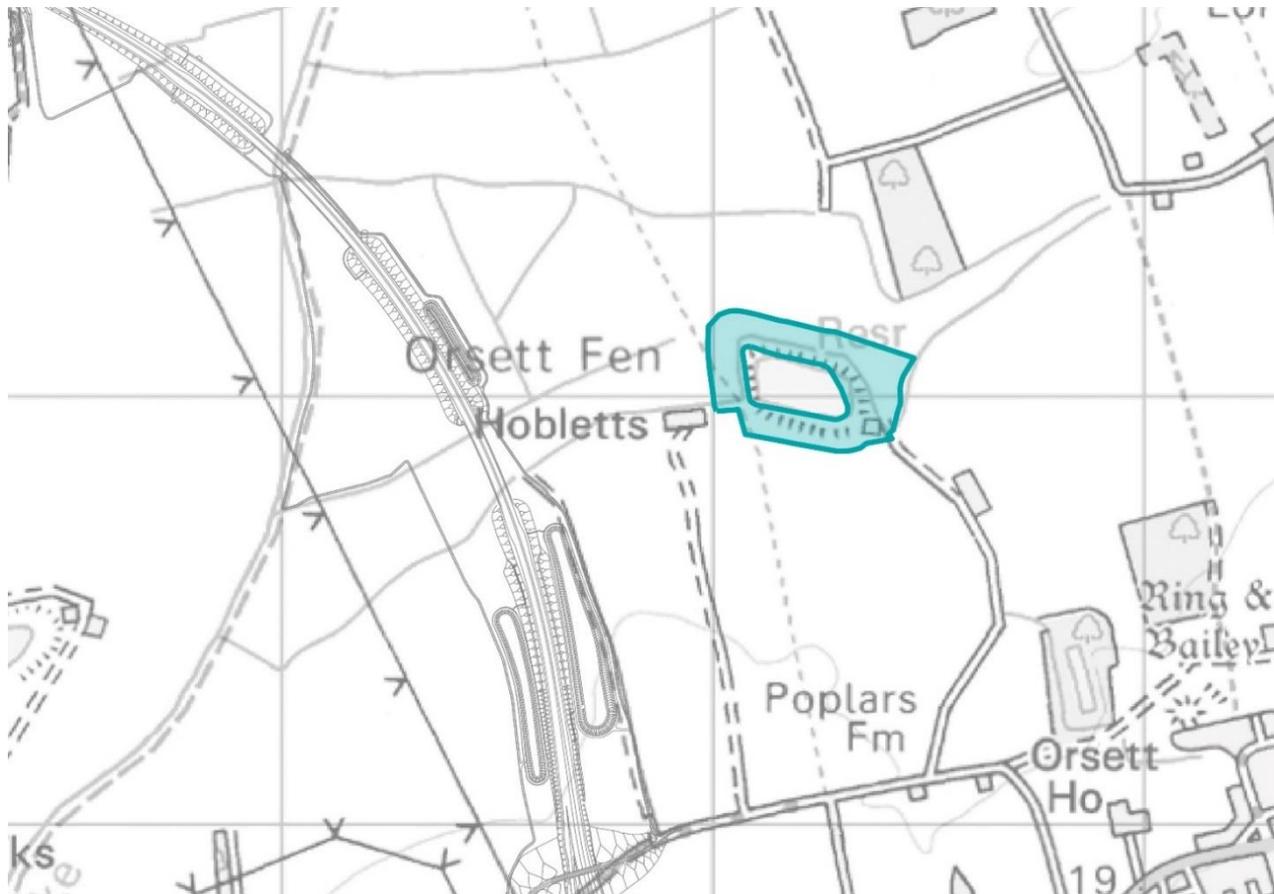
- 6.3.1 This management area is located within the Orsett Fen, which is designated as Common Land and is former fenland. The management area is within Flood Zone 2 and 3.
- 6.3.2 The current landscape is comprised of arable agricultural fields, with gappy hedgerows and ditches forming the boundaries. On the western boundary, the management area borders the Mardyke River and Mardyke trail.
- 6.3.3 The Project route within this management area is a combination of embankment and viaduct as the Project crosses over the flood zones.
- 6.3.4 The management area is approximately XXha in size.
- 6.3.5 This management area is shown in the Environmental Masterplan (REF TBC).

Management Requirements

This management area is subject to change ahead of the finalisation of the outline LEMP. Placeholder text has been included above for the description of the management area. The outline management requirements for this area are currently being progressed.

6.4 Reservoir – Open Mosaic

Plate 6.4 Reservoir – Open Mosaic Habitat



Description of Management Area

- 6.4.1 This management area is located to the east of the Orsett Fen, on an existing reservoir owned by the Coles.
- 6.4.2 The existing reservoir is located within embankments and the existing landscape comprises of a mixture of woodland and scrub planting.
- 6.4.3 The management area is approximately XXha in size.
- 6.4.4 This management area is shown in the Environmental Masterplan (REF TBC).

Management Requirements

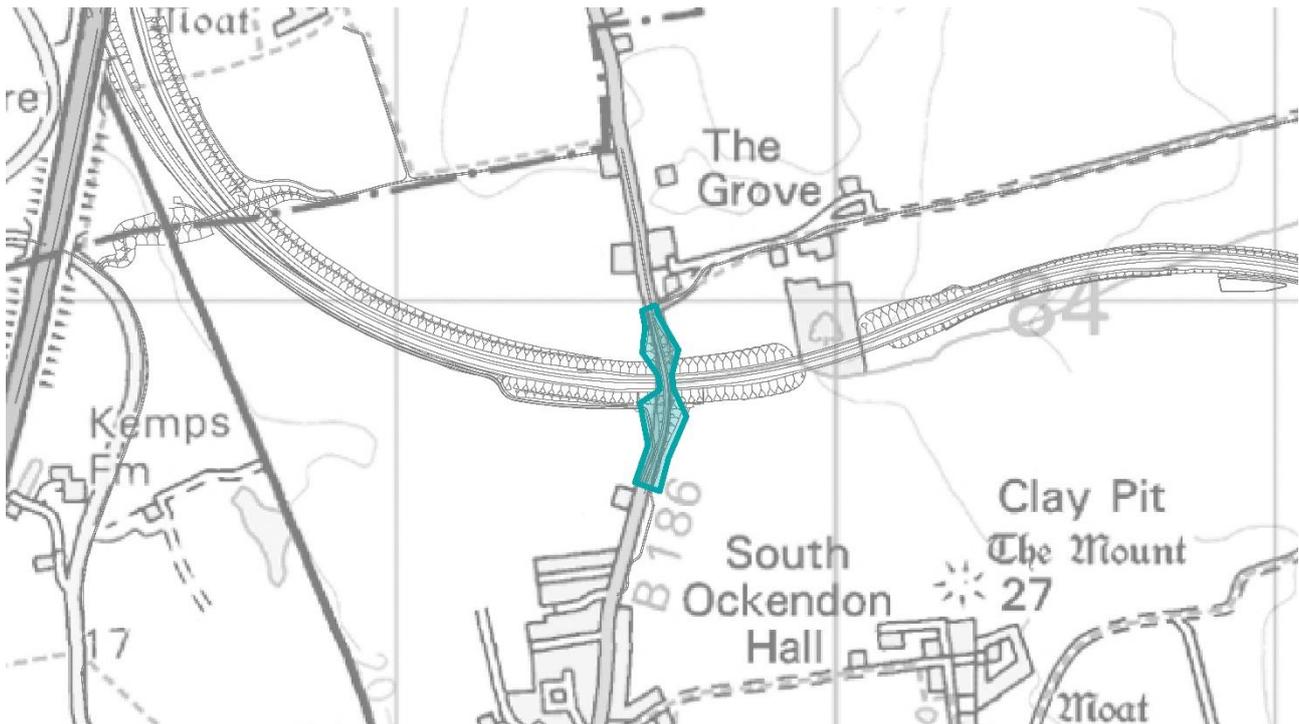
- 6.4.5 The management requirements of this area are:
 - a. To establish a mosaic of open habitat which would provide suitable habitat for the translocation of species including reptiles and amphibians.
 - b. Habitat present would be rough grassland, scrub, and patches of bare earth, planted as a patchwork rather than large areas of similar habitat. Hibernacula and refuges for translocated species would also be provided around the site, based on good practice guidance designs (English Nature, 2001).

Typologies Present

- 6.4.6 The planting and habitat typologies present within this area are listed below:
- a. E.2 Open Mosaic Habitat
- 6.4.7 The outline management prescriptions and programmes for the typologies listed above are detailed in Chapter 7 of this document.

6.5 Green Bridges (North Road)

Plate 6.5 Green bridges



Description of Management Area

- 6.5.1 This management area is located on the current alignment of North Road, between South Ockendon and North Ockendon.
- 6.5.2 The current character of North Road comprises a rural road with hedgerow planting adjacent to the road, with a small grass verge. The road currently has no safe provision for pedestrians with no footpath or hardstanding running adjacent the road.
- 6.5.3 Beyond the hedgerows, North road is located with existing arable, agricultural fields.
- 6.5.4 The Project route passes beneath North Road in this location. The proposals include raising North Road above the Project route on a green bridge, with the inclusion of pedestrian and cycle routes connecting North and South Ockendon within the Order Limits.
- 6.5.5 The management area is approximately XXha in size.
- 6.5.6 This management area is shown in the Environmental Masterplan (REF TBC).

Management Requirements

- 6.5.7 The management requirements of this area are:
- b. To design and manage a continuous hedgerow and planting connecting the landscape either side of the Project route.
 - c. The alignment of North Road to reflect the existing character of a rural road by replicating hedgerow planting either side on the road and connecting into the existing hedgerows.
 - d. Hedgerow planting to be managed to provide a wildlife corridor for invertebrates, reptiles and amphibians, birds, bats and other mammals, following an existing bat commuting route.
 - e. Open grassland areas, 7m wide, to be managed to provide a sheltered corridor across the Project route.
 - f. To manage shrub and tree planting towards the edge of the bridge structures to ensure branches and trees do not fall onto the carriageway below but retain a connection into habitats adjacent to the ends of each bridge.
 - g. Establish and manage species that are suitable to the constrained growing conditions and soil depth on the green bridge. Variations in soil depth on the bridge can provide diversity in planting species and heights.
 - h. To manage shrub and tree planting towards the edge of the bridge structures to ensure branches and trees do not fall onto the carriageway below but retain a connection into habitats adjacent to the ends of each bridge
 - i. Shrubs with intermittent tree planting on the embankments to the green bridge to be managed to soften the appearance of the earthworks and integrate the structure into the surrounding landscape.

Typologies Present

- 6.5.8 The planting and habitat typologies present within this area are listed below:
- a. LE1.3 Species Rich Grassland
 - b. LE2.5 Shrubs with Intermittent Trees
 - c. LE4.4 Native Hedgerow with Trees
- 6.5.9 The outline management prescriptions and programmes for the typologies listed above are detailed in Chapter 7 of this document.

6.6 M25 junction

Plate 6.6 M25 junction



Description of Management Area

- 6.6.1 This management area extends from North Road green bridge in the south on the Project route and extends north towards the Folkes Lane overbridge on the M25.
- 6.6.2 The management area includes the proposed junction and slip roads between the Project route and the M25 and the existing M25 corridor including junction 29.
- 6.6.3 The varied topography within this management area results in the Project route and M25 passing through a series of cuttings and embankments.
- 6.6.4 The management area is approximately XXha in size.
- 6.6.5 This management area is shown in the Environmental Masterplan (REF TBC).

Management Requirements

- 6.6.6 The management requirements of this area are:
 - a. To provide suitable planting along the M25 to replace vegetation which has been removed to widen the M25 corridor.

- b. Woodland planting to be created and managed within 'islanded' parcels within the proposed junction of Lower Thames Crossing and the M25, and the parcels of land located between the Project route and the railway line.
- c. To establish areas of open mosaic habitat to act as replacement habitat and receptor sites for translocated species including amphibians (notably GCN) and reptiles. These areas would be positioned along the Project route so they were in proximity to existing species populations and to provide stepping stones of habitat joining up retained habitats running along the north–south orientation of the Project.
- d. To create and establish an open mosaic habitat to the south of St Marys Lane. As this area is designed primarily for GCN habitat, following discussion with Natural England, the ratio of habitat types in this area should be 70% grassland, 10% woodland, 10% bare ground and 10% scrub. This differs from the open mosaic description as found in Section 7.23.
- e. Land parcel north of Ockendon road to be returned to landowner, with woodland planting to perimeter of land parcel to be managed so as to provide visual screening and to reinforce the wooded character of the junction.
- f. The woodland planting shall be managed to screen views of the junction, vehicles and associated structures, including gantries, bridges and overpasses from the wider landscape. Enclosing the junction within woodland planting will also help ensure views out of the junction are limited and allow drivers to focus on navigating the complex junction.
- g. Woodland planting to be managed to soften the appearance of any engineered earthworks associated within the junction and slip roads.
- h. Woodland planting to the south of the nurseries at Hall Farm to be managed to provide visual screening from the Conservation Area at North Ockendon.
- i. No woodland or scrub planting to be planted within visibility splays within the proposed Lower Thames Crossing and M25 junction. Adjacent woodland and scrub planting to be managed to ensure there is no encroachment and impact into visibility splays.
- j. Planting within the 'islanded' parcels to be low maintenance as there would be limitations on gaining safe access to these parcels of land to manage them.
- k. Woodland edge and scrub planting to embankments to overbridges to be managed to soften the appearance of the structure and provide integration into the surrounding landscape.

Typologies Present

- 6.6.7 The planting and habitat typologies present within this area are listed below:
- a. LE1.3 Species Rich Grassland
 - b. LE2.1 Woodland
 - c. LE2.1 Woodland – Including Non-Native species
 - d. LE2.2 Woodland Edge
 - e. LE2.5 Shrubs with Intermittent Trees
 - f. LE4.4 Native Hedgerow with Trees
 - g. LE6.1 Water Bodies (Standing Water)
 - h. LE6.2 Banks and Ditches
 - i. LE6.4 Marsh and Wet Grassland
 - j. E.2 Open Mosaic Habitat
- 6.6.8 The outline management prescriptions and programmes for the typologies listed above are detailed in Chapter 7 of this document.

6.7 Thames Chase Compensation

Plate 6.7 Thames Chase Compensation Land



Description of Management Area

- 6.7.1 This management area is located to the south of the existing Thames Chase site, between the proposed Lower Thames Crossing to M25 slip road and the existing Upminster and Grays branch rail line.
- 6.7.2 In addition to the compensation land provided to the south of Thames Chase, this management area also includes the land reinstated within Thames Chase itself, adjacent the proposed slip road.
- 6.7.3 The existing landscape to the south of Thames Chase is comprised of arable, agricultural land and has a vegetated boundary to the railway line.
- 6.7.4 Within the existing Thames Chase site, the landscape is a mixture of maturing woodland planting, open grassland, and formal and informal footpaths as part of the Thames Chase community forest.
- 6.7.5 The management area is approximately XXha in size.
- 6.7.6 This management area is shown in the Environmental Masterplan (REF TBC).

Management Requirements

- 6.7.7 The management requirements of this area are:
 - a. To the south of Thames Chase, the management area is to be designed as replacement land for open space to be acquired within the existing Thames Chase community forest.

- b. The landscape shall be a mosaic of woodland, woodland edge and open grassland, designed in the same character as the existing Thames Chase site.
- c. The replacement open space would be landscaped to complement the existing site and use, linking together and functioning as one.
- d. To act as replacement habitat and a receptor site for translocated species including amphibians, particularly GCN. Hibernacula and refuges for translocated species would also be provided around the site, based on good practice guidance designs (English Nature, 2001).
- e. Woodland planting on the embankment within the existing Thames Chase area to be managed to provide visual screening of the proposed slip road which is located to the top of the embankment.
- f. Species selection, form and pattern of planting within the Thames Chase area to be reflective of the existing character.

Typologies Present

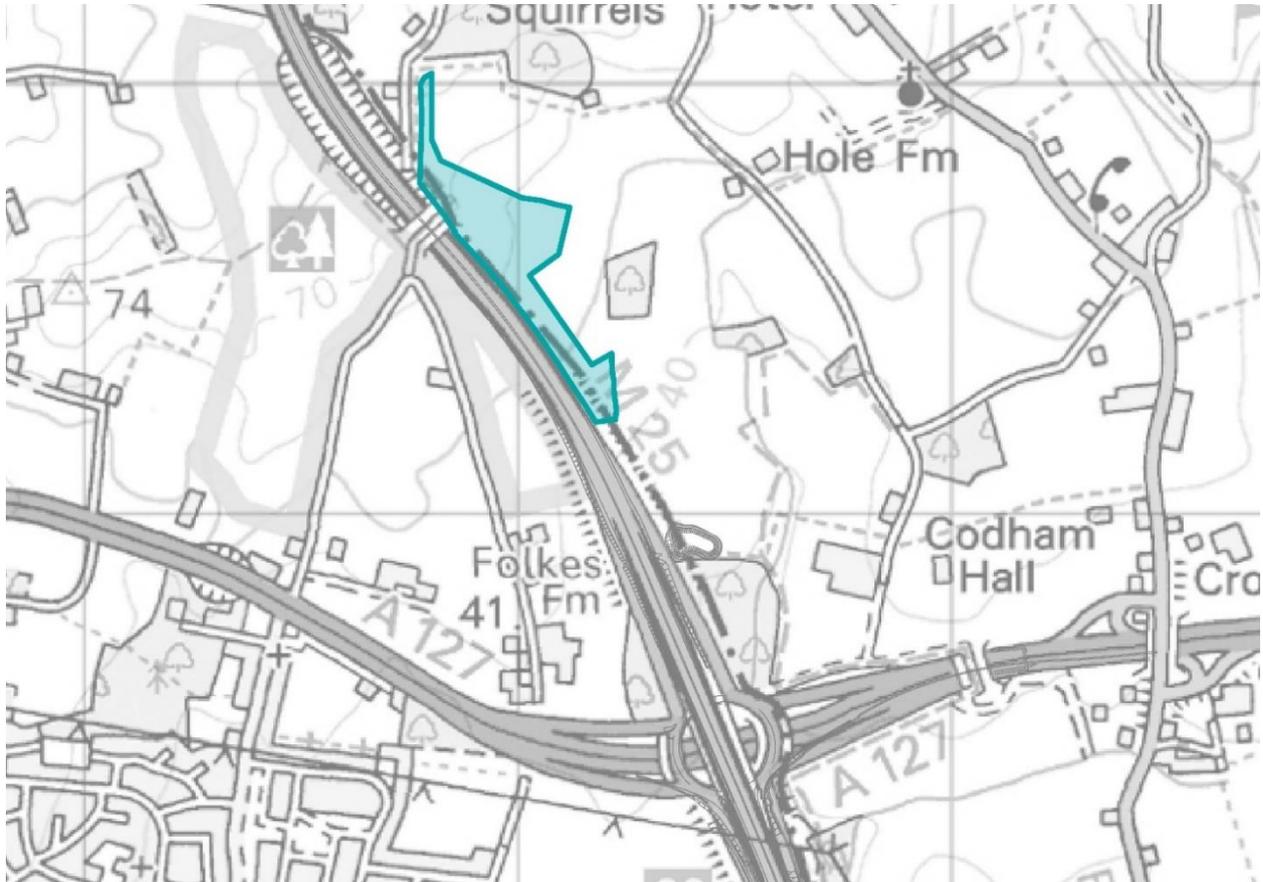
6.7.8 The planting and habitat typologies present within this area are listed below:

- a. LE1.3 Species Rich Grassland
- b. LE2.1 Woodland
- c. LE2.1 Woodland – Including Non-Native species
- d. LE2.2 Woodland Edge
- e. LE2.5 Shrubs with Intermittent Trees
- f. LE4.4 Native Hedgerow with Trees
- g. LE6.1 Water Bodies (Standing Water)
- h. LE6.2 Banks and Ditches
- i. LE6.4 Marsh and Wet Grassland

6.7.9 The outline management prescriptions and programmes for the typologies listed above are detailed in Chapter 7 of this document.

6.8 Folkes Lane Woodland Compensation

Plate 6.8 Folkes Lane Replacement



Description of Management Area

This management area is subject to change ahead of the finalisation of the outline LEMP. Placeholder text has been included above for the description of the management area. The outline management requirements for this area are currently being progressed.

7 Habitat Typologies

7.1 LE1.3 Species Rich Grassland

Description

- 7.1.1 Species rich grassland is proposed throughout the Project route, on grass verges, embankments and cutting edges adjacent to the carriageway.
- 7.1.2 Species rich grasslands are an integral part of the landscape mitigation, by softening the edge of the Project route and integrating it within the surrounding landscape.

Outline Requirements

- 7.1.3 The following outline requirements are for all areas of species rich grassland and should align with MPI-85-102020 (Highways England, 2020):
- Species rich grassland to provide a robust and easily managed ground cover for the soft estate around the Project route.
 - Species rich grassland where possible shall replicate the existing grassland communities within the surrounding landscape or existing on site.
 - Grass species to be appropriate to the location and underlying geology, with a species composition and diversity capable of being maintained by one cut per year.
 - The grassland would be managed to increase biodiversity by providing a diverse range of plant species, which would then support a range of animal species, such as invertebrates, amphibians and reptiles, birds and small mammals.
 - To enhance the biodiversity value of the Project route.
 - To ensure successful establishment of the proposed species.
 - To create grassland habitats that follow the priority habitat descriptions for lowland meadows¹.
- 7.1.4 A list of potential native species planting is shown in the appendix to the Design Principles. Species mix shall be developed during the detail design stage to be tolerant of the roadside verge environment and underlying substrate used in the creation of earthworks.

Outline Prescriptions

- 7.1.5 The exact details of the management activities to be undertaken will be developed between all relevant parties during the development of the LEMP

¹ [Lowland meadows \(UK BAP Priority Habitat description\) \(jncc.gov.uk\)](https://jncc.gov.uk/lowland-meadows)

7.1.6 Table 7.1 below describes the programme of work for establishment and initial maintenance (first five years), and then goes on to explain the outline long-term management.

Table 7.1 Outline establishment regime

Action			Years 0-5				
Task	Responsibility	Season	1	2	3	4	5
Attendance of quarterly site inspections with the Project Landscape Architect	Specialist contractor appointed by Highways England	Quarterly	Y	Y	Y	Y	Y
It is anticipated that a flush of annual weeds will be present in the soil within the first growing season, weed growth is to be controlled by topping or mowing monthly. All plant growth (sown grasses and weeds) is to be mown regularly to 40-60mm throughout the first growing season to prevent weeds smothering the slower-growing grasses. Removing cuttings if dense	Specialist contractor appointed by Highways England	Monthly during the growing season	Y	N	N	N	N
Planting to be managed according to the location – along verges planting will require regular mowing to maintain the required visibility splay. Cuttings are to be raked off and removed	Specialist contractor appointed by Highways England	As required	Y	Y	Y	Y	Y
Planting to be managed according to the location – where visibility splay requirements are not required, planting is to be managed as a meadow, allowing the grasses to grow tall, flower and seed from May through to July/August. The grass meadow should be cut	Specialist contractor appointed by Highways England	Late Autumn	N	Y	Y	Y	Y

Action			Years 0-5				
Task	Responsibility	Season	1	2	3	4	5
in late summer/early autumn and cuttings removed from site							
Injurious weeds are to be eradicated, removed and disposed of off-site, as per the latest Defra/Natural England guidance. Grass swards that do not contain wildflowers can be selectively sprayed. Hand weeding will be required in areas of wildflower	Specialist contractor appointed by Highways England	As required	Y	Y	Y	Y	Y
In areas where seed has not taken, re-prepare ground and re-seed in autumn	Specialist contractor appointed by Highways England	In autumn where required	Y	Y	Y	Y	Y

7.1.7 Following establishment, the following management prescriptions are proposed:

- a. Species rich grassland shall be mown annually
- b. Species rich grassland areas that are adjacent to other habitat will be mown less frequently than the main grassland areas.

Outline Measure of Success

7.1.8 To ensure that the management requirements outlined previously are achieved, the following monitoring targets have been devised to measure the success of the management requirements:

- a. The sward shall cover at least 90% of the area to be managed to ensure this typology fulfils the environmental function required
- b. The area shall contain no more than 10% cover of competitive or problem species such as nettles (*Urtica dioica*), cow parsley (*Anthriscus sylvestris*), hemlock (*Conium maculatum*), gorse (*Ulex europaeus*), bracken (*Pteridium aquilinum*), thistles (*Cirsium* spp.), dock (*Rumex* spp.).
- c. Species rich grassland to support at least 12 or more plant species per m², and managed to prevent natural succession to scrub and woodland and retain the open grassland character.
- d. Target species numbers to be met by Year 5.

Outline Monitoring frequency and methods

7.1.9 The aim of the suggested monitoring programme is to ascertain whether the outline measures of success listed above have been achieved, and whether maintenance operations or remedial actions are required.

- 7.1.10 After the 5-year establishment period, long-term monitoring would be undertaken to assess the success of the grassland in terms of developing into the relevant target priority habitat. This would include surveys following Common Standards Monitoring Guidance for Lowland Grassland Habitats (JNCC, 2004a), and Natural England guidance on the creation of priority grassland habitat (Natural England, 2012). These would continue every five years with the detailed monitoring approach being refined over this period as part of the steering group discussions.
- 7.1.11 Highways England's appointed monitoring party will carry out the monitoring visits and feed back to the steering group as part of the monitoring report.

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7.2 LE1.3 Species Rich Chalk Grassland

Overarching Aims

- 7.2.1 Species rich chalk grassland is proposed within Chalk Park and appropriate areas around the A2/M2/Lower Thames Crossing junction to retain and enhance the existing landscape character and provide biodiversity benefits.

Description

- 7.2.2 Species rich chalk grassland are areas of meadow comprising a diverse selection of native perennial wildflowers and grasses that thrive on chalky soil.
- 7.2.3 This typology is proposed as an integral component of the landscape mitigation design. The specific methodology for the establishment of species rich chalk grassland will be developed during detailed design and form part of the final LEMP.
- 7.2.4 Species are to be appropriate to the location or are to reflect existing species already on site, with a composition and diversity capable of being maintained by an annual cut, so that in time, biodiversity interest is developed.
- 7.2.5 A list of potential species mix is shown in the Appendix to the Design Principles and should be appropriate to the underlying geology and aspect.

Outline Requirements

- 7.2.6 The following outline requirements are for all areas of species-rich chalk grassland and should align with MPI-85-102020 (Highways England, 2020).
- a. To provide a visual interest within Chalk Park and the setting of the park with the rolling topography accentuated by the rich flora found within chalk grassland.
 - b. The chalk grassland would be managed to increase biodiversity by providing a diverse range of plant species, which would support a range of animal species such as invertebrates, amphibians and reptiles, birds and small mammals.
 - c. The sward shall cover at least 90% of the area to be managed to ensure this typology fulfils the environmental function required; and
 - d. The area shall contain no more than 10% cover of competitive or problem species such as nettles (*Urtica dioica*), cow parsley (*Anthriscus sylvestris*), hemlock (*Conium maculatum*), gorse (*Ulex europaeus*), bracken (*Pteridium aquilinum*), thistles (*Cirsium* spp.), dock (*Rumex* spp.).
 - e. Species rich grassland to support at least 12 or more plant species per m², and managed to prevent natural succession to scrub and woodland and retain the open grassland character.
 - f. Target species numbers to be met by Year 5.
 - g. To create grassland habitats that follow the priority habitat descriptions for lowland calcareous grassland².

² [Lowland calcareous grassland \(UK BAP Priority Habitat description\) \(jncc.gov.uk\)](https://jncc.gov.uk)

Outline Prescriptions

- 7.2.7 The exact details of the management activities to be undertaken will be developed between all relevant parties during the development of the LEMP
- 7.2.8 Table 7.2 below describes the programme of work for establishment and initial maintenance (first five years), and then goes on to explain the outline long-term management.

Table 7.2 Outline establishment regime

Action			Years 0-5				
Task	Responsibility	Season	1	2	3	4	5
Attendance of quarterly site inspections with the Project Landscape Architect	Specialist contractor appointed by Highways England	Quarterly	Y	Y	Y	Y	Y
It is anticipated that a flush of annual weeds will be present in the soil within the first growing season, weed growth is to be controlled by topping or mowing monthly. All plant growth (sown grasses and weeds) is to be mown regularly to 40-60mm throughout the first growing season to prevent weeds smothering the slower-growing grasses. Removing cuttings if dense	Specialist contractor appointed by Highways England	Monthly during the growing season	Y	N	N	N	N
Planting to be managed according to the location – along verges planting will require regular mowing to maintain the required visibility splay. Cuttings are to be raked off and removed	Specialist contractor appointed by Highways England	As required	Y	Y	Y	Y	Y
Planting to be managed according to the location – where visibility splay requirements are not required, planting is to be managed as a meadow, allowing the grasses to grow tall, flower and seed from May through to	Specialist contractor appointed by Highways England	Late Autumn	N	Y	Y	Y	Y

Action			Years 0-5				
Task	Responsibility	Season	1	2	3	4	5
July/August. The grass meadow should be cut in late summer/early autumn and cuttings removed from site							
Injurious weeds are to be eradicated, removed and disposed of off-site, as per the latest Defra/Natural England guidance. Grass swards that do not contain wildflowers can be selectively sprayed. Hand weeding will be required in areas of wildflower	Specialist contractor appointed by Highways England	As required	Y	Y	Y	Y	Y
In areas where seed has not taken, re-prepare ground and re-seed in autumn	Specialist contractor appointed by Highways England	In autumn where required	Y	Y	Y	Y	Y
All litter/foreign debris should be removed from planted areas and taken off site	Specialist contractor appointed by Highways England	As required	Y	Y	Y	Y	Y

- 7.2.9 Following establishment, the following management prescriptions are proposed:
- a. Species rich chalk grassland shall be mown annually

Outline Measure of Success

- 7.2.10 To ensure that the management requirements outlined above are achieved, the following monitoring targets have been devised to measure the success of the management requirements:
- a. The sward shall cover at least 80% of the area to be managed where necessary to ensure this typology fulfils the environmental function required; and
 - b. The area shall contain no more than 10% scrub cover.
 - c. Species rich chalk grassland to support 12 or more species plants capable of thriving even under frequent mowing.
 - d. Target species numbers to be met by Year 3

Outline Monitoring frequency and methods

- 7.2.11 The aim of the suggested monitoring programme is to ascertain whether the outline measures of success listed above have been achieved, and whether maintenance operations or remedial actions are required.
- 7.2.12 After the 5-year establishment period, long-term monitoring would be undertaken to assess the success of the grassland in terms of developing into the relevant target priority habitat. This would include surveys following Common Standards Monitoring Guidance for Lowland Grassland Habitats (JNCC, 2004a), and Natural England guidance on the creation of priority grassland habitat (Natural England, 2012). These would continue every five years with the detailed monitoring approach being refined over this period as part of the steering group discussions.
- 7.2.13 Highways England's appointed monitoring party will carry out the monitoring visits and feed back to the steering group as part of the monitoring report.

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7.3 LE1.3 Species Rich Annual Wildflower grassland

Overarching Aims

- 7.3.1 To provide visually vibrant and exciting meadow areas using native species of perennial and annual wildflower and grasses. The annual wildflower meadow is to be managed to reflect the former RAF Gravesend runways within Chalk Park South and provide heritage interest.

Description

- 7.3.2 Species rich annual wildflower grassland is an area of meadow comprising a diverse selection of native annual wildflowers and grasses. The meadow area is based on plants completing a one-year life cycle and setting seed for the following years growth.
- 7.3.3 This typology is proposed as an integral component of the landscape mitigation design. The specific methodology for the establishment of annual wildflower grassland will be developed during detailed design and form part of the final LEMP.
- 7.3.4 Species selection are to be appropriate to the location or as exist already on site, with a species composition and diversity capable of being maintained by one cut per year, so that in time, biodiversity interest is developed.
- 7.3.5 A list of potential species mixes for annual wildflower grassland is shown in the Appendix to the Design Principles and should be appropriate to the underlying geology and aspect.

Outline Requirements

- 7.3.6 The following outline requirements are for all areas of species-rich annual wildflower grassland.
- a. To provide a visually interesting component to the landscape while establishing and maintaining species rich swards of differing character, including plants that support invertebrate larvae and flowers that attract pollinators at different times of year.
 - b. The wildflower grassland would be managed to increase biodiversity by providing a diverse range of plant species, which would then support a range of animal species such as invertebrates, amphibians and reptiles, birds and small mammals.
 - c. To maintain as a colourful and species rich meadow by allowing the more desirable species to flourish and reducing the vigour of the more extensive species.
 - d. To create grassland habitats that follow the priority habitat descriptions for lowland meadows.

Outline Prescriptions

- 7.3.7 The exact details of the management activities to be undertaken will be developed between all relevant parties during the development of the LEMP
- 7.3.8 Table 7.3 below describes the programme of work for establishment and initial maintenance (first five years), and then goes on to explain the outline long-term management.

Table 7.3 Outline establishment regime

Action			Years 0-5				
Task	Responsibility	Season	1	2	3	4	5
Attendance of quarterly site inspections with the Project Landscape Architect	Specialist contractor appointed by Highways England	Quarterly	Y	Y	Y	Y	Y
It is anticipated that a flush of annual weeds will be controlled by the rapid growth of the annual plants so no mowing will be necessary in Year 1. Where visibility splay requirements are not required planting is to be managed as an annual meadow, allowing the plants to grow tall, flower and seed from May through to July/August. The annual meadow should be cut back in late summer, cleared, and cultivated. An annual cultivation is essential for re-establishment from self-sown seed.	Specialist contractor appointed by Highways England	Early Autumn	N	Y	Y	Y	Y
Planting to be managed according to the location – along verges planting will require regular mowing to maintain the required visibility splay. Cuttings are to be raked off and removed	Specialist contractor appointed by Highways England	As required	Y	Y	Y	Y	Y
Injurious weeds are to be eradicated, removed, and disposed of off-site, as per the latest Defra/Natural England guidance. Grass swards that do not contain	Specialist contractor appointed by Highways England	As required	Y	Y	Y	Y	Y

Action			Years 0-5				
Task	Responsibility	Season	1	2	3	4	5
wildflowers can be selectively sprayed. Hand weeding will be required in areas of wildflower							
In areas where seed has not taken, re-prepare ground and re-seed in autumn	Specialist contractor appointed by Highways England	In autumn where required	Y	Y	Y	Y	Y
All litter/foreign debris should be removed from planted areas and taken off site	Specialist contractor appointed by Highways England	As required	Y	Y	Y	Y	Y

- 7.3.9 Following establishment, the following management prescriptions are proposed:
- a. Species rich annual wildflower grassland shall be mown annually

Outline Measure of Success

- 7.3.10 To ensure that the management requirements outlined previously are achieved, the following monitoring targets have been devised to measure the success of the management requirements:
- a. The sward shall cover at least 90% of the area to be managed to ensure this typology fulfils the environmental function required; and
 - b. The area shall contain no more than 10% cover of competitive or problem species such as nettles (*Urtica dioica*), cow parsley (*Anthriscus sylvestris*), hemlock (*Conium maculatum*), gorse (*Ulex europaeus*), bracken (*Pteridium aquilinum*), thistles (*Cirsium* spp.), dock (*Rumex* spp.).
 - c. Species rich grassland to support at least 12 or more plant species per m², and managed to prevent natural succession to scrub and woodland and retain the open grassland character.
 - d. Target species numbers to be met by Year 5.

Outline Monitoring frequency and methods

- 7.3.11 The aim of the suggested monitoring programme is to ascertain whether the outline measures of success listed above have been achieved, and whether maintenance operations or remedial actions are required.
- 7.3.12 After the 5-year establishment period, long-term monitoring would be undertaken to assess the success of the grassland in terms of developing into the relevant target priority habitat. This would include surveys following Common Standards Monitoring Guidance for Lowland Grassland Habitats (JNCC, 2004a), and Natural England guidance on the creation of priority grassland habitat (Natural England, 2012). These would continue every five

years with the detailed monitoring approach being refined over this period as part of the steering group discussions.

- 7.3.13 Highways England's appointed monitoring party will carry out the monitoring visits and feed back to the steering group as part of the monitoring report.

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7.4 LE1.4 Rock and Scree

Description

- 7.4.1 Rock and scree are areas of free and loose rock and scree material.
- 7.4.2 This typology is proposed on the approach to the South Portal, where the Project route is within a deep cutting through the underlying chalk geology. The cutting has steep gradients on the cutting faces to limit the amount of land take within this section of the Project route.
- 7.4.3 Rock and scree are proposed on the cutting faces, and will be allowed to be naturally colonised by grass, herb and scrub species, suitable to underlying geology.

Outline Requirements

- 7.4.4 The following outline requirements are for all areas of rock and scree:
- To create species interest by creation of small ledges and pockets of nutrient-poor fine material on the cutting face.
 - Natural colonisation to be encouraged on the chalk face, to break up the bare faces of the chalk cutting.
 - Control of tree seedlings and scrub to prevent encroachment over the ground flora.
 - To create grassland habitats that follow the priority habitat descriptions for inland rock outcrop and scree habitats³.

Outline Prescriptions

- 7.4.5 The exact details of the management activities to be undertaken will be developed between all relevant parties during the development of the LEMP
- 7.4.6 Table 7.4 below describes the programme of work for establishment and initial maintenance (first five years), and then goes on to explain the outline long-term management.

Table 7.4 Outline Establishment regime

Action			Years 0-5				
Task	Responsibility	Season	1	2	3	4	5
Attendance of quarterly site inspections with the Project Landscape Architect	Specialist contractor appointed by Highways England	Quarterly	Y	Y	Y	Y	Y
Injurious weeds are to be eradicated, removed and disposed of off-site, as per the latest	Specialist contractor appointed by Highways England	As required	Y	Y	Y	Y	Y

³ [Inland rock outcrop and scree habitats \(UK BAP Priority Habitat description\) \(jncc.gov.uk\)](https://jncc.gov.uk/)

Action			Years 0-5				
Task	Responsibility	Season	1	2	3	4	5
Defra/Natural England guidance.							
All litter/foreign debris should be removed from planted areas and taken off site	Specialist contractor appointed by Highways England	As required	Y	Y	Y	Y	Y

- 7.4.7 Following establishment, the following management prescriptions are proposed:
- a. Removal of scrub encroachment every 3 years.

Outline Measure of Success

- 7.4.8 To ensure that the management requirements outlined previously are achieved, the following monitoring targets have been devised to measure the success of the management requirements:
- a. Obvious natural colonisation on face edges by Year 3

Outline Monitoring frequency and methods

- 7.4.9 The aim of the suggested monitoring programme is to ascertain whether the outline measures of success listed above have been achieved, and whether maintenance operations or remedial actions are required.
- 7.4.10 After the 5-year establishment period, monitoring visits every five years would be undertaken in the summer to ensure that the measures of success are being met and maintained. If necessary, the findings of the monitoring may result in corrective actions or the prescriptions for the management or measures of success may need to be modified. Any modifications to the requirements, would be agreed with consultation with the steering group.
- 7.4.11 Highways England's appointed monitoring party will carry out the monitoring visits and feed back to the steering group as part of the monitoring report.

7.5 LE2.1 Woodland

Description

- 7.5.1 Planting areas comprising of lowland, mixed, mainly native deciduous woodland with native/commonly naturalised ground flora, shrub edge planting and tall herb edge planting (grass/forb mix).
- 7.5.2 Woodland creation consisting of a mix of native trees and shrubs is provided throughout the Project to mitigate loss of vegetation associated with the Project, to provide visual screening of the road from nearby receptors and to integrate the road into the surrounding landscape.
- 7.5.3 Proposed woodland would also provide biodiversity benefit as well as delivering the mitigation described above.
- 7.5.4 A list of potential species for consideration for the woodland planting species mix is shown in the Appendix to the Design Principles. Species selection should be appropriate to the underlying geology and substrate.

Outline Requirements

- 7.5.5 The following outline requirements apply to all areas of woodland planting:
- a. To create the form and pattern of native woodlands of the same character found in the neighbouring areas. Species mix and selection shall be comprised of local provenance stock and species mixes shall be adapted to reflect the local character. Woodland habitats would follow the priority habitat descriptions for lowland mixed deciduous woodland⁴.
 - b. To create thick woodland to screen views towards roads in areas as defined in the Environmental Masterplan.
 - c. Woodland planting to be designed and managed to create seasonal variety and visual interest.
 - d. Woodland planting to be designed and managed to create structure in the landscape, replicating the existing vegetation communities and patterns of woodland found locally and where possible link into existing woodland areas.
 - e. Woodland to be managed to create a diversity of habitat within the woodland, comprising a mix of age classes, species, and structure, and to provide increases in biodiversity value. This includes containing open areas, variation in canopy structure and a healthy ground flora and understory.
 - f. Where appropriate, woodland to incorporate open rides and glades within the woodland structure to add biodiversity benefit.

Outline Prescriptions

- 7.5.6 The exact details of the management activities to be undertaken will be developed between all relevant parties during the development of the LEMP

⁴ [Lowland mixed deciduous woodland \(UK BAP Priority Habitat description\) \(jncc.gov.uk\)](https://jncc.gov.uk)

7.5.7 Table 7.5 below describes the programme of work for establishment and initial maintenance, and then goes on to explain the outline long-term management.

Table 7.5 Outline Establishment regime

Action			Years 0-5				
Task	Responsibility	Season	1	2	3	4	5
Attendance of quarterly site inspections with the Project Landscape Architect	Specialist contractor appointed by Highways England	Quarterly	Y	Y	Y	Y	Y
Provide irrigation during the establishment period (year 1) and growing season (April-September) as required. As required during Years 2 – 5.	Specialist contractor appointed by Highways England	As required	Y	Y	Y	Y	Y
Adjust any guy fixings, stakes and ties at the start and end of growing season or at any other time as necessary to avoid chafing and maintain firm support	Specialist contractor appointed by Highways England	Twice yearly - April and November	Y	Y	Y	Y	Y
General pruning. Prune dead, dying, crossing, rubbing and damaged branches and encourage new leader if necessary.	Specialist contractor appointed by Highways England	Once yearly - Nov to Feb	Y	Y	Y	Y	Y
Any dead or damaged plants should be replaced annually with matching species of the same size during the next planting season after failure. To be undertaken once yearly during Nov and Feb.	Specialist contractor appointed by Highways England	Once yearly - Nov to Feb	N	Y	Y	Y	Y
All litter/foreign debris should be removed from planted areas and taken off site	Specialist contractor appointed by Highways England	As required	Y	Y	Y	Y	Y
Hand weed control to be undertaken three times during the year (Spring, Summer and Winter)	Specialist contractor appointed by Highways England	April, August and January	Y	Y	Y	Y	Y
Selective spot treatment of herbicide as required for larger pernicious weeds	Specialist contractor appointed by Highways England	Twice yearly - May and September	Y	Y	Y	Y	Y
Removal of all tree guards, stakes	Specialist contractor appointed by Highways England	As required	N	N	N	N	Y

7.5.8 Following establishment, the following management prescriptions are proposed:

- a. Selected removal of planted trees shall take place to retain the best specimens and contribute to the development of the woodland canopy structure. This should take place between years 8-10 but is to be agreed in the final LEMP
- b. Removal of deadwood/individual trees undertaken as necessary to maintain health and safety every 5 years throughout the management period.
- c. Thinning to maintain and promote a healthy woodland structure every 5 years throughout the management period.

Outline Measure of Success

7.5.9 To ensure that the management requirements outlined previously are achieved, the following monitoring targets have been devised to measure the success of the management requirements:

- a. Years 1-2
 - iii. 80% establishment of planting
- b. Year 5
 - i. All plant failures to have been replaced and replanted, with a 95% success rate of new planting by the end of year 5.
- c. Long-term (Post 5 years)
 - i. The woodland shall form or be clearly capable of forming groups of similar species, form and height to existing woodlands within the vicinity and reflect local planting patterns, structure and nature conservation value.
 - iv. Native ground flora shall have been allowed to develop.

Outline Monitoring frequency and methods

7.5.10 The aim of the suggested monitoring programme is to ascertain whether the outline measures of success listed above have been achieved, and whether maintenance operations or remedial actions are required.

7.5.11 After the 5-year establishment period, long-term monitoring would be undertaken to assess the success of the woodland in terms of developing into the relevant target priority habitat. This would include fixed point or aerial photography to record overall habitat development within any given management area, as well as surveys following Common Standards Monitoring Guidance for Woodland Habitats (JNCC, 2004b). These would continue every five years with the detailed monitoring approach being refined over this period as part of the steering group discussions.

7.5.12 Highways England's appointed monitoring party will carry out the monitoring visits and feed back to the steering group as part of the monitoring report.

7.6 LE2.1 Woodland including non-native species

Description

- 7.6.1 Planting areas comprising of lowland, mixed, native deciduous woodland containing a significant proportion of non-native species for climate change resilience. Also comprises native/commonly naturalised ground flora, shrub edge planting and tall herb edge planting (grass/forb mix).
- 7.6.2 Woodland including non-native is predominantly used for large areas of woodland creation that do not adjoin onto existing woodlands, particularly around junctions. Exceptions are within Thames Chase and the Thames Chase compensation land.
- 7.6.3 Woodland with non-native species perform the same function as LE2.1 woodland in terms of providing replacement woodland planting, screening functions for visual mitigation and to integrate the Project route into the surrounding landscape.
- 7.6.4 The inclusion of non-native species shall provide additional diversity in the woodland mix to provide resilience against disease and predicted climate change.
- 7.6.5 A list of potential species for consideration for the species mix for woodland, including non-native species, is shown in the Appendix to the Design Principles. Species selection should consider the local underlying geology and substrate within the new planting areas.

Outline Requirements

- 7.6.6 The following outline requirements are for all areas of woodland planting including non-native species:
- a. To create the form and pattern of native woodlands of the same character found in the neighbouring areas. The species mix and selection shall be largely comprised of local provenance stock and species mixes shall be adapted to reflect the local character.
 - b. To create thick woodland to screen views towards roads in areas as defined in the Environmental Masterplan.
 - c. Woodland mix to comprise an inclusion of non-native stock, to provide resilience to disease and future climate change. Non-native stock to be comprised of species suitable for predicted impacts of climate change and look to replicate species mixes found at lower latitude levels.
 - d. Woodland planting to be designed and managed to create seasonal variety and visual interest.
 - e. Woodland planting to be designed and managed to create structure in the landscape, replicating the existing pattern of woodland found locally and where possible link into existing woodland areas.

- f. Woodland to be managed to create a diversity of habitat within the woodland, comprising a mix of age classes, species, and structure, and to provide increases in biodiversity value. This includes containing open areas, variation in canopy structure and a healthy ground flora and understory.

Outline Prescriptions

- 7.6.7 The exact details of the management activities to be undertaken will be developed between all relevant parties during the development of the LEMP
- 7.6.8 Table 7.6 below describes the programme of work for establishment and initial maintenance (first five years), and then goes on to explain the outline long-term management.

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Table 7.6 Outline Establishment regime

Action			Years 0-5				
Task	Responsibility	Season	1	2	3	4	5
Attendance of quarterly site inspections with the Project Landscape Architect	Specialist contractor appointed by Highways England	Quarterly	Y	Y	Y	Y	Y
Provide irrigation during the establishment period (year 1) and growing season (April-September) as required. As required during Years 2 – 5.	Specialist contractor appointed by Highways England	As required	Y	Y	Y	Y	Y
Adjust any guy fixings, stakes and ties at the start and end of growing season or at any other time as necessary to avoid chafing and maintain firm support	Specialist contractor appointed by Highways England	Twice yearly - April and November	Y	Y	Y	Y	Y
Prune weak plants in Year 1 and 2 to encourage new growth development	Specialist contractor appointed by Highways England	Once yearly - Nov to Feb	Y	Y	N	N	N
General pruning. Prune dead, dying, crossing, rubbing and damaged branches and encourage new leader if necessary.	Specialist contractor appointed by Highways England	Once yearly - Nov to Feb	Y	Y	Y	Y	Y
Any dead or damaged plants should be replaced annually with matching species of the same size during the next planting season after failure. To be undertaken once yearly during Nov and Feb.	Specialist contractor appointed by Highways England	Once yearly - Nov to Feb	N	Y	Y	Y	Y
All guards should be checked and adjusted, repaired or replaced as necessary twice yearly in October and March.	Specialist contractor appointed by Highways England	Twice yearly - October and March	Y	Y	Y	Y	Y

Action			Years 0-5				
Task	Responsibility	Season	1	2	3	4	5
All litter/foreign debris should be removed from planted areas and taken off site	Specialist contractor appointed by Highways England	As required	Y	Y	Y	Y	Y
Hand weed control to be undertaken three times during the year (Spring, Summer and Winter)	Specialist contractor appointed by Highways England	April, August and January	Y	Y	Y	Y	Y
Selective spot treatment of herbicide as required for larger pernicious weeds	Specialist contractor appointed by Highways England	Twice yearly - May and September	Y	Y	Y	Y	Y

7.6.9 Following establishment, the following management prescriptions are proposed:

- a. Selected removal of planted trees shall take place to retain the best specimens and contribute to the development of the woodland canopy structure. This should take place between years 8-10 but is to be agreed in the final LEMP.
- b. Removal of deadwood/individual trees undertaken as necessary to maintain health and safety every 5 years throughout the management period.
- c. Thinning to maintain and promote a healthy woodland structure every 10 years throughout the management period.

Outline Measure of Success

7.6.10 To ensure that the management requirements outlined previously are achieved, the following monitoring targets have been devised to measure the success of the management requirements:

- a. Years 1-2
 - i. 80% establishment of planting
- b. Year 5
 - ii. All plant failures to have been replaced and replanted.
- c. Long-term
 - i. The woodland shall form or be clearly capable of forming groups of similar species, form, and height to existing woodlands within the vicinity and reflect local planting patterns, structure and nature conservation value.
 - ii. Invasive weeds kept to less than 20% ground cover.
 - iii. Native ground flora shall have been allowed to develop.

Outline Monitoring frequency and methods

- 7.6.11 The aim of the suggested monitoring programme is to ascertain whether the outline measures of success listed above have been achieved, and whether maintenance operations or remedial actions are required.
- 7.6.12 After the 5-year establishment period, long-term monitoring would be undertaken to assess the success of the woodland in terms of developing into the relevant target priority habitat. This would include fixed point or aerial photography to record overall habitat development within any given management area, as well as surveys following Common Standards Monitoring Guidance for Woodland Habitats (JNCC, 2004b). These would continue every five years with the detailed monitoring approach being refined over this period as part of the steering group discussions.
- 7.6.13 Highways England's appointed monitoring party will carry out the monitoring visits and feed back to the steering group as part of the monitoring report.

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7.7 LE2.1 Woodland Edible Species

Description

- 7.7.1 Lowland, mixed, mainly native deciduous woodland comprising mostly of species bearing edible fruits and nuts for human consumption. Also comprises native/commonly naturalised ground flora, shrub edge planting and tall herb edge planting (grass/forb mix).
- 7.7.2 A list of potential species to be considered for the species mix for woodland edible species is shown in the Appendix to the Design Principles. Species selection should consider the underlying geology and substrate used within the planting areas.

Outline Requirements

- 7.7.3 The following outline requirements are for all areas of woodland planting including edible species:
- Woodland to be managed to include edible species.
 - Woodland to be managed to provide visual screening and containment within the A13 junction
 - Dense areas of bramble or similar to deter access to adjacent roads and land parcels in combination with boundary fencing.
 - Woodland planting and understorey/woodland edge to be designed and managed to create seasonal variety and visual interest.
 - Woodland planting to be designed and managed to create structure in the landscape, replicating the existing pattern of woodland found locally and where possible link into existing woodland areas.
 - Woodland planting and understorey/woodland edge to be managed to create a diversity of habitat within the woodland, comprising a mix of age classes, species, and structure, and to provide increases in biodiversity value. This includes containing open areas, variation in canopy structure and a healthy ground flora and understorey.

Outline Prescriptions

- 7.7.4 The exact details of the management activities to be undertaken will be developed between all relevant parties during the development of the LEMP
- 7.7.5 Table 7.7 below describes the programme of work for establishment and initial maintenance (first five years), and then goes on to explain the outline long-term management.

Table 7.7 Outline Establishment regime

Action			Years 0-5				
Task	Responsibility	Season	1	2	3	4	5
Attendance of quarterly site inspections with the Project Landscape Architect	Specialist contractor appointed by Highways England	Quarterly	Y	Y	Y	Y	Y
Provide irrigation during the establishment period (year 1) and growing season (April-September) as required. As required during Years 2 – 5.	Specialist contractor appointed by Highways England	As required	Y	Y	Y	Y	Y
Adjust any guy fixings, stakes and ties at the start and end of growing season or at any other time as necessary to avoid chafing and maintain firm support	Specialist contractor appointed by Highways England	Twice yearly - April and November	Y	Y	Y	Y	Y
Prune weak plants in Year 1 and 2 to encourage new growth development	Specialist contractor appointed by Highways England	Once yearly - Nov to Feb	Y	Y	N	N	N
General pruning. Prune dead, dying, crossing, rubbing and damaged branches and encourage new leader if necessary. Prune to encourage production of fruit to normal good horticultural standards	Specialist contractor appointed by Highways England	Once yearly - Nov to Feb	Y	Y	Y	Y	Y
Any dead or damaged plants should be replaced annually with matching species of the same size during the next planting season after failure. To be undertaken once yearly during Nov and Feb.	Specialist contractor appointed by Highways England	Once yearly - Nov to Feb	N	Y	Y	Y	Y
All guards should be checked and adjusted, repaired or replaced as	Specialist contractor appointed by Highways England	Twice yearly - October and March	Y	Y	Y	Y	Y

Action			Years 0-5				
Task	Responsibility	Season	1	2	3	4	5
necessary twice yearly in October and March.							
All litter/foreign debris should be removed from planted areas and taken off site	Specialist contractor appointed by Highways England	As required	Y	Y	Y	Y	Y
Hand weed control to be undertaken three times during the year (Spring, Summer and Winter)	Specialist contractor appointed by Highways England	April, August and January	Y	Y	Y	Y	Y
Selective spot treatment of herbicide as required for larger pernicious weeds	Specialist contractor appointed by Highways England	Twice yearly - May and September	Y	Y	Y	Y	Y

7.7.6 Following establishment, the following management prescriptions are proposed:

- a. Selected removal of planted trees shall take place to retain the best specimens and contribute to the development of the woodland canopy structure. This should take place between years 8-10 but is to be agreed in the final LEMP and with any potential management agent/landowner.
- b. Removal of deadwood/individual trees undertaken as necessary to maintain health and safety every 5 years throughout the management period.
- c. Thinning to maintain and promote a healthy woodland structure every 5 years throughout the management period.

Outline Measure of Success

7.7.7 To ensure that the management requirements outlined previously are achieved, the following monitoring targets have been devised to measure the success of the management requirements:

- a. Years 1-2
 - i. 80% establishment of planting
- b. Year 5
 - i. All plant failures to have been replaced and replanted, with a 95% success rate of new planting by the end of year 5.
- c. Long-term
 - i. The woodland shall form or be clearly capable of forming groups of similar species, form and height to existing woodlands within the vicinity and reflect local planting patterns, structure and nature conservation value.

- ii. Successful fruit and nut production.
- iii. Invasive weeds kept to less than 20% ground cover.
- iv. Native ground flora shall have been allowed to develop.

Outline Monitoring frequency and methods

- 7.7.8 The aim of the suggested monitoring programme is to ascertain whether the outline measures of success listed above have been achieved, and whether maintenance operations or remedial actions are required.
- 7.7.9 After the 5-year establishment period, long-term monitoring would be undertaken to assess the success of the woodland in terms of developing into the relevant target priority habitat. This would include fixed point or aerial photography to record overall habitat development within any given management area, as well as surveys following Common Standards Monitoring Guidance for Woodland Habitats (JNCC, 2004b). These would continue every five years with the detailed monitoring approach being refined over this period as part of the steering group discussions.
- 7.7.10 Highways England's appointed monitoring party will carry out the monitoring visits and feed back to the steering group as part of the annual monitoring reporting.

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7.8 LE2.2 Woodland Edge

Description

- 7.8.1 Area of lowland, mixed, mainly native deciduous woodland shrubs on the edge of the main woodland. This typology is a transitional zone between main woodland and adjacent grasslands providing a biodiverse continuous range of structure, shelter, and food sources.
- 7.8.2 Woodland edge is proposed throughout the Project and to all areas of woodland creation.
- 7.8.3 Woodland edge is also proposed in mitigation areas where there are constraints to achieving traditional woodland planting, such as areas of proximity to underground and overground utilities and areas where there is insufficient space to achieve a thick woodland block.
- 7.8.4 Woodland edge can be managed to appear as more traditional woodland in longer views and can provide visual screening of the Project, as well as integrating the Project route into the surrounding landscape.
- 7.8.5 A list of potential species to be considered for the species mix for woodland edible species is shown in the Appendix to the Design Principles. Species selection should consider the underlying geology and substrate used within the planting areas.

Outline Requirements

- 7.8.6 The following outline requirements apply to all areas of woodland edge:
- a. Woodland edge planting to be designed and managed to create seasonal variety and visual interest.
 - b. Where used for visual screening, woodland edge managed to provide a thick and scalloped edge to avoid funnelling wind and allowing micro-climates to develop which will benefit invertebrate species and the range of animals which prey upon them, notably bats along woodland edges.
 - c. Woodland edge when used in proximity to underground/overhead utilities to be managed in accordance with guidance from the relevant statutory utility provider. Heights and spread shall be managed so they do not encroach into utility providers' easements or exceed safety area.

Outline Prescriptions

- 7.8.7 The exact details of the management activities to be undertaken will be developed between all relevant parties during the development of the LEMP
- 7.8.8 Table 7.8 below describes the programme of work for establishment and initial maintenance (first five years), and then goes on to explain the outline long-term management.

Table 7.8 Outline Establishment regime

Action			Years 0-5				
Task	Responsibility	Season	1	2	3	4	5
Attendance of quarterly site inspections with the Project Landscape Architect	Specialist contractor appointed by Highways England	Quarterly	Y	Y	Y	Y	Y
Provide irrigation during the establishment period (year 1) and growing season (April-September) as required. As required during Years 2 – 5.	Specialist contractor appointed by Highways England	As required	Y	Y	Y	Y	Y
Prune weak plants in Year 1 and 2 to encourage new growth development	Specialist contractor appointed by Highways England	Once yearly - Nov to Feb	Y	Y	N	N	N
General pruning in order to provide a structurally diverse and graduated woodland edge. Prune dead, dying, crossing, rubbing and damaged branches and encourage new leader if necessary.	Specialist contractor appointed by Highways England	Once yearly - Nov to Feb	Y	Y	Y	Y	Y
Any dead or damaged plants should be replaced annually with matching species of the same size during the next planting season after failure. To be undertaken once yearly during Nov and Feb.	Specialist contractor appointed by Highways England	Once yearly - Nov to Feb	N	Y	Y	Y	Y
All guards should be checked and adjusted, repaired or replaced as necessary twice yearly in October and March.	Specialist contractor appointed by Highways England	Twice yearly - October and March	Y	Y	Y	Y	Y
All litter/foreign debris should be removed from planted areas and taken off site	Specialist contractor appointed by Highways England	As required	Y	Y	Y	Y	Y
Hand weed control to be undertaken three times during the year (Spring, Summer and Winter)	Specialist contractor appointed by Highways England	April, August and January	Y	Y	Y	Y	Y
Selective spot treatment of herbicide as required for larger pernicious weeds	Specialist contractor appointed by Highways England	Twice yearly - May and September	Y	Y	Y	Y	Y

7.8.9 Following establishment, the following management prescriptions are proposed:

Outline Measure of Success

7.8.10 To ensure that the management aims and requirements outlined above are achieved, the following monitoring targets have been devised to measure the success of the management requirements:

- a. Years 1-2
 - i. 80% establishment of planting
- b. Year 5
 - i. All plant failures to have been replaced and replanted, with a 95% success rate of new planting by the end of year 5.
- c. Long-term
 - i. The woodland edge shall form or be clearly capable of forming groups of similar species, forming edges to existing woodlands within the vicinity and reflect local planting patterns, structure, and nature conservation value.
 - ii. biodiverse woodland edge providing a continuous range of structure, shelter, and food sources (nectar, berries etc)
 - iii. Invasive weeds kept to less than 20% of ground cover.
 - iv. Native ground flora shall have been allowed to develop.

Outline Monitoring frequency and methods

7.8.11 The aim of the suggested monitoring programme is to ascertain whether the outline measures of success listed above have been achieved, and whether maintenance operations or remedial actions are required.

7.8.12 After the 5-year establishment period, long-term monitoring would be undertaken to assess the success of the woodland in terms of developing into the relevant target priority habitat. This would include fixed point or aerial photography to record overall habitat development within any given management area, as well as surveys following Common Standards Monitoring Guidance for Woodland Habitats (JNCC, 2004b). These would continue every five years with the detailed monitoring approach being refined over this period as part of the steering group discussions.

7.8.13 Highways England's appointed monitoring party will carry out the monitoring visits and feed back to the steering group as part of the monitoring report.

7.9 LE2.4 Linear Belt of Shrubs and Trees

Description

- 7.9.1 Mixed, native trees and shrubs with native/commonly naturalised ground flora. Similar in nature to the woodland typology but forming narrow belts of woodland (wider than hedgerows) creating barriers between differing typologies.
- 7.9.2 Linear belts of shrubs and trees are proposed to provide visual screening and landscape integration where there are constraints in land availability within the order limits or overhead and underground utilities that mean more traditional woodland planting cannot be achieved.
- 7.9.3 Linear belts of shrubs and trees are also proposed to replace existing belts of trees that have been lost due to construction works.

Outline Requirements

- 7.9.4 The following outline requirements apply to all areas of linear belts of shrubs and trees:
- a. To provide appropriate visual screening and landscape integration at locations defined in the Environmental Masterplan where space is constrained.
 - b. To create the form and pattern of woodlands of the same character found in the neighbouring areas. Species mix and selection shall be comprised of local provenance stock and species mixes shall be adapted to reflect the local character.
 - c. To create belts of woodland to screen views towards roads in areas as defined in the Environmental Masterplan.
 - d. Woodland planting to be designed and managed to create seasonal variety and visual interest.
 - e. Woodland planting to be designed and managed to create structure in the landscape, replicating the existing pattern of woodland found locally and where possible link into existing woodland areas.
 - f. Woodland to be managed to create a diversity of habitat within the woodland, comprising a mix of age classes, species, and structure, and to provide increases in biodiversity value. This includes containing open areas, variation in canopy structure and a healthy ground flora and understory.
 - g. Where established in proximity to underground and overhead utilities, woodland planting to be managed to retain safety distances and heights as agreed with the statutory stakeholder.

Outline Prescriptions

- 7.9.5 The exact details of the management activities to be undertaken will be developed between all relevant parties during the development of the LEMP
- 7.9.6 Table 7.9 below describes the programme of work for establishment and initial maintenance (first five years), and then goes on to explain the outline long-term management.

Table 7.9 Outline Establishment regime

Action			Years 0-5				
Task	Responsibility	Season	1	2	3	4	5
Attendance of quarterly site inspections with the Project Landscape Architect	Specialist contractor appointed by Highways England	Quarterly	Y	Y	Y	Y	Y
Provide irrigation during the establishment period (year 1) and growing season (April-September) as required. As required during Years 2 – 5.	Specialist contractor appointed by Highways England	As required	Y	Y	Y	Y	Y
Adjust any guy fixings, stakes and ties at the start and end of growing season or at any other time as necessary to avoid chafing and maintain firm support	Specialist contractor appointed by Highways England	Twice yearly - April and November	Y	Y	Y	Y	Y
Prune weak plants in Year 1 and 2 to encourage new growth development.	Specialist contractor appointed by Highways England	Once yearly - Nov to Feb	Y	Y	N	N	N
General pruning. Prune dead, dying, crossing, rubbing and damaged branches and encourage new leader if necessary. Pruning should take into account and reinforce linear form of planting.	Specialist contractor appointed by Highways England	Once yearly - Nov to Feb	Y	Y	Y	Y	Y
Any dead or damaged plants should be replaced annually with matching species of the same size during the next planting season after failure. To be	Specialist contractor appointed by Highways England	Once yearly - Nov to Feb	N	Y	Y	Y	Y

Action			Years 0-5				
Task	Responsibility	Season	1	2	3	4	5
undertaken once yearly during Nov and Feb.							
All guards should be checked and adjusted, repaired or replaced as necessary twice yearly in October and March.	Specialist contractor appointed by Highways England	Twice yearly - October and March	Y	Y	Y	Y	Y
All litter/foreign debris should be removed from planted areas and taken off site	Specialist contractor appointed by Highways England	As required	Y	Y	Y	Y	Y
Hand weed control to be undertaken three times during the year (Spring, Summer and Winter)	Specialist contractor appointed by Highways England	April, August and January	Y	Y	Y	Y	Y
Selective spot treatment of herbicide as required for larger pernicious weeds	Specialist contractor appointed by Highways England	Twice yearly - May and September	Y	Y	Y	Y	Y

Outline Measure of Success

- 7.9.7 To ensure that the management requirements outlined above are achieved, the following monitoring targets have been devised to measure the success of the management requirements:
- a. Years 1-2
 - i. 80% establishment of planting
 - b. Year 5
 - v. All plant failures to have been replaced and replanted, with a 95% success rate of new planting by the end of year 5.
 - c. Long-term
 - i. Native ground flora shall have been allowed to develop

Outline Monitoring frequency and methods

- 7.9.8 The aim of the suggested monitoring programme is to ascertain whether the outline measures of success listed above have been achieved, and whether maintenance operations or remedial actions are required.
- 7.9.9 After the 5-year establishment period, monitoring visits every five years would be undertaken in the summer to ensure that the measures of success are being met and maintained. If necessary, the findings of the monitoring may result in corrective actions or the prescriptions for the management or measures of success may need to be modified. Any modifications to the requirements, would be agreed with consultation with the steering group.

- 7.9.10 Highways England's appointed monitoring party will carry out the monitoring visits and feed back to the steering group as part of the monitoring report.

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7.10 LE2.5 Shrubs with Intermittent Trees

Description

- 7.10.1 Mixed, mainly native deciduous shrubs with intermittent larger tree planting with native/commonly naturalised ground flora.
- 7.10.2 Shrubs with intermittent tree planting are proposed throughout the Project where constraints caused by land availability, overhead and underground utilities and local constraints that mean that traditional woodland planting cannot be achieved, but some tree cover is required.
- 7.10.3 Shrubs with intermittent tree planting are proposed on embankments to structures to soften the appearance of the engineered structures and to tie the earthworks into the adjacent landscape.
- 7.10.4 Shrubs with intermittent tree planting are proposed adjacent to or directly under/over utilities, where constraints mean that larger tree planting cannot be achieved. The species mix allows for suitable species to be planted within agreed distances of the utilities following guidance and agreement with by the relevant statutory undertaker, but still aim to achieve a scrubby/woodland character, particularly adjacent to existing woodland areas, where the intermittent trees can be located to the periphery of the planting area to transition from woodland to smaller shrubs.

Outline Requirements

- 7.10.5 The following outline requirements are for all areas of shrubs with intermittent trees.
- a. To provide appropriate visual screening and landscape integration at locations defined in the Environmental Masterplan.
 - b. To create the form and pattern of woodlands/shrub planting of the same character found in the neighbouring areas. Species mix and selection shall be comprised of local provenance stock and species mixes shall be adapted to reflect the local character.
 - c. Shrubs with intermittent trees to be designed and managed to create seasonal variety and visual interest.
 - d. Shrubs with intermittent trees to be designed and managed to create structure in the landscape, replicating the existing pattern of planting found locally and where possible link into existing woodland/shrub areas.
 - e. Shrubs with intermittent trees to be managed to create a diversity of habitat within the woodland, comprising a mix of age classes, species, and structure.
 - f. Shrubs with intermittent trees managed to provide increased biodiversity value.

- g. Where established in proximity to underground and overhead utilities, planting to be managed to retain safety distances and heights as agreed with the statutory stakeholder.

Outline Prescriptions

- 7.10.6 The exact details of the management activities to be undertaken will be developed between all relevant parties during the development of the LEMP
- 7.10.7 Table 7.10 below describes the programme of work for establishment and initial maintenance (first five years), and then goes on to explain the outline long-term management.

Table 7.10 Outline Establishment regime

Action			Years 0-5				
Task	Responsibility	Season	1	2	3	4	5
Attendance of quarterly site inspections with the Project Landscape Architect	Specialist contractor appointed by Highways England	Quarterly	Y	Y	Y	Y	Y
Provide irrigation during the establishment period (year 1) and growing season (April-September) as required. As required during Years 2 – 5.	Specialist contractor appointed by Highways England	As required	Y	Y	Y	Y	Y
Adjust any guy fixings, stakes and ties at the start and end of growing season or at any other time as necessary to avoid chafing and maintain firm support	Specialist contractor appointed by Highways England	Twice yearly - April and November	Y	Y	Y	Y	Y
Prune weak plants in Year 1 and 2 to encourage new growth development.	Specialist contractor appointed by Highways England	Once yearly - Nov to Feb	Y	Y	N	N	N
General pruning. Prune dead, dying, crossing, rubbing and damaged branches and encourage new leader if necessary. Special attention should be given to ensure intermittent trees are healthy and strong growing	Specialist contractor appointed by Highways England	Once yearly - Nov to Feb	Y	Y	Y	Y	Y

Action			Years 0-5				
Task	Responsibility	Season	1	2	3	4	5
Any dead or damaged plants should be replaced annually with matching species of the same size during the next planting season after failure. To be undertaken once yearly during Nov and Feb.	Specialist contractor appointed by Highways England	Once yearly - Nov to Feb	N	Y	Y	Y	Y
All guards should be checked and adjusted, repaired or replaced as necessary twice yearly in October and March.	Specialist contractor appointed by Highways England	Twice yearly - October and March	Y	Y	Y	Y	Y
All litter/foreign debris should be removed from planted areas and taken off site	Specialist contractor appointed by Highways England	As required	Y	Y	Y	Y	Y
Hand weed control to be undertaken three times during the year (Spring, Summer and Winter)	Specialist contractor appointed by Highways England	April, August and January	Y	Y	Y	Y	Y
Selective spot treatment of herbicide as required for larger pernicious weeds	Specialist contractor appointed by Highways England	Twice yearly - May and September	Y	Y	Y	Y	Y

Outline Measure of Success

7.10.8 To ensure that the management requirements outlined previously are achieved, the following monitoring targets have been devised to measure the success of the management requirements:

- a. Years 1-2
 - i. 80% establishment of planting
- b. Year 5
 - i. All plant failures to have been replaced and replanted, with a 95% success rate of new planting by the end of year 5.
- c. Long-term
 - i. The shrubs with trees typology shall form or be clearly capable of forming groups of similar species and reflect local planting patterns, structure, and nature conservation value.

- ii. Biodiverse shrub area providing a continuous range of structure, shelter, and food sources (nectar, berries etc)
- iii. Invasive weeds kept to less than 20% of ground cover.
- iv. Native ground flora shall have been allowed to develop.

Outline Monitoring frequency and methods

- 7.10.9 The aim of the suggested monitoring programme is to ascertain whether the outline measures of success listed above have been achieved, and whether maintenance operations or remedial actions are required.
- 7.10.10 After the 5-year establishment period, monitoring visits every five years would be undertaken in the summer to ensure that the measures of success are being met and maintained. If necessary, the findings of the monitoring may result in corrective actions or the prescriptions for the management or measures of success may need to be modified. Any modifications to the requirements, would be agreed with consultation with the steering group.
- 7.10.11 Highways England's appointed monitoring party will carry out the monitoring visits and feed back to the steering group as part of the monitoring report.

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7.11 LE2.7 Scattered Trees & LE5.1 Individual Trees

Description

- 7.11.1 Comprising either specimen/feature trees and large shrubs or small groups, scattered trees are an integral part of the landscape structure, reflecting the changing character of the landscape. Scattered specimen trees provide seasonal interest, create habitat and biodiversity, and provide shade.
- 7.11.2 Scattered trees are proposed throughout the Project to replace existing features lost in the landscape due to construction works.
- 7.11.3 Scattered trees are proposed around drainage attenuation ponds, to soften the appearance of the water bodies and to integrate the ponds into the surrounding landscape.
- 7.11.4 Scattered trees are proposed in open grassland areas, adjacent to the Project route where appropriate to break up long distance views and to provide structure in the landscape.
- 7.11.5 Scattered trees and individual trees are also proposed to link areas of woodland planting.

Outline Requirements

- 7.11.6 The following outline requirements apply to all areas of scattered trees and individual trees:
 - a. To provide appropriate landscape integration at locations defined in the Environmental Masterplan.
 - b. Species mix and selection shall be comprised of local provenance stock and species mixes shall be adapted to reflect the local character.
 - c. Scattered and individual trees to be designed and managed to create seasonal variety and visual interest.
 - d. Scattered and individual trees to be designed and managed to create structure in the landscape, replicating the existing pattern of planting found locally and where possible link into existing woodland/shrub areas.

Outline Prescriptions

- 7.11.7 The exact details of the management activities to be undertaken will be developed between all relevant parties during the development of the LEMP
- 7.11.8 Table 7.11 below describes the programme of work for establishment and initial maintenance (first five years), and then goes on to explain the outline long-term management.

Table 7.11 Outline Establishment regime

Action			Years 0-5				
Task	Responsibility	Season	1	2	3	4	5
Attendance of quarterly site inspections with the Project Landscape Architect	Specialist contractor appointed by Highways England	Quarterly	Y	Y	Y	Y	Y
Provide irrigation during the establishment period (year 1) and growing season (April-September) as required. As required during Years 2 – 5.	Specialist contractor appointed by Highways England	As required	Y	Y	Y	Y	Y
Adjust any guy fixings, stakes and ties at the start and end of growing season or at any other time as necessary to avoid chafing and maintain firm support	Specialist contractor appointed by Highways England	Twice yearly - April and November	Y	Y	Y	Y	Y
Prune weak plants in Year 1 and 2 to encourage new growth development.	Specialist contractor appointed by Highways England	Once yearly - Nov to Feb	Y	Y	N	N	N
General pruning. Prune dead, dying, crossing, rubbing and damaged branches and encourage new leader if necessary.	Specialist contractor appointed by Highways England	Once yearly - Nov to Feb	Y	Y	Y	Y	Y
Any dead or damaged plants should be replaced annually with matching species of the same size during the next planting season after failure. To be undertaken once yearly during Nov and Feb.	Specialist contractor appointed by Highways England	Once yearly - Nov to Feb	N	Y	Y	Y	Y
All guards should be checked and adjusted, repaired or replaced as necessary twice yearly in October and March.	Specialist contractor appointed by Highways England	Twice yearly - October and March	Y	Y	Y	Y	Y
All litter/foreign debris should be removed from planted areas and taken off site	Specialist contractor appointed by Highways England	As required	Y	Y	Y	Y	Y
Hand weed control to be undertaken twice during the year (Spring and Summer)	Specialist contractor appointed by Highways England	April, August	Y	Y	Y	Y	Y

Action			Years 0-5				
Task	Responsibility	Season	1	2	3	4	5
Selective spot treatment of herbicide as required for larger pernicious weeds	Specialist contractor appointed by Highways England	Twice yearly - May and September	Y	Y	Y	Y	Y
Maintain mulch where required by topping up twice a year (Spring and Autumn), 500mm either side of tree.	Specialist contractor appointed by Highways England	Twice yearly - May and September	Y	Y	Y	Y	Y

Outline Measure of Success

- 7.11.9 To ensure that the management requirements outlined previously are achieved, the following monitoring targets have been devised to measure the success of the management requirements:
- a. Years 1-2
 - i. 80% establishment of planting
 - b. Year 5
 - i. All plant failures to have been replaced and replanted, with a 95% success rate of new planting by the end of year 5.
 - c. Long-term
 - i. Invasive weeds kept to less than 10% of ground cover.
 - ii. The area shall contain no more than 10% scrub cover.

Outline Monitoring frequency and methods

- 7.11.10 The aim of the suggested monitoring programme is to ascertain whether the outline measures of success listed above have been achieved, and whether maintenance operations or remedial actions are required.
- 7.11.11 After the 5-year establishment period, monitoring visits every five years would be undertaken in the summer to ensure that the measures of success are being met and maintained. If necessary, the findings of the monitoring may result in corrective actions or the prescriptions for the management or measures of success may need to be modified. Any modifications to the requirements, would be agreed with consultation with the steering group.
- 7.11.12 Highways England's appointed monitoring party will carry out the monitoring visits and feed back to the steering group as part of the monitoring report.

7.12 LE2.8 Scrub

Overarching Aims

- 7.12.1 Scrub planting is used throughout the Project to replace vegetation loss, provide visual screening and to provide wildlife and landscape connectivity where appropriate.

Description

- 7.12.2 Native scrub planting, comprising low growing native scrub mixes, understorey scrub and wetland scrub. Scrub provides excellent habitat, seasonal interest and is the main component of woodland edge and woodland understorey.
- 7.12.3 Scrub planting is proposed as an integral component of the landscape mitigation design as scrub can provide vegetated links between areas of woodland where constraints such as overhead and/or underground utilities constrain larger tree planting.
- 7.12.4 Scrub planting can provide visual and habitat links, and also provide visual screening in constrained areas where it is not possible to achieve a woodland block.
- 7.12.5 The specific methodology for scrub planting will be developed during detailed design. Species mixes for scrub planting are to be appropriate to the location or as exist already on site.
- 7.12.6 A list of potential species mix for areas of scrub planting is shown in the Appendix to the Design Principles.

Outline Requirements

- 7.12.7 The following outline requirements apply to all areas of scrub planting:
- Scrub species to be managed to grow to their natural shape and height (where practicable) to increase habitat potential and visual interest from flower, fruit, and autumn colour.
 - Some coppicing of species such as dogwood, hazel and willow will add to these requirements. Coppicing to be undertaken in a rotational programme every ten years for scrub adjacent grasslands and every 15 years for inner areas of scrub. This will allow species such as hazel to become mature enough to provide fruit for species like dormice.
 - To provide structure in the landscape.
 - Where established in proximity to underground and overhead utilities, scrub to be managed to retain safety distances and heights as agreed with the relevant statutory stakeholder.
 - To provide suitable shelter, foraging, nesting and commuting habitat for a range of species including dormice, amphibians and reptiles, birds and small mammals.
- 7.12.8 This will be agreed between Highways England and the identified management agent.

Outline Prescriptions

- 7.12.9 The exact details of the management activities to be undertaken will be developed between all relevant parties during the development of the LEMP
- 7.12.10 Table 7.12 below describes the programme of work for establishment and initial maintenance (first five years), and then goes on to explain the outline long-term management.

Table 7.12 Outline Establishment regime

Action			Years 0-5				
Task	Responsibility	Season	1	2	3	4	5
Attendance of quarterly site inspections with the Project Landscape Architect	Specialist contractor appointed by Highways England	Quarterly	Y	Y	Y	Y	Y
Provide irrigation during the establishment period (year 1) and growing season (April-September) as required. As required during Years 2 – 5.	Specialist contractor appointed by Highways England	As required	Y	Y	Y	Y	Y
Prune weak plants in Year 1 and 2 to encourage new growth development.	Specialist contractor appointed by Highways England	Once yearly - Nov to Feb	Y	Y	N	N	N
General pruning. Prune dead, dying, crossing, rubbing and damaged branches and encourage new leader if necessary.	Specialist contractor appointed by Highways England	Once yearly - Nov to Feb	Y	Y	Y	Y	Y
Any dead or damaged plants should be replaced annually with matching species of the same size during the next planting season after failure. To be undertaken once yearly during Nov and Feb.	Specialist contractor appointed by Highways England	Once yearly - Nov to Feb	N	Y	Y	Y	Y
Scrub should be managed to provide areas of dense and less densely spaced plants. Long-term coppicing will be required after year 5, areas should be cut in rotation in a cyclical	Specialist contractor appointed by Highways England	5-7 year rotation from year 5 - Nov to Feb	N	N	N	N	Y

Action			Years 0-5				
Task	Responsibility	Season	1	2	3	4	5
programme every 5-7 years							
All guards should be checked and adjusted, repaired or replaced as necessary twice yearly in October and March.	Specialist contractor appointed by Highways England	Twice yearly - October and March	Y	Y	Y	Y	Y
All litter/foreign debris should be removed from planted areas and taken off site	Specialist contractor appointed by Highways England	As required	Y	Y	Y	Y	Y
Hand weed control to be undertaken three times during the year (Spring, Summer and Winter)	Specialist contractor appointed by Highways England	April, August and January	Y	Y	Y	Y	Y
Selective spot treatment of herbicide as required for larger pernicious weeds	Specialist contractor appointed by Highways England	Twice yearly - May and September	Y	Y	Y	Y	Y
Maintain mulch where required by topping up twice a year (Spring and Autumn), 500mm either side of tree.	Specialist contractor appointed by Highways England	Twice yearly - May and September	Y	Y	Y	Y	Y

7.12.11 Following establishment, the following management prescriptions are proposed:

- a. Coppice scrub to encourage regrowth. Cut areas of scrub in a rotation, aiming to retain all ages. Leave berry bearing scrub cutting until after December so the resource remains available for birds and mammals. Coppicing to be undertaken in a rotational programme every ten years for scrub adjacent grasslands and every 15 years for inner areas of scrub. This will allow species such as hazel to become mature enough to provide fruit for species like dormice.

Outline Measure of Success

7.12.12 To ensure that the management requirements outlined previously are achieved, the following monitoring targets have been devised to measure the success of the management requirements:

- a. Years 1-2
 - i. 80% establishment of planting
- b. Year 5

- i. All plant failures to have been replaced and replanted, with a 95% success rate of new planting by the end of year 5.
- c. Long-term
 - i. Areas of scrub shall form or be clearly capable of forming groups of similar species, reflect local planting patterns, structure, and nature conservation value.
 - ii. Provide biodiverse scrub areas providing a continuous range of structure, shelter, and food sources (nectar, berries etc)
 - iii. Native ground flora shall have been allowed to develop.

Outline Monitoring frequency and methods

- 7.12.13 The aim of the suggested monitoring programme is to ascertain whether the outline measures of success listed above have been achieved, and whether maintenance operations or remedial actions are required.
- 7.12.14 After the 5-year establishment period, monitoring visits every five years would be undertaken in the summer to ensure that the measures of success are being met and maintained. If necessary, the findings of the monitoring may result in corrective actions or the prescriptions for the management or measures of success may need to be modified. Any modifications to the requirements, would be agreed with consultation with the steering group.
- 7.12.15 Highways England's appointed monitoring party will carry out the monitoring visits and feed back to the steering group as part of the monitoring report.

7.13 LE3.1 Amenity Tree and Shrub Planting - Orchard

Description

- 7.13.1 Comprising either specimen/feature trees and large shrubs or small groups, amenity trees and shrubs are planted primarily for the enjoyment of people, providing aesthetic qualities, seasonal interest and shade as well as creating habitat and contributing to biodiversity. The orchard's main function is to provide an edible fruit or nut harvest. These trees should be managed accordingly.
- 7.13.2 Orchards are proposed within 4.9 Gateway to Shorne Woods Country Park management area. Orchards have been proposed to recreate historic areas of orchard planting that have been removed in the same location.
- 7.13.3 Orchard planting replicates the former land use, and by designing sufficient spacing can be planted above proposed utilities works and provide a vegetated connection between Shorne Woods Country park and the woodland planting on and adjacent to the Thong Lane green bridge over Lower Thames Crossing.
- 7.13.4 Orchard planting can provide an additional community benefit and interest, replicating the historic character and linking areas of planting.

Outline Requirements

- a. To provide appropriate fruiting trees for community benefit and interest in the Gateway to Shorne Woods Country Park, as well as the biodiversity benefits to a range of pollinating insects, nesting birds, reptiles and small mammals.
- b. Canopies and tree cover to give visual impression of a connected wooded corridor as far as reasonably practicable. Orchard habitats would follow the priority habitat descriptions for traditional orchards⁵.
- c. Where established in proximity to underground and overhead utilities, to be managed to retain safety distances and heights as agreed with the statutory stakeholder.

Outline Prescriptions

- 7.13.5 The exact details of the management activities to be undertaken will be developed between all relevant parties during the development of the LEMP
- 7.13.6 Table 7.13 below describes the programme of work for establishment and initial maintenance (first five years), and then goes on to explain the outline long-term management.

⁵ [Traditional orchards \(UK BAP Priority Habitat description\) \(jncc.gov.uk\)](https://jncc.gov.uk/traditional-orchards)

Table 7.13 Outline Establishment regime

Action			Years 0-5				
Task	Responsibility	Season	1	2	3	4	5
Attendance of quarterly site inspections with the Project Landscape Architect	Specialist contractor appointed by Highways England	Quarterly	Y	Y	Y	Y	Y
Provide irrigation during the establishment period (year 1) and growing season (April-September) as required. As required during Years 2 – 5.	Specialist contractor appointed by Highways England	As required	Y	Y	Y	Y	Y
Adjust any guy fixings, stakes and ties at the start and end of growing season or at any other time as necessary to avoid chafing and maintain firm support	Specialist contractor appointed by Highways England	Twice yearly - April and November	Y	Y	Y	Y	Y
Prune weak plants in Year 1 and 2 to encourage new growth development.	Specialist contractor appointed by Highways England	Once yearly - Nov to Feb	Y	Y	N	N	N
General pruning. Prune dead, dying, crossing, rubbing and damaged branches and encourage new leader if necessary. For fruit trees prune to encourage production of fruit to normal good horticultural standards	Specialist contractor appointed by Highways England	Once yearly - Nov to Feb	Y	Y	Y	Y	Y
Any dead or damaged plants should be replaced annually with matching species of the same size during the next planting season after failure. To be undertaken once yearly during Nov and Feb.	Specialist contractor appointed by Highways England	Once yearly - Nov to Feb	N	Y	Y	Y	Y

Action			Years 0-5				
Task	Responsibility	Season	1	2	3	4	5
All litter/foreign debris should be removed from planted areas and taken off site	Specialist contractor appointed by Highways England	As required	Y	Y	Y	Y	Y
Hand weed control to be undertaken three times during the year (Spring, Summer and Winter)	Specialist contractor appointed by Highways England	April, August and January	Y	Y	Y	Y	Y
Selective spot treatment of herbicide as required for larger pernicious weeds	Specialist contractor appointed by Highways England	Twice yearly - May and September	Y	Y	Y	Y	Y
Maintain mulch where required by topping up twice a year (Spring and Autumn), 500mm either side of tree.	Specialist contractor appointed by Highways England	Twice yearly - May and September	Y	Y	Y	Y	Y

7.13.7 Following establishment, the long-term maintenance to be as set out in Natural England Technical Information Note (TIN012) Traditional Orchard.⁶

Outline Measure of Success

7.13.8 To ensure that the management requirements outlined previously are achieved, the following monitoring targets have been devised to measure the success of the management requirements:

- a. Years 1-2
 - i. 80% establishment of planting
- b. Year 5
 - i. All plant failures to have been replaced and replanted, with a 95% success rate of new planting by the end of year 5.
- c. Long-term
 - i. Fruit/nut production
 - ii. Invasive weeds kept to less than 10% of ground cover.
 - iii. The area shall contain no more than 10% scrub cover.

⁶ <http://publications.naturalengland.org.uk/publication/19007>

Outline Monitoring frequency and methods

- 7.13.9 The aim of the suggested monitoring programme is to ascertain whether the outline measures of success listed above have been achieved, and whether maintenance operations or remedial actions are required.
- 7.13.10 After the 5-year establishment period, monitoring visits every five years would be undertaken in the summer to ensure that the measures of success are being met and maintained. If necessary, the findings of the monitoring may result in corrective actions or the prescriptions for the management or measures of success may need to be modified. Any modifications to the requirements, would be agreed with consultation with the steering group.
- 7.13.11 Highways England's appointed monitoring party will carry out the monitoring visits and feed back to the steering group as part of the monitoring report.

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7.14 LE4.3 Native species hedge (Untrimmed)

Overarching Aims

- 7.14.1 Native species hedges (untrimmed) provide wildlife corridors and habitat connectivity throughout the Project and integrate the Project Route into the adjacent landscape.

Description

- 7.14.2 Native species rich hedgerows are comprised of native scrub species providing containment, significant wildlife habitat and an ecological corridor. No annual hedge trimming required; hedge left to develop naturally.
- 7.14.3 These hedgerows are proposed as an integral component of the landscape mitigation design, linking habitat areas, and providing natural boundaries to the Project.
- 7.14.4 Hedge species are to be appropriate to the location or as exist already on site.
- 7.14.5 A list of potential native species hedge planting is shown in the Appendix to the Design Principles.

Outline Requirements

- 7.14.6 The following outline requirements are for all areas of native species rich hedgerow.
- a. To integrate the highway with the character of the existing landscape by retaining, enhancing the existing field patterns, or restoring historic patterns.
 - b. Species diverse hedgerow planting to form part of a matrix of biodiverse habitats aiding wildlife movement through areas of intensive arable land.
 - c. Neatly trimmed hedgerows have less value in this respect and free growing hedges should be managed.
 - d. Hedgerow planting to comprise a diverse mix of native species, with a proportion of fruiting species such as hazel (*Corylus avellana*), hawthorn (*Crataegus monogyna*), blackthorn (*Prunus spinosa*), and wayfaring tree (*Viburnum lantana*), as well as other plants such as bramble (*Rubus fruticosus*) and honeysuckle (*Lonicera periclymenum*), to provide foraging opportunities for animals such as birds and dormice.
 - e. Hedgerow planting, where appropriate and in keeping with local character, to be established at the toe of earthworks or beyond to soften the earthworks and integrate into the surrounding landscape.
 - f. Hedgerow planting to be combined with fencing along the highways boundary to integrate fencing into the landscape.
 - g. To create visual interest and seasonal variety

- h. To provide strong green corridors which provide shelter, nesting, foraging and commuting opportunities for a range of species, notably dormice and bats moving between woodland blocks. Hedgerow habitats would follow the priority habitat descriptions for hedgerows⁷.

7.14.7 This will be agreed between Highways England and the identified management agent.

Outline Prescription

7.14.8 The exact details of the management activities to be undertaken will be developed between all relevant parties during the development of the LEMP

7.14.9 Table 7.14 below describes the programme of work for establishment and initial maintenance (first five years), and then goes on to explain the outline long-term management.

Table 7.14 Outline Establishment regime

Action			Years 0-5				
Task	Responsibility	Season	1	2	3	4	5
Attendance of quarterly site inspections with the Project Landscape Architect	Specialist contractor appointed by Highways England	Quarterly	Y	Y	Y	Y	Y
Provide irrigation during the establishment period (year 1) and growing season (April-September) as required. As required during Years 2 – 5.	Specialist contractor appointed by Highways England	As required	Y	Y	Y	Y	Y
Formative pruning in Years 1 - 3. Prune immediately after planting in autumn to 150mm above ground level. If planted late in season leave to grow on for a year before cutting back to 150mm the again following winter. In the 2nd winter cut back previous seasons growth by about one half. In the third winter trim laterals and leaders to create an even shape. Do not prune in frosty weather. Once established (after Year 3) no	Specialist contractor appointed by Highways England	Once yearly - Nov to Feb	Y	Y	Y	N	N

⁷ [Hedgerows \(UK BAP Priority Habitat description\) \(jncc.gov.uk\)](https://jncc.gov.uk)

Action			Years 0-5				
Task	Responsibility	Season	1	2	3	4	5
trimming/pruning of hedge will be required							
Any dead or damaged trees should be replaced annually with matching species of the same size during the next planting season after failure. To be undertaken once yearly during Nov and Feb.	Specialist contractor appointed by Highways England	Once yearly - Nov to Feb	N	Y	Y	Y	Y
All guards should be checked and adjusted, repaired or replaced as necessary twice yearly in October and March.	Specialist contractor appointed by Highways England	Twice yearly - October and March	Y	Y	Y	Y	Y
All litter/foreign debris should be removed from planted areas and taken off site	Specialist contractor appointed by Highways England	As required	Y	Y	Y	Y	Y
Hand weed control to be undertaken three times during the year (Spring, Summer and Winter)	Specialist contractor appointed by Highways England	April, August and January	Y	Y	Y	Y	Y
Selective spot treatment of herbicide as required for larger pernicious weeds	Specialist contractor appointed by Highways England	Twice yearly - May and September	Y	Y	Y	Y	Y
Maintain mulch where required by topping up twice a year (Spring and Autumn), 500mm either side of hedge.	Specialist contractor appointed by Highways England	Twice yearly - May and September	Y	Y	Y	Y	Y

7.14.10 Following establishment, the following management prescriptions are proposed:

- a. Trim to required height and width with a mechanical flail, every 3 years between October to February on a rotational basis so that some hedges always have at least three years growth. Approximately one third of hedgerows would be left uncut for up to 10 years where this did not compromise road safety. Hedgerow height should be between 3m and 4m.

Outline Measure of Success

7.14.11 To ensure that the management requirements outlined previously are achieved, the following monitoring targets have been devised to measure the success of the management requirements:

- a. The native hedge shall form a continuous structure and shall be

- b. Form a biodiverse habitat providing shelter and food sources (nectar, berries etc)
- c. Invasive weeds and undesirable species are removed.
- d. Native ground flora shall have been allowed to develop.

Outline Monitoring frequency and methods

- 7.14.12 The aim of the suggested monitoring programme is to ascertain whether the outline measures of success listed above have been achieved, and whether maintenance operations or remedial actions are required.
- 7.14.13 After the 5-year establishment period, monitoring visits every five years would be undertaken to ensure that the measures of success are being met and maintained, with the habitat developing into the target priority habitat. If necessary, the findings of the monitoring may result in corrective actions or the prescriptions for the management or measures of success may need to be modified. Any modifications to the requirements, would be agreed with consultation with the steering group.
- 7.14.14 Highways England's appointed monitoring party will carry out the monitoring visits and feed back to the steering group as part of the monitoring report.

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7.15 LE4.4 Native hedgerow with Trees

Description

- 7.15.1 Native species rich hedgerows comprised of native scrub species providing containment, significant wildlife habitat and an ecological corridor. Hedge interspersed with standard trees which are allowed to grow on to maturity.

Outline Requirements

- 7.15.2 The following outline requirements are for all areas of native species rich hedgerow with trees.
- a. To integrate the highway with the character of the existing landscape by retaining, enhancing the existing field patterns or restoring historic patterns.
 - b. Species diverse hedgerow planting to form part of a matrix of biodiverse habitats aiding wildlife movement through areas of intensive arable land.
 - c. Neatly trimmed hedgerows have less value in this respect and free growing hedges should be managed.
 - d. Hedgerow planting to comprise a diverse mix of native species, with a proportion of fruiting species such as hazel, hawthorn, blackthorn and wayfaring tree as well as other plants such as bramble and honeysuckle, to provide foraging opportunities for animals such as birds and dormice. Tree species which offer good foraging opportunities for dormice include oak (*Quercus robur*), and hornbeam (*Carpinus betulus*).
 - e. Hedgerow planting, where appropriate and in keeping with local character, to be established at the toe of earthworks or beyond to soften the earthworks and integrate into the surrounding landscape.
 - f. Hedgerow planting to be combined with fencing along the highways boundary to integrate fencing into the landscape.
 - g. To create visual interest and seasonal variety
 - h. To provide strong green corridors which provide shelter, nesting, foraging and commuting opportunities for a range of species, notably dormice and bats moving between woodland blocks. Hedgerow habitats would follow the priority habitat descriptions for hedgerows⁸.

Outline Prescriptions

- 7.15.3 The exact details of the management activities to be undertaken will be developed between all relevant parties during the development of the LEMP

⁸ [Hedgerows \(UK BAP Priority Habitat description\) \(jncc.gov.uk\)](https://jncc.gov.uk)

7.15.4 Table 7.15 below describes the programme of work for establishment and initial maintenance (first five years), and then goes on to explain the outline long-term management.

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Table 7.15 Outline Establishment regime

Action			Years 0-5				
Task	Responsibility	Season	1	2	3	4	5
Attendance of quarterly site inspections with the Project Landscape Architect	Specialist contractor appointed by Highways England	Quarterly	Y	Y	Y	Y	Y
Provide irrigation during the establishment period (year 1) and growing season (April-September) as required. As required during Years 2 – 5.	Specialist contractor appointed by Highways England	As required	Y	Y	Y	Y	Y
Adjust any guy fixings, stakes and ties at the start and end of growing season or at any other time as necessary to avoid chafing and maintain firm support	Specialist contractor appointed by Highways England	Twice yearly - April and November	Y	Y	Y	Y	Y
Formative pruning of hedge plants only, in Years 1 - 3. Prune immediately after planting in autumn to 150mm above ground level. If planted late in season leave to grow on for a year before cutting back to 150mm the again following winter. In the 2nd winter cut back previous seasons growth by about one half. In the third winter trim laterals and leaders to create an even shape. Do not prune in frosty weather	Specialist contractor appointed by Highways England	Once yearly - Nov to Feb	Y	Y	Y	N	N
General pruning for larger trees - do not prune as hedge. Prune dead, dying, crossing, rubbing and damaged branches and encourage new leader if necessary.	Specialist contractor appointed by Highways England	Once yearly - Nov to Feb	Y	Y	Y	Y	Y
Any dead or damaged plants should be replaced annually with	Specialist contractor appointed by Highways England	Once yearly - Nov to Feb	N	Y	Y	Y	Y

Action			Years 0-5				
Task	Responsibility	Season	1	2	3	4	5
matching species of the same size during the next planting season after failure. To be undertaken once yearly during Nov and Feb.							
All guards should be checked and adjusted, repaired or replaced as necessary twice yearly in October and March.	Specialist contractor appointed by Highways England	Twice yearly - October and March	Y	Y	Y	Y	Y
All litter/foreign debris should be removed from planted areas and taken off site	Specialist contractor appointed by Highways England	As required	Y	Y	Y	Y	Y
Hand weed control to be undertaken three times during the year (Spring, Summer and Winter)	Specialist contractor appointed by Highways England	April, August and January	Y	Y	Y	Y	Y
Selective spot treatment of herbicide as required for larger pernicious weeds	Specialist contractor appointed by Highways England	Twice yearly - May and September	Y	Y	Y	Y	Y
Maintain mulch where required by topping up twice a year (Spring and Autumn), 500mm either side of hedge.	Specialist contractor appointed by Highways England	Twice yearly - May and September	Y	Y	Y	Y	Y

- 7.15.5 Following establishment, the following management prescriptions are proposed:
- Maintain habitat integrity and removing of undesirable species.

Outline Measure of Success

- 7.15.6 To ensure that the management requirements outlined previously are achieved, the following monitoring targets have been devised to measure the success of the management requirements:
- The native hedge shall form a continuous structure and shall be fit for purpose.
 - Form a biodiverse habitat providing shelter and food sources (nectar, berries etc)
 - Invasive weeds and undesirable species are removed.
 - Native ground flora shall have been allowed to develop.
 - Intermittent individual plants shall have been allowed to reach maturity and not managed to as a hedge.

Outline Monitoring frequency and methods

- 7.15.7 The aim of the suggested monitoring programme is to ascertain whether the outline measures of success listed above have been achieved, and whether maintenance operations or remedial actions are required.
- 7.15.8 After the 5-year establishment period, monitoring visits every five years would be undertaken to ensure that the measures of success are being met and maintained, with the habitat developing into the target priority habitat. If necessary, the findings of the monitoring may result in corrective actions or the prescriptions for the management or measures of success may need to be modified. Any modifications to the requirements, would be agreed with consultation with the steering group.
- 7.15.9 Highways England's appointed monitoring party will carry out the monitoring visits and feed back to the steering group as part of the monitoring report.

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7.16 LE6.1 Water Bodies

Description

- 7.16.1 Wildlife ponds are proposed within the Project design, their primary function being to offset the loss of existing water bodies, and to provide links between retained habitat. They do not form part of the Project drainage design, and would be designed to maximise their biodiversity value, following good practice guidance such as English Nature (2001): ponds would have a range of depths; native species of submergent and marginal vegetation; an absence of fish.

Outline Requirements

- 7.16.2 The following outline requirements are for all water bodies.
- To integrate the water bodies into the surrounding landscape by ensuring pond shape reflects local field and vegetation patterns.
 - To plant the edge of water bodies with marginal and emergent planting.
 - Water bodies to be managed to provide biodiversity and landscape amenity value. Habitats would follow the priority habitat descriptions for ponds⁹.

Outline Prescriptions

- 7.16.3 The exact details of the management activities to be undertaken will be developed between all relevant parties during the development of the LEMP
- 7.16.4 Table 7.16 below describes the programme of work for establishment and initial maintenance (first five years), and then goes on to explain the outline long-term management.

Table 7.16 Outline Establishment regime

Action			Years 0-5				
Task	Responsibility	Season	1	2	3	4	5
Attendance of annual site inspections with the Project Landscape Architect	Specialist contractor appointed by Highways England	Annual	Y	Y	Y	Y	Y
Removal from water bodies of floating litter, debris, fly tipping, surface weeds, contaminants and animal carcasses – weekly as part of general litter maintenance	Specialist contractor appointed by Highways England	As required	Y	Y	Y	Y	Y

⁹ [Ponds \(UK BAP Priority Habitat description\) \(jncc.gov.uk\)](https://jncc.gov.uk)

Action			Years 0-5				
Task	Responsibility	Season	1	2	3	4	5
Annual removal of excess vegetation and invasive weeds from edges/margins (non-reeds)	Specialist contractor appointed by Highways England	Summer	Y	Y	Y	Y	Y
Annual removal of excessive submergent and marginal vegetation in wildlife ponds. Macrophyte cover would be managed at around 70% of pond surface.	Specialist contractor appointed by Highways England	Summer	Y	Y	Y	Y	Y
Biennial management of surrounding woodland/scrub vegetation which may shade the wildlife pond. Southern aspect of pond edge to be kept free from shading plants.	Specialist contractor appointed by Highways England	Autumn/winter	-	Y	-	Y	-
Biennial survey for the presence of fish species. Control of fish should they be recorded as present.	Specialist contractor appointed by Highways England	Autumn	-	Y	-	Y	-
Annual jet washing of any markers/mooring piles and other water relates structures	Specialist contractor appointed by Highways England	Early Spring	Y	Y	Y	Y	Y
Additional checks after extreme weather events	Specialist contractor appointed by Highways England	As required	Y	Y	Y	Y	Y

Outline Measure of Success

7.16.5 To ensure that the management requirements outlined previously are achieved, the following monitoring targets have been devised to measure the success of the management requirements:

- a. To establish and maintain marginal/emergent planting areas.
- b. Years 1-2
 - i. Good macrophyte cover achieved. Approximately 70% coverage in wildlife ponds.
 - ii. No single species become dominant.
- c. Year 2-3

- i. Injurious weeds total no more than 20% of the area coverage.
- d. Long-term
- i. A diversity of species occurring with injurious weeds totally no more than 10% of the area coverage.
 - ii. The area shall contain no more than 10% scrub cover on banks of drainage ponds.
 - iii. Shading species (trees and shrubs/scrub) to be cleared around the southern edges of the wildlife ponds.
 - iv. Fish species absent from wildlife ponds.

Outline Monitoring frequency and methods

- 7.16.6 The aim of the suggested monitoring programme is to ascertain whether the outline measures of success listed above have been achieved, and whether maintenance operations or remedial actions are required.
- 7.16.7 After the 5-year establishment period, biennial monitoring visits would be undertaken to ensure that the measures of success are being met and maintained, with the habitat developing into the target priority habitat. If necessary, the findings of the monitoring may result in corrective actions or the prescriptions for the management or measures of success may need to be modified. Any modifications to the requirements, would be agreed with consultation with the steering group.
- 7.16.8 Highways England's appointed monitoring party will carry out the monitoring visits and feed back to the steering group as part of the monitoring report.

7.17 LE6.2 Banks and Ditches

Description

- 7.17.1 This typology covers the creation of new ditches to offset the loss of watercourses and water vole habitat as a result of the Project. Ditches would be designed to offer water vole foraging and burrowing opportunities with banks profiles at 45° angles above water level to provide burrowing sites, and a diverse range of native riparian vegetation to give foraging opportunities throughout the year. The design would follow good practice guidance such as Dean et al. (2016).

Outline Requirements

- 7.17.2 The following requirements are for all areas of banks and ditches.
- a. To profile ditches to provide burrow opportunities for water vole and areas for abundant and diverse riparian habitat to establish. This offers both foraging and shelter opportunities for water voles as well as a range of other wildlife including invertebrates, amphibians and reptiles, birds and small mammals.
 - b. To create strong green corridors which animals would use to commute through the landscape.
 - c. To include emergent rush, sedge and reed planting, together with wider margins of tall grasses and ruderals such as rosebay willowherb (*Chamerion angustifolium*), purple loosestrife (*Lythrum salicaria*), meadowsweet (*Filipendula ulmaria*). Brambles and nettles will also add to the cover and foraging opportunities.

Outline Prescriptions

- 7.17.3 The exact details of the management activities to be undertaken will be developed between all relevant parties during the development of the LEMP
- 7.17.4 Table 7.17 below describes the programme of work for establishment and initial maintenance (first five years), and then goes on to explain the outline long-term management.

Table 7.17 Outline Establishment regime

Action			Years 0-5 and 10					
Task	Responsibility	Season	1	2	3	4	5	10
Attendance of quarterly site inspections with the Project Landscape Architect	Specialist contractor appointed by Highways England	Quarterly	Y	Y	Y	Y	Y	Y
For water vole ditches, cutting bankside vegetation to a height approximately 100-150mm above ground level. Cut alternate banks in alternate years.	Specialist contractor appointed by Highways England	Mid-July to mid-September	-	-	Y	-	Y	Y
For water vole ditches, de-silt every three to five years working in an up-stream direction.	Specialist contractor appointed by Highways England	Autumn/winter	-	-	-	-	Y	Y
For water vole ditches, riparian vegetation cutting in a three to five years rotation.	Specialist contractor appointed by Highways England	August - September	-	-	-	-	Y	Y
Annual monitoring of the area for colonisation of water vole and the non-native American mink which presents significant predation pressure on water vole. Should signs of mink be recorded, control measures should be installed within newly created ditches and any tributaries they flow into.	Specialist contractor appointed by Highways England	February - April	Y	Y	Y	Y	Y	Y
All litter/foreign debris should be removed from ditches and taken off site	Specialist contractor appointed by Highways England	As required	Y	Y	Y	Y	Y	Y

Outline Measure of Success

7.17.5 To ensure that the management requirements outlined previously are achieved, the following monitoring targets have been devised to measure the success of the management requirements:

- a. Retain sufficient vegetation to provide sufficient cover and foraging opportunities and prevent scour and washout at times of water inundation.

- b. Maintain species diversity and structure where appropriate and prevention of scrubbing over or blocking of watercourse.
- c. The area shall contain no more than 10% scrub cover.
- d. Invasive/non-native weeds kept to less than 10% of ground cover.
- e. Control of the non-native American mink to remove resident family groups and record no more than transitory adults moving through the catchment.

Outline Monitoring frequency and methods

- 7.17.6 The aim of the suggested monitoring programme is to ascertain whether the outline measures of success listed above have been achieved, and whether maintenance operations or remedial actions are required.
- 7.17.7 After the 5-year establishment period, monitoring visits every three years would be undertaken to ensure that the measures of success are being met and maintained. If necessary, the findings of the monitoring may result in corrective actions or the prescriptions for the management or measures of success may need to be modified. Any modifications to the requirements, would be agreed with consultation with the steering group.
- 7.17.8 Highways England's appointed monitoring party will carry out the monitoring visits and feed back to the steering group as part of the monitoring report.

7.18 LE6.4 Marsh and Wet Grassland - Fen

Description

- 7.18.1 The marsh and wet grassland – fen typology is located within the Orsett Fen Management area and includes a mosaic of blocks of wet woodland, wet grassland, dry grassland, water bodies, ditches, reed and marginal planting.
- 7.18.2 Areas of meadow that are prone to prolonged periods of flooding. Plants consist of moisture loving and flood tolerant grass and wildflower species, mainly situated around the periphery of water bodies and in lower areas. To be specifically managed as fen.

Outline Requirements

- a. To manage the existing Orsett Fen area to recreate the wetland character of the former fenland.
- b. The restored fenland character shall create a visually interesting setting to the Mardyke viaduct and the associated embankments.
- c. To create the pattern and form of small native wet woodland blocks that are typical of poor draining and seasonally wet soils.
- d. Maintain key views through the Orsett Fen.
- e. Wet woodland to integrate and soften the appearance of the Mardyke embankments and abutments, vertical elements within a flat open landscape.
- f. Any proposed reedbeds to soften and green edges of water bodies, and to strengthen the structure of the wetland habitat.
- g. Create seasonal interest and variety in terms of trees, shrubs, marginal and grassland species.
- h. Create a diversity of habitat, species and structure reflecting the range of dry, seasonally wet, or permanently wet substrates.
- i. To create habitat appropriate for wetland species including invertebrates, birds, water vole, otter (*Lutra lutra*), amphibians and grass snake (*Natrix natrix*).

Outline Prescriptions

- 7.18.3 The exact details of the management activities to be undertaken will be developed between all relevant parties during the development of the LEMP
- 7.18.4 Table 7.18 below describes the programme of work for establishment and initial maintenance (first five years), and then goes on to explain the outline long-term management.

Table 7.18 Outline Establishment regime

Action			Years 0-5				
Task	Responsibility	Season	1	2	3	4	5
Attendance of quarterly site inspections with the Project Landscape Architect	Specialist contractor appointed by Highways England	Quarterly	Y	Y	Y	Y	Y
Removal from water bodies of floating litter, debris, fly tipping, surface weeds, contaminants and animal carcasses – weekly as part of general litter maintenance	Specialist contractor appointed by Highways England	As required	Y	Y	Y	Y	Y
Any dead or damaged plug plants should be replaced annually with matching species of the same size during the next planting season after failure. To be undertaken once yearly during Nov and Feb.	Specialist contractor appointed by Highways England	Once yearly - Nov to Feb	N	Y	Y	Y	Y
Injurious weeds are to be eradicated, removed and disposed of off-site, as per the latest Defra/Natural England guidance. Grass swards that do not contain wildflowers can be selectively sprayed. Hand weeding will be required in areas of wildflower	Specialist contractor appointed by Highways England	As required	Y	Y	Y	Y	Y
Annual removal of excess vegetation and invasive and non-native weeds from edges/margins	Specialist contractor appointed by Highways England	Summer	Y	Y	Y	Y	Y
Cutting back of vegetation on a rotational basis once yearly to prevent	Specialist contractor appointed by Highways England	Once yearly - Early Autumn	N	Y	Y	Y	Y

Action			Years 0-5				
Task	Responsibility	Season	1	2	3	4	5
scrub build up and maintain open fen typology							

Outline Measure of Success

- 7.18.5 To ensure that the management requirements outlined previously are achieved, the following monitoring targets have been devised to measure the success of the management requirements:
- The sward shall cover at least 80% of the area to be managed where necessary to ensure this typology fulfils the environmental function required.
 - The area shall contain no more than 10% scrub cover.
 - Wet grassland to support 12 or more species plants capable of thriving in wet conditions.
 - Target species numbers to be met by Year 3

Outline Monitoring frequency and methods

- 7.18.6 The aim of the suggested monitoring programme is to ascertain whether the outline measures of success listed above have been achieved, and whether maintenance operations or remedial actions are required.
- 7.18.7 After the 5-year establishment period, monitoring visits every five years would be undertaken to ensure that the measures of success are being met and maintained. If necessary, the findings of the monitoring may result in corrective actions or the prescriptions for the management or measures of success may need to be modified. Any modifications to the requirements, would be agreed with consultation with the steering group.
- 7.18.8 Highways England's appointed monitoring party will carry out the monitoring visits and feed back to the steering group as part of the monitoring report.

7.19 LE6.4 Marsh and Wet Grassland

Description

- 7.19.1 Areas of grassland planting containing moisture loving grass and wildflower species situated around the periphery of water bodies or in grassland areas prone to be seasonally inundated with water.

Outline Requirements

- a. To create a diverse grassland which would develop into NVC community MG8 and provide habitat appropriate for wetland species including invertebrates, birds, water vole, otter, amphibians and grass snake.
- b. To assist with water attenuation and water quality when adjacent or within attenuation basins.

Outline Prescriptions

- 7.19.2 The exact details of the management activities to be undertaken will be developed between all relevant parties during the development of the LEMP
- 7.19.3 Table 7.19 below describes the programme of work for establishment and initial maintenance (first five years), and then goes on to explain the outline long-term management.

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Table 7.19 Outline Establishment regime

Action			Years 0-5				
Task	Responsibility	Season	1	2	3	4	5
Attendance of quarterly site inspections with the Project Landscape Architect	Specialist contractor appointed by Highways England	Quarterly	Y	Y	Y	Y	Y
It is anticipated that a flush of annual weeds will be present in the soil within the first growing season, weed growth is to be controlled by topping or mowing monthly. All plant growth (sown grasses and weeds) is to be mown regularly to 40-60mm throughout the first growing season to prevent weeds smothering the slower-growing grasses. Removing cuttings if dense	Specialist contractor appointed by Highways England	Monthly during the growing season	Y	N	N	N	N
Planting to be managed according to the location – where visibility splay requirements are not required, planting is to be managed as a wet meadow, allowing the grasses to grow tall, flower and seed from May through to July/August. The wet meadow should be cut in late summer/early autumn in dry conditions and cuttings removed from site.	Specialist contractor appointed by Highways England	Late Autumn	N	Y	Y	Y	Y
Areas within 4m of ditches to be left uncut for 5 years (potentially cut every 3 years if required to avoid ditches)	Specialist contractor appointed by Highways England	Late Autumn	N	N	Y	N	Y

Action			Years 0-5				
Task	Responsibility	Season	1	2	3	4	5
becoming blocked with vegetation). This is in line with typology 7.17 above.							
Injurious weeds are to be eradicated, removed and disposed of off-site, as per the latest Defra/Natural England guidance. Grass swards that do not contain wildflowers can be selectively sprayed. Hand weeding will be required in areas of wildflower	Specialist contractor appointed by Highways England	As required	Y	Y	Y	Y	Y
In areas where seed has not taken, re-prepare ground and re-seed in autumn before ground becomes saturated	Specialist contractor appointed by Highways England	In autumn where required	Y	Y	Y	Y	Y
All litter/foreign debris should be removed from planted areas and taken off site	Specialist contractor appointed by Highways England	As required	Y	Y	Y	Y	Y

Outline Measure of Success

- 7.19.4 To ensure that the management requirements outlined previously are achieved, the following monitoring targets have been devised to measure the success of the management requirements:
- The sward shall cover at least 80% of the area to be managed where necessary to ensure this typology fulfils the environmental function required.
 - The area shall contain no more than 10% scrub cover.
 - Wet grassland to support at least 12 or more plant species per m², managed to prevent natural succession to scrub and woodland and retain the open grassland character.
 - Target species numbers to be met by Year 3.

Outline Monitoring frequency and methods

- 7.19.5 The aim of the suggested monitoring programme is to ascertain whether the outline measures of success listed above have been achieved, and whether maintenance operations or remedial actions are required.
- 7.19.6 After the 5-year establishment period, monitoring visits every five years would be undertaken in the summer to ensure that the measures of success are being met and maintained. If necessary, the findings of the monitoring may result in corrective actions or the prescriptions for the management or measures of success may need to be modified. Any modifications to the requirements, would be agreed with consultation with the steering group.
- 7.19.7 Highways England's appointed monitoring party will carry out the monitoring visits and feed back to the steering group as part of the monitoring report.

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7.20 LE7.2 Green Roofs

Description

- 7.20.1 Green roofs are areas on roofs of buildings with suitable and tolerant perennial low growing species. Green roofs will have a layer of suitable substrate and drainage systems.
- 7.20.2 Green roofs are proposed at both the North Portal and South Portal. Both roofs are designed to be extensive green roofs and require low maintenance.
- 7.20.3 The green roof at the South Portal shall reflect the surrounding chalk grassland character.
- 7.20.4 The green roof at the North Portal shall reflect the character of the surrounding marshland character.

Outline Requirements

- 7.20.5 The following outline requirements are for all green roofs.
- To provide a visually interesting, planted roof that is of low maintenance.
 - Species mix shall be reflective of the surrounding landscape and comprise of local species which provide food sources for both larval and adult stage invertebrates.
 - Green roof shall fulfil its purpose to provide sustainable drainage and insulation.
 - Green roof shall be designed and managed so that it flows seamlessly into the adjacent grassland.

Outline Prescriptions

- 7.20.6 The exact details of the management activities to be undertaken will be developed between all relevant parties during the development of the LEMP
- 7.20.7 Table 7.20 below describes the programme of work for establishment and initial maintenance (first five years), and then goes on to explain the outline long-term management.

Table 7.20 Outline Establishment regime

Action			Years 0-5				
Task	Responsibility	Season	1	2	3	4	5
Attendance of quarterly site inspections with the Project Landscape Architect - ensure safe access can be gained to the roof and that relevant Health and Safety procedures are	Specialist contractor appointed by Highways England	Quarterly	Y	Y	Y	Y	Y

Action			Years 0-5				
Task	Responsibility	Season	1	2	3	4	5
followed when working at roof level							
Water in dry periods as required. This is especially pertinent during the first 12 months.	Specialist contractor appointed by Highways England	As required	Y	Y	Y	Y	Y
All litter/foreign debris should be removed from roof as required	Specialist contractor appointed by Highways England	As required	Y	Y	Y	Y	Y
Any dead or damaged plants should be replaced annually with matching species of the same size during the next planting season after failure. To be undertaken once yearly during Nov and Feb. Advice should be sought from green roof system installer	Specialist contractor appointed by Highways England	Once yearly - Nov to Feb	N	Y	Y	Y	Y
Remove the lids of all inspection chambers, ensure drainage outlets remain clear from blockages and free from vegetation	Specialist contractor appointed by Highways England	Quarterly	Y	Y	Y	Y	Y
Injurious weeds are to be eradicated, removed and disposed of off-site, as per the latest Defra/Natural England guidance. Grass swards that do not contain wildflowers can be selectively sprayed. Hand weeding will be required in areas of wildflower	Specialist contractor appointed by Highways England	As required	Y	Y	Y	Y	Y
Annual removal of excess vegetation and invasive weeds (including any gravel margins)	Specialist contractor appointed by Highways England	Summer	Y	Y	Y	Y	Y

Outline Measure of Success

- 7.20.8 To ensure that the management requirements outlined previously are achieved, the following monitoring targets have been devised to measure the success of the management requirements:
- a. Retain sufficient vegetation to prevent scour and washout at times of water inundation.
 - b. Maintain species diversity and structure.
 - c. Target species numbers to be met by Year 3.
 - d. Creation of a diverse floral assemblage which supports a broad range of invertebrate species.
 - e. Invasive weeds kept to less than 10% of ground cover.

Outline Monitoring frequency and methods

- 7.20.9 The aim of the suggested monitoring programme is to ascertain whether the outline measures of success listed above have been achieved, and whether maintenance operations or remedial actions are required.
- 7.20.10 After the 5-year establishment period, monitoring visits every five years would be undertaken in the summer to ensure that the measures of success are being met and maintained. If necessary, the findings of the monitoring may result in corrective actions or the prescriptions for the management or measures of success may need to be modified. Any modifications to the requirements, would be agreed with consultation with the steering group.
- 7.20.11 Highways England's appointed monitoring party will carry out the monitoring visits and feed back to the steering group as part of the monitoring report.

7.21 E.2 Ancient Woodland Compensation

Overarching Aims

- 7.21.1 This typology builds on that for woodland (LE2.1 in Section 7.5), aiming to develop broad-leaved native species woodland which develops into the NVC communities of adjacent woodland blocks (predominantly W10 and W8).
- 7.21.2 Where practicable, to utilities as much of the existing soil resource as possible from existing ancient woodland areas directly affected by the Project. This would aid habitat development in terms of its speed and diversity.

Description of salvaging ancient woodland soil and material

- 7.21.3 Soil and material would, where practicable, be salvaged to retain soil microbes, fungal rhizomes, seed bank, and invertebrate fauna contained within. The operation would also include the salvage of coppice stools and deadwood from the areas affected by the Project.
- 7.21.4 Soil and other material would be salvaged from the affected ancient woodland areas and redistributed at receptor sites that would have been prepared in advance to offer similar ground conditions to that of the donor site, increasing the likelihood that the value of the material would be maintained and would establish at the donor site. This process would follow good practice guidance such as Anderson and Groutage (2003). Once this movement of materials was complete, woodland planting in line with the proposals detailed in Section 7.5 would be undertaken.

Outline Requirements

- 7.21.5 The following outline requirements are for all areas of ancient woodland compensation.
- a. To establish woodland that is closely aligned to the type of woodland that occurs in the vicinity of the new woodland creation areas. The NVC communities of these adjacent woodlands have been identified in Chapters 4, 5 and 6.

Outline Prescriptions

- 7.21.6 The exact details of the work activities will be developed between all parties during the development of the LEMP and subsequent work-specific method statements. A steering group would provide guidance on the detailed specification of ancient woodland soil and material salvage, including receptor site preparation.
- 7.21.7 This is a high-level description of the basic steps involved, and not a detailed methodology which will be developed during detailed design using best practice guidance.

- 7.21.8 Approach to ancient woodland soil translocation:
- a. Carry out pre-construction botanical surveys to produce a baseline for the donor areas and receptor site.
 - b. Carry out soil sampling tests and analysis the data for the detailed areas within receptor area to ensure best point to point matching with the donor sites.
 - c. Produce a detailed specification for ancient woodland soil translocation in consultation with the steering group – to include stringent soil protection measures and new tree planting plans. The specification and detailed method statements will be submitted to the steering group for comment prior to being finalised for use.
 - d. Prepare donor areas for soil removal (e.g. tree coppicing/felling/stump removal, debris removal) ensuring soil conditions are kept as favourable as possible (i.e. limiting disturbance and compaction from plant).
 - e. Prepare receptor area: install tree protection around any existing trees, remove any debris, strip existing topsoil and remove off site and limit compaction of exposed subsoil.
 - f. Translocate soil from donor areas to the receptor site (wherever possible native coppice stools will also be translocated).
 - g. Tree planting within receptor area: trees planted will be native species recorded in the donor areas and locally sourced.

Outline Measure of Success

- 7.21.9 To ensure that the management requirements outlined previously are achieved, the following monitoring targets have been devised to measure the success of the management requirements:
- a. Vegetation within ancient woodland compensation area to develop into the relevant NVC community from adjacent existing woodland; W8 and/or W10 depending on location.
 - b. Native ground flora shall have been allowed to develop through provision of a variable light environment including shaded areas beneath a closed canopy at year 25.

Outline Monitoring frequency and methods

- 7.21.10 The aim of the suggested monitoring programme is to ascertain whether the outline measures of success listed above have been achieved, and whether maintenance operations or remedial actions are required.

- 7.21.11 After the 5-year establishment period, long-term monitoring would be undertaken to assess the success of the woodland in terms of developing into the relevant target priority habitat. This would include fixed point or aerial photography to record overall habitat development within any given management area, as well as surveys following Common Standards Monitoring Guidance for Woodland Habitats (JNCC, 2004b). These would continue every five years with the detailed monitoring approach being refined over this period as part of the steering group discussions.
- 7.21.12 Highways England's appointed monitoring party will carry out the monitoring visits and feed back to the steering group as part of the monitoring report.

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7.22 E.2 Open Mosaic Habitat

Overarching requirements

- 7.22.1 To provide Open mosaic habitat that incorporates a structural diversity of bare, sandy flat areas and south-facing slopes and banks. Species-rich habitats of native grasses and wildflowers should transition into more dense scrub habitats where adjacent to dense scrub or woodland.

Description

- 7.22.2 Open mosaic habitat is proposed as essential component of the landscape mitigation design and will provide biodiversity and nature conservation value.
- 7.22.3 Open mosaic habitat is a dynamic habitat the value of which is generated through regular disturbance, avoiding habitat succession, and retaining structural diversity.
- 7.22.4 Various differing elements make up an open mosaic habitat, they are associated with brownfield or previously developed/disturbed land. Open mosaic consists of a variety of different habitats at different stages of transition.
- 7.22.5 Open mosaic habitat can include varied microtopography to incorporate south-facing banks which can be created using inert material such as pulverised fuel ash (PFA)/sands/gravels.
- 7.22.6 The proposed make-up of the open mosaic habitat is:
- Scrub: no greater than 10% coverage
 - Bare ground: approx. 10% coverage (small patches spread across site rather than single areas)
 - Rough grassland: approx. 30% coverage
 - Low nutrient, free draining grassland: 50% coverage (PFA to provide a minimum 10% overall area substrate and left to regenerate naturally)
 - Wildlife ponds and hibernacula and refuges to be created in line with good practice guidance (English Nature, 2001).

Outline Requirements

- 7.22.7 The following outline requirements are for all areas of open mosaic habitat.
- To provide replacement habitat for reptiles, amphibians, invertebrates, and other fauna.
 - To be a receptor site for translocated species including amphibians and reptiles.
 - To be managed to avoid natural succession and retaining the mosaic character of the habitat.

- d. To create grassland habitats that follow the priority habitat descriptions for open mosaic habitats¹⁰.

7.22.8 This will be agreed between Highways England and the identified management agent.

Outline Prescriptions

7.22.9 The exact details of the work activities will be developed between all parties during the development of the LEMP and subsequent work-specific method statements.

- a. To plant the open mosaic habitat areas to ensure the ratio of habitats as described above.
- b. For the first few years after initial planting, habitat maintenance will be minimal to allow areas to establish naturally.
- c. Botanical and protected species surveys will be carried out to ensure the habitat developed as anticipated and that there are healthy populations of species that have been translocated to these sites.
- d. Where issues arise, such as over dominance of a particular species or habitat, then appropriate reactive responses will be undertaken to ensure the diversity of the habitats.
- e. Habitats will be managed to ensure that the structure and diversity of habitats is retained. Open mosaic habitats are dynamic areas which respond well to regular disturbance. Management through a range of measures including mowing, flailing and grazing would be employed to control natural succession and create the disturbed conditions which this broad habitat benefits from.
- f. Planting of habitats will be with species that are found locally to tie in with the surrounding areas.

Measure of Success

7.22.10 To ensure that the management requirements outlined previously are achieved, the following monitoring targets have been devised to measure the success of the management requirements:

- a. Establishment of open mosaic habitat in accordance with the structural composition specified within the Design Principles.
- b. Establishment of floral species composition in line with planting palette set out within Design Principles.

¹⁰ [Open mosaic habitats on previously developed land \(UK BAP Priority Habitat description\) \(jncc.gov.uk\)](https://jncc.gov.uk)

- c. Colonisation by diverse invertebrate species assemblage typical of open mosaic habitat along the Greater Thames Estuary National Character Area
- d. Pond creation in line with design approach in Great Crested Newt Mitigation Guidelines (English Nature, 2001).

Outline Monitoring frequency and methods

- 7.22.11 The aim of the suggested monitoring programme is to ascertain whether the outline measures of success listed above have been achieved, and whether maintenance operations or remedial actions are required.
- 7.22.12 After the 5-year establishment period, long-term monitoring would be undertaken to assess the success of the grassland in terms of developing into the relevant target priority habitat. This would include fixed point or aerial photography to record overall habitat development within any given management area, as well as ground truth habitat and botanical surveys to assess species diversity within grassland swards. These would continue every five years with the detailed monitoring approach being refined over this period as part of the steering group discussions.
- 7.22.13 Highways England's appointed monitoring party will carry out the monitoring visits and feed back to the steering group as part of the monitoring report.

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7.23 E.2 Acid Grassland Soil Salvage

Description

- 7.23.1 Acid grassland soil salvage is proposed from Low Street Pit LWS which would be lost as a result of the Project's construction, to be moved to a receptor site on land close to Coalhouse Fort (Section 5.3). Acid grassland occurs on nutrient poor and free-draining soils of acidic pH. Characteristic floral species can support a diverse assemblage of invertebrate species.

Outline Requirements

- 7.23.2 The following outline requirements are for all areas of translocated acidic grassland.
- To maintain and promote structural and botanical diversity, and prevent the grassland scrubbing over.
- 7.23.3 This will be agreed between Highways England and the identified management agent.

Outline Prescriptions

- 7.23.4 The exact details of the work activities will be developed between all parties during the development of the LEMP. A steering group would provide guidance on the detailed specification of acid grassland translocation, including receptor site preparation. Methodologies would follow good practice guidance such as Anderson and Groutage (2003).
- The acid grassland would be managed to replicate the structure and diversity of that found at the donor site. This would lead to a sward which developed into NVC community U1.
 - The sward would cover at least 90% of the receptor site which no more than 10% cover of competitive or problem species.
 - To create grassland habitats the follow the priority habitat description for lowland dry acid grassland¹¹.

Outline Measure of Success

- 7.23.5 To ensure that the management requirements outlined previously are achieved, the following monitoring targets have been devised to measure the success of the management requirements:
- Unlike the species rich grassland typologies, acid grassland can, in contrast, be less species diverse (less than five species per 4m²), although can exceed 25 species per 4m². Given the donor grassland site supports the NVC U1 community, key species development at the receptor site will be the presence of sheep's fescue (*Festuca ovina*), common bent (*Agrostis capillaris*), and wavy hair-grass (*Deschampsia flexuosa*).
 - Scrub encroachment into the grassland habitat would be limited to no greater than 10% of the total area.

¹¹ [Lowland dry acid grassland \(UK BAP Priority Habitat description\) \(jncc.gov.uk\)](https://jncc.gov.uk/priority-habitats/lowland-dry-acid-grassland)

Outline Monitoring frequency and methods

- 7.23.6 The aim of the suggested monitoring programme is to ascertain whether the outline measures of success listed above have been achieved, and whether maintenance operations or remedial actions are required.
- 7.23.7 After the 5-year establishment period, long-term monitoring would be undertaken to assess the success of the grassland in terms of developing into the relevant target priority habitat. This would include surveys following Common Standards Monitoring Guidance for Lowland Grassland Habitats (JNCC, 2004a), and Natural England guidance on the creation of priority grassland habitat (Natural England, 2012). These would continue every five years with the detailed monitoring approach being refined over this period as part of the steering group discussions.
- 7.23.8 Highways England's appointed monitoring party will carry out the monitoring visits and feed back to the steering group as part of the monitoring report.

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Glossary

Term	Explanation
Alignment	The alignment is the horizontal and vertical route of a road, defined as a series of horizontal tangents and curves or vertical crest and sag curves, and the gradients connecting them.
AONB	Area of Outstanding Natural Beauty: Statutory designation intended to conserve and enhance the ecology, natural heritage and landscape value of an area of countryside.
DCO	Development Consent Order
DMRB	Design Manual for Roads and Bridges: A comprehensive manual which contains requirements, advice and other published documents relating to works on motorway and all-purpose trunk roads for which one of the Overseeing Organisations (Highways England, Transport Scotland, The Welsh Government or the Department for Regional Development (Northern Ireland)) is highway authority. The DMRB has been developed as a series of documents published by the Overseeing Organisations of England, Scotland, Wales and Northern Ireland. For the Lower Thames Crossing the Overseeing Organisation is Highways England.
Green bridge	Heavy Weight Green Bridge: incorporates tree planting and be wooded in character. Light Weight Green Bridge: includes hedgerows, scrub and grassland as minimum.
Ha	Hectares
Landscape element	Individual parts of the landscape include physical influences (geology, soils, landform, drainage, and water bodies); land cover (different types of vegetation, patterns, and types of tree cover); and human influences (land use and management, character of settlements of buildings, and pattern and type of fields and enclosure) (source of definition: GLVIA3).
Mardyke	A small river, mainly in Thurrock, that flows into the River Thames at Purfleet, close to the QEII Bridge.
NPS	National Policy Statement (see NPSNN)
NPSNN	National Policy Statement for National Networks: The NPSNN sets out the need for, and Government's policies to deliver, development of nationally significant infrastructure projects on the national road and rail networks in England. It provides planning guidance for promoters of nationally significant infrastructure projects on the road and rail networks, and the basis for the examination by the Examining Authority and decisions by the Secretary of State.
OMH	Open mosaic habitat
REAC	Register of Environmental Actions and Commitments

Term	Explanation
Prescription	An outline list of tasks and activities required to manage the proposed typology.
The Project	The Lower Thames Crossing project is a proposed tunnel, associated structures and connecting roads, which crosses the River Thames linking Essex, Thurrock and Kent.
PRoW	Public Right of Way: A right possessed by the public, to pass along routes over land at all times. Although the land may be owned by a private individual, the public may still gain access across that land along a specific route. The mode of transport allowed differs according to the type of public right of way which consist of footpaths, bridleways and open and restricted byways.
SEB(s)	Statutory Environmental Body(ies): Any principal council as defined in subsection (1) of section 270 of the Local Government Act 1982 for the area where the land is situated. Where the land is situated in England; Natural England, Historic England, the Environment Agency, Natural Resources Wales and the National Assembly for Wales where, in the opinion of the Secretary of State, the land is sufficiently near to Wales to be of interest to them and any other public authority which has environmental responsibilities and which the Secretary of State considers likely to have an interest in the Project.
Setting	This is defined in the National Planning Policy Framework as 'The surroundings in which a heritage asset is experienced. Its extent is not fixed and may change as the asset and its surroundings evolve. Elements of a setting may make a positive or negative contribution to the significance of the asset, may affect the ability to appreciate that significance or may be neutral.'
WCH	Walking, cycling and horse riding

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Lower Thames Crossing Framework Construction Travel Plan

DATE: June 2021

Version 0.2

Lower Thames Crossing

Framework Construction Travel Plan

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Covering Note

This document is a draft of one of a series of Control Documents that will form part of our planned DCO application. Following this consultation we will carefully consider your feedback as we finalise the documents for our planned submission of our DCO application for the Lower Thames Crossing later this year.

This Framework Construction Travel Plan (FCTP) sets out a framework to reduce the impact of the project's construction workforce on the road network as a result of travel to and from construction areas and compounds (including utility logistic hubs). This FCTP sets out proposed ways in which this would be done, including by reducing single occupancy vehicle trips and encouraging sustainable and active travel.

Before starting construction, contractors would develop Site Specific Travel Plans (SSTPs) in accordance with this FCTP for the sites they are responsible for, following the latest policy advice and best practice documents. This would apply to individual compounds, or several where they are closely located with similar levels of accessibility.

The following contains a draft copy of this document to provide an example of how mitigation and commitments would be secured within our DCO application when it is submitted.

This FCTP reflects the changes to the design described in this consultation. Updates will be made to this document to reflect feedback received from stakeholders ahead of submitting the document as part of our DCO application.

As this is a draft control document, there are references to the upcoming Development Consent Order (DCO). Any documents referenced that will form part of our DCO are mentioned with a (REF TBC).

1 Executive summary

- 1.1.1 The primary purpose of this Framework Construction Travel Plan (FCTP) is to set out a framework with regard to the implementation of travel planning for the movement of personnel to and from the construction areas and compounds during the construction phase of the Lower Thames Crossing (the Project).
- 1.1.2 The key aims of the FCTP are to minimise adverse local disruption or traffic impacts on the highway network from worker and visitor travel to and from construction areas and compounds by reducing the number of single-occupancy vehicle trips and encouraging the uptake of sustainable and active modes of travel. Potential changes in travel behaviours would also be explored to identify the most efficient ways of working, such as reducing the distance travelled and the need to travel.
- 1.1.3 These Project-wide aims and objectives are also set out in the Code of Construction Practice (CoCP), and are secured as commitments to be delivered by the Project through the DCO Schedule 2.
- 1.1.4 In line with this overarching FCTP, contractors would develop Site-Specific Travel Plans (SSTPs) in respect of the sites for which they are responsible (either an individual construction area or compound, or a number of construction areas and compounds where these are closely located with similar levels of accessibility), following the latest policy advice and best practice documents.
- 1.1.5 The SSTPs would be required to contribute to the development and refinement of Project-wide targets, measures and incentives, as outlined in this FCTP, as suitable for each of the specific construction areas and compounds. This would be required to be summarised in an action plan, which sets out a programme of regular scheduled activities and monitoring, with associated timescales and responsibilities, to be carried out as a minimum during the Project's construction period.
- 1.1.6 This FCTP and future SSTPs are designed to incorporate the flexibility needed to respond and adapt to changing conditions over the duration of the Project and will require a continuous monitoring and reviewing process. Regular employee travel surveys would be undertaken at each site, reviewing targets and indicators as necessary.
- 1.1.7 A Travel Plan Liaison Group (TPLG) would be established, with the collective responsibility of providing high level support to, and critical review of, travel planning across the Project. It would support efforts towards achieving greater use and increased uptake of sustainable travel, monitoring and reviewing progress, and agreeing new or amended initiatives. To ensure sufficient progress is being made, the effectiveness of the FCTP and SSTPs would be reviewed, audited and reported to Highways England by the Travel Plan Manager (TPM) within the first six months of construction (to be repeated every six months throughout the duration of construction thereafter).
- 1.1.8 Highways England would fund the preparation, implementation and operation of this FCTP, including the activities related to the implementation of this FCTP and the TPLG. The preparation of the SSTPs and the implementation and monitoring of SSTP measures would be a requirement of contractors' appointment and so would be funded by those contractors.

2 Introduction

2.1 Purpose of the document

- 2.1.1 This document is the Framework Construction Travel Plan (FCTP) for the Lower Thames Crossing (hereafter referred to as the Project).
- 2.1.2 The purpose of the FCTP is to set out a framework with regard to the implementation of travel planning for the movement of personnel to and from the construction areas and compounds during the construction phase of the Project. These construction areas and compounds are located to support distinct works such as the tunnel portals or areas such as compound CA 02 to the A2/M2 connection area. Compounds are sized based on forecast labour demand (office and site), catering and welfare and plant and material storage.
- 2.1.3 The key aim of the FCTP is to minimise adverse local disruption or traffic impacts on the highway network from worker and visitor travel to and from construction areas and compounds (including the construction compounds, and the site office in Ebbsfleet, also known as the enterprise office) by reducing the number of single-occupancy vehicle trips and encouraging the uptake of sustainable and active modes of travel. Potential changes in travel behaviours will also be explored to identify the most efficient ways of working, such as reducing the distance travelled and the need to travel, where possible.
- 2.1.4 The FCTP sets out guidance for developing Site-Specific Travel Plans (SSTPs) for each construction compound, or compounds where these are closely located with similar levels of accessibility. This includes the Utility Logistic Hubs (ULH) required for Statutory Undertakers (SU) to carry out the utility-specific works. The ULH would be established, in different locations and at different time periods to the main works compounds. The SSTPs will be developed by the contractors as set out in the Requirements and produced following the latest guidance and best practice. The SSTPs will be subject to review (and approval) by the Secretary of State (SoS), in consultation with relevant local planning authorities.
- 2.1.5 As set out in the Government guidance ‘Travel Plans, Transport Assessments and Statements’¹ (outlined in detail in Chapter 7) some of the main high-level benefits which Travel Plans can positively contribute towards, include the following:
- a. Encouraging sustainable travel
 - b. Lessening traffic generation and its detrimental impacts
 - c. Reducing carbon emissions and climate impacts
 - d. Creating accessible, connected, inclusive communities

¹ <https://www.gov.uk/guidance/travel-plans-transport-assessments-and-statements>

- e. Improving health outcomes and quality of life
- f. Improving road safety
- g. Reducing the need for new development to increase existing road capacity or provide new roads

2.1.6 These benefits provide the key focus of the FCTP and subsequent SSTPs and are captured in detail in Chapter 3.

2.2 The Project

2.2.1 The A122 Lower Thames Crossing (the Project) would provide a connection between the A2 and M2 in Kent, east of Gravesend, crossing under the River Thames through a tunnel, before joining the M25 south of junction 29. The Project route is presented in Plate 2.1.

2.2.2 The A122 road would be approximately 23km long, 4.25km of which would be in tunnel. On the south side of the River Thames, the Project route would link the tunnel to the A2 and M2. On the north side, it would link to the A13 and junction 29 of the M25. The tunnel entrances would be located to the east of the village of Chalk on the south of the River Thames and to the west of East Tilbury on the north side.

2.2.3 Junctions are proposed at the following locations:

- a. New junction with the A2 to the south-east of Gravesend
- b. Modified junction with the A13/A1089 in Thurrock
- c. New junction with the M25 between junctions 29 and 30

2.2.4 To align with NPSNN policy and to help the Project meet the Scheme Objectives, it is proposed that road user charges would be levied. Vehicles would be charged for using the new tunnel.

2.2.5 The Project route would be three lanes in both directions, except for:

- d. link roads
- e. stretches of the carriageway through junctions
- f. the southbound carriageway from the M25 to the junction with the A13/A1089, which would be two lanes

2.2.6 In common with other A-roads, the A122 would operate with no hard shoulder but would feature a 1m hard strip on either side of the carriageway. It would also feature technology including stopped vehicle and incident detection, lane control, variable speed limits and electronic signage and signalling. Our A122 road design outside of the tunnel includes emergency areas spaced at intervals between 800 metres and 1.6km (less than one mile). The tunnel would include a range of enhanced systems and response measures instead of emergency areas.

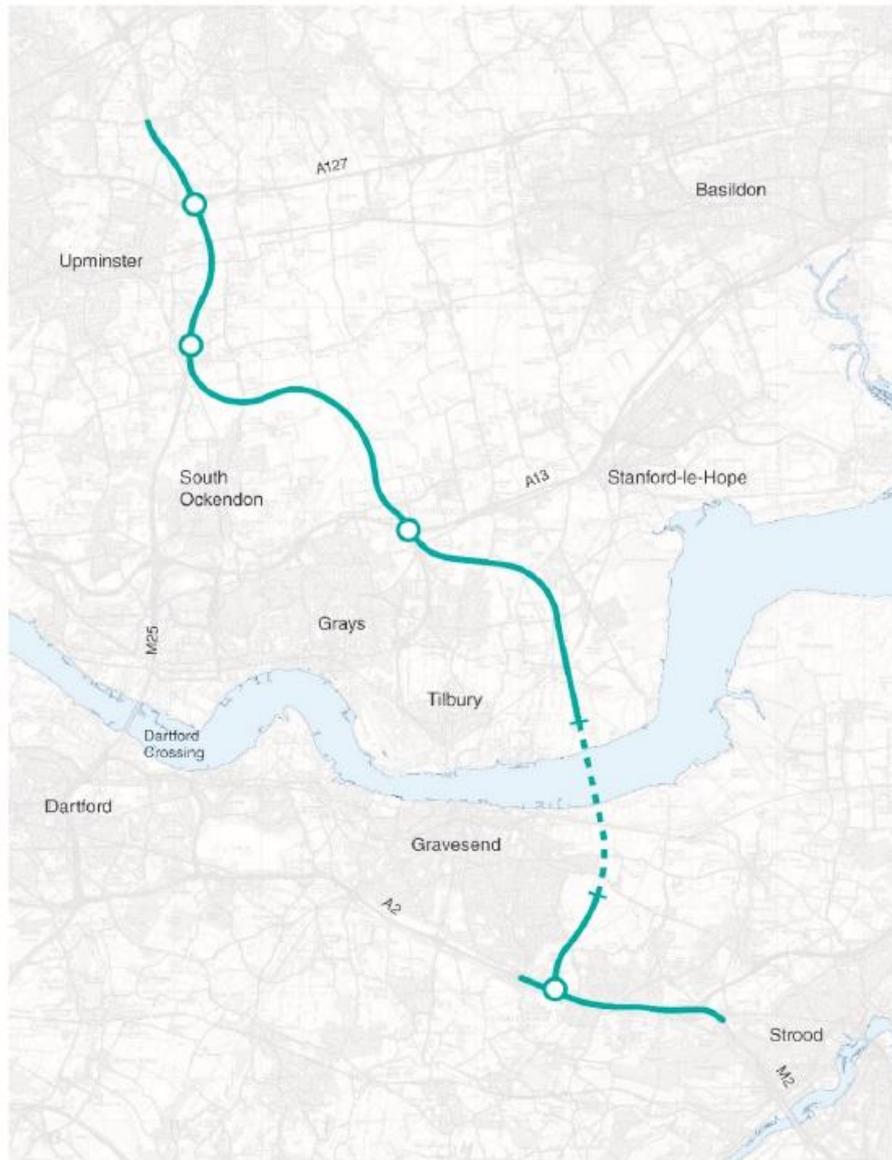
2.2.7 The A122 would be classified as an 'all-purpose trunk road' with green signs. For the benefit of safety, walkers, cyclists, horse-riders and slow-moving vehicles would be prohibited from using it.

2.2.8 The Project would include adjustment to a number of side roads. There would also be changes to a number of public rights of way, used by walkers, cyclists

and horse riders. Construction of the Project would also require the installation and diversion of a number of utilities, including gas pipelines, overhead power lines and underground electricity cables, as well as water supplies and telecommunications assets and associated infrastructure.

- 2.2.9 The Project has been developed to avoid or minimise significant effects on the environment. Some of the measures adopted include landscaping, noise mitigation, green bridges, floodplain compensation, new areas of ecological habitat and two new parks.

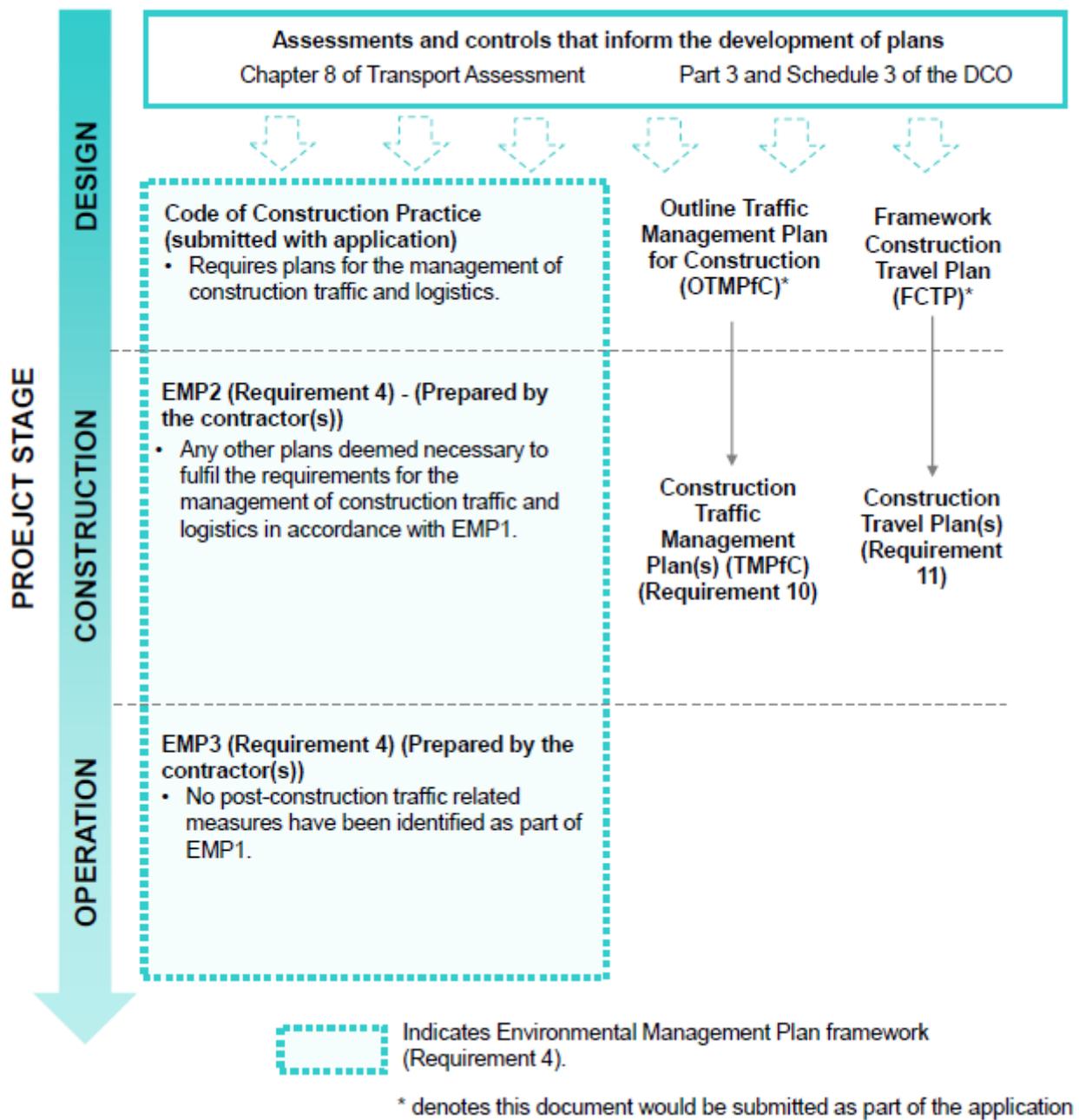
Plate 2.1 Lower Thames Crossing route



2.3 Approach to the document

- 2.3.1 This FCTP is a stand-alone document and compliance with the measures set out in this document are secured under Requirement 10 (Part 1 of the DCO Schedule 2). The document has been developed in coordination with a number of related Project documents, as illustrated in Plate 2.2.

Plate 2.2 Document map



2.3.2 This document has been produced in support of the commitments set out in the Code of Construction Practice (CoCP) which, together with the Register of Environmental Actions and Commitments (REAC), provides a framework for how the mitigation and management of environmental effects of the Project would be delivered and maintained. This is detailed further in Chapter 3.

2.3.3 As shown in the diagram above, the CoCP feeds into the EMP2 and EMP3 for construction and operational phases. The Environmental Management Plan (Second Iteration) (EMP2) must be substantially in accordance with this CoCP and must reflect the mitigation measures set out in the REAC. During the final phases of construction, the contractors would prepare an EMP3 in consultation with, and subject to agreement by, Highways England. The information contained within the EMP3 serves to inform the approach to environmental management during the Project’s operational phase to be implemented by

Highways England. The EMP3 would build on the EMP2 and would provide the relevant information on existing and future environmental commitments and objectives that will need to be honoured and ongoing actions and risks that will need to be managed.

- 2.3.4 This FCTP is also closely related to the outline Materials Handling Plan (oMHP), and the outline Traffic Management Plan for Construction (oTMPfC) (Requirement 10, Part 1 of the DCO Schedule 2).
- 2.3.5 The oMHP presents the outline strategy for handling construction materials required for the construction of the project, including the handling of excavated materials and the delivery of large and/ or frequent materials defined as bulk deliveries. It also includes the approach which the Project intends to reduce the impact of construction related movements, including HGVs on the road network. Contractors will be required to produce further MHPs before commencing works. These documents will be submitted to and approved by the SoS before the relevant part of the authorised development can commence.
- 2.3.6 The oTMPfC provides outline concepts and principles that will inform the temporary traffic management measures and transport logistics for the Project. Contractors will be required to produce Traffic Management Plans for construction before commencing works. These documents will be presented to Highways England and submitted to and approved by the SoS before the relevant part of the authorised development can commence.
- 2.3.7 This FCTP is also closely related to the Transport Assessment (REF TBC), in particular Chapter 8 which assesses the impacts of the Project on the performance of the highway and public transport network during the construction phase. This is detailed further in Chapter 5.
- 2.3.8 It is important to retain a coordinated approach to managing and mitigating the impacts of the Project during the construction phase. While the development of this FCTP provides a framework for improving travel opportunities to and from the Project construction areas and compounds and managing travel demands, it must remain consistent with the other related documents and control processes required to be implemented.
- 2.3.9 This FCTP falls within a dynamic process intended to adapt and develop with time as the travel patterns of the construction workforce change, and new initiatives are introduced. The FCTP sets out a framework and overarching principles for the future SSTPs. This would incorporate the flexibility required to respond and adapt to changing conditions over the duration of the Project, such as:
- a. Variation in the levels of construction activity over the duration of the construction programme in each location.
 - b. New or amended public transport provision in the vicinity of each site.
 - c. Transport network operation as a result of changing background levels of travel demand over time.
 - d. Initiatives employed through travel planning, drawing on experience of its implementation.

- e. Consideration of updates in policy or guidance – this FCTP has been prepared based on current established policy and guidance including that from the Department for Transport (DfT) and Transport for London (TfL), alongside local highway authority guidance, which are the most up-to-date documents available. This is detailed further in Chapter 7.

2.4 Ownership of the document

- 2.4.1 This FCTP is owned by Highways England who would retain overall responsibility for the implementation of the SSTPs approved under it, and for liaising with the appropriate local highway authorities and transport operators.
- 2.4.2 Operational responsibility for the development of measures specific to each site, and for day-to-day implementation of these measures, would be delegated to the appointed contractor at each site. Contractors would be required to work within the context of this FCTP and to monitor and report progress to Highways England.
- 2.4.3 This is set out in detail in Chapter 4 which includes details of the wider management organisation, roles and responsibilities applicable to this FCTP and the SSTPs.

2.5 FCTP structure

- 2.5.1 This FCTP comprises the following 12 chapters:
 - a. Chapter 1 – executive summary
 - b. Chapter 2 – introduces the purpose, and sets out the approach and ownership of the document
 - c. Chapter 3 – sets out the aims and objectives of the document
 - d. Chapter 4 – sets out details of the wider management organisation, and roles and responsibilities relevant to this document and the SSTPs
 - e. Chapter 5 – provides an overview of the Project's construction traffic details and arrangements
 - f. Chapter 6 – sets out the baseline traffic conditions on the road and public transport networks
 - g. Chapter 7 – summarises the overarching and local highway authority policy guidance related to travel planning which has informed the preparation of this document
 - h. Chapter 8 – details high-level targets for workforce travel
 - i. Chapter 9 – sets out the measures and incentives proposed for workforce travel
 - j. Chapter 10 – sets out the proposed implementation strategy and action plan

- k. Chapter 11 – sets out the proposed monitoring and review process, along with the steps to be taken to roll out any remedial measures required in the short term
- l. Chapter 12 – provides a summary

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3 Aims and objectives

3.1 Aims and objectives

3.1.1 The overarching aims and objectives of this FCTP are presented below.

3.1.2 These have also been set out in the CoCP within Section 6.3 (journey planning) and are secured as commitments to be delivered by the Project, through Requirement 4, Part 1 of the DCO Schedule 2.

Aims

3.1.3 The key aims of the FCTP are as follows:

- a. The Project is committed to, and will encourage, sustainable travel.
- b. SSTPs for the movement of personnel to and from the construction areas and compounds will be developed by the contractors following the latest guidance and best practice (see Chapter 7).
- c. SSTPs will be produced by the contractors for each compound, or compounds where these are closely located with similar levels of accessibility. The SSTPs will be subject to review (and approval) by the SoS, in consultation with relevant planning authorities.
- d. The intent of the SSTPs will be to identify, mitigate and appropriately manage negative travel impacts that may be generated by travel to and from construction sites.

Objectives

3.1.4 The SSTPs will adhere to the following principles to promote the use of sustainable transport:

- a. Walking and using sustainable forms of transport at sites shall be supported where travel can be completed in a safe, lit highway environment, with footways for pedestrians.
- b. Parking will be controlled at each compound to ensure demand does not exceed supply.
- c. Shuttle buses will operate from existing transport hubs on both sides of the River Thames. These hubs are currently envisaged at Gravesend (Bus, HS1, National Rail), Grays (Bus, National Rail) and Upminster (Bus, National Rail, London Underground, London Overground). Buses are likely to provide routes to each compound and inter-compound connectivity and will be for Project workforce only.

3.1.5 The mechanism for implementing these objectives is set out in paragraph 9.4.1.

Implementation strategy and action plan.

- 3.1.6 Each SSTP will contain the following information:
- a. An assessment of the existing accessibility of the compound
 - b. The sustainable transport principles, as encapsulated above
 - c. Targets for the Travel Plan, which will be SMART (specific, measurable, attainable, realistic and time-bound)
 - d. Measures, which are targeted to the location to enable the targets to be achieved
 - e. Details of the management of the Travel Plan, including the appointment of a Travel Plan Coordinator (TPC)
 - f. Details of a clear monitoring programme which will establish the effectiveness of the Travel Plan measures against the targets set
 - g. An action plan which provides a programme for the delivery of the measures, setting this out in a clear way

3.2 Intent of the framework

- 3.2.1 The information below sets out how this document aims to support meeting the aims and objectives detailed above.

Guidance for contractors

- 3.2.2 This document provides a single central framework to manage and guide the movement of construction workers to and from construction areas and compounds across the Project. Given that the project falls within a number of local authority areas (both highway and planning) and has a complex overlapping programme of construction at each site, the travel planning strategy would be underpinned by the SSTPs. This is to ensure that implementation, development of targets and the subsequent monitoring and management are appropriate to each site and its surroundings, whilst also retaining a project-wide overview.

Inclusion of commitments

- 3.2.3 Contractors would be required to develop SSTPs for the sites for which they are responsible, and to contribute to the development and refinement of Project-wide measures.
- 3.2.4 To support this process, guidance has been developed which will form part of the arrangements for appointed contractors. These will include the following obligations:
- a. A requirement to develop an SSTP within the framework of the FCTP and to implement an SSTP prior to the start of construction at that site

- b. To meet the minimum requirements for the content of the SSTPs in relation to the aims, objectives and measures to be employed as set out in this FCTP, and the need for an identified action plan
- c. A requirement to work with Highways England to monitor the effectiveness of the SSTPs, including undertaking regular travel surveys
- d. A requirement to ensure that subcontractors and suppliers comply with the SSTPs

3.2.5 The contractual requirements to produce SSTPs are supported by the content of this FCTP, including understanding the objectives of the Travel Plan, the responsibilities of the various parties and the range of potential measures that should be considered for inclusion in the action plan.

3.2.6 In addition, a template to aid the development of the SSTPs is provided in Appendix A.

Flexibility

3.2.7 This FCTP identifies a series of Travel Plan measures which may be relevant to one or more sites or could be applied on a Project-wide basis. These are discussed in further detail in Chapter 9

3.2.8 Issues which are specific to individual site locations would be captured in the SSTPs to ensure that local characteristics are fully and appropriately reflected.

3.2.9 It is important that the implementation of measures within this FCTP and associated SSTPs is responsive, flexible, and dynamic in order to respond to changes in the context within which they are delivered and assessed.

3.2.10 This means that the SSTPs would draw from a range of potential measures, identifying those which are appropriate for each location and are likely to be most effective. During the construction period, it may be appropriate to add, remove or amend measures in the SSTPs, following the high-level guidance set out in the FCTP, to respond to changing requirements and travel patterns.

3.2.11 Travel Plan measures which at this stage are considered to be suitable for the Project fall into the following broad categories:

- a. Travel awareness
- b. Walking and cycling
- c. Public transport
- d. Shared worker transport
- e. Single-occupancy car travel

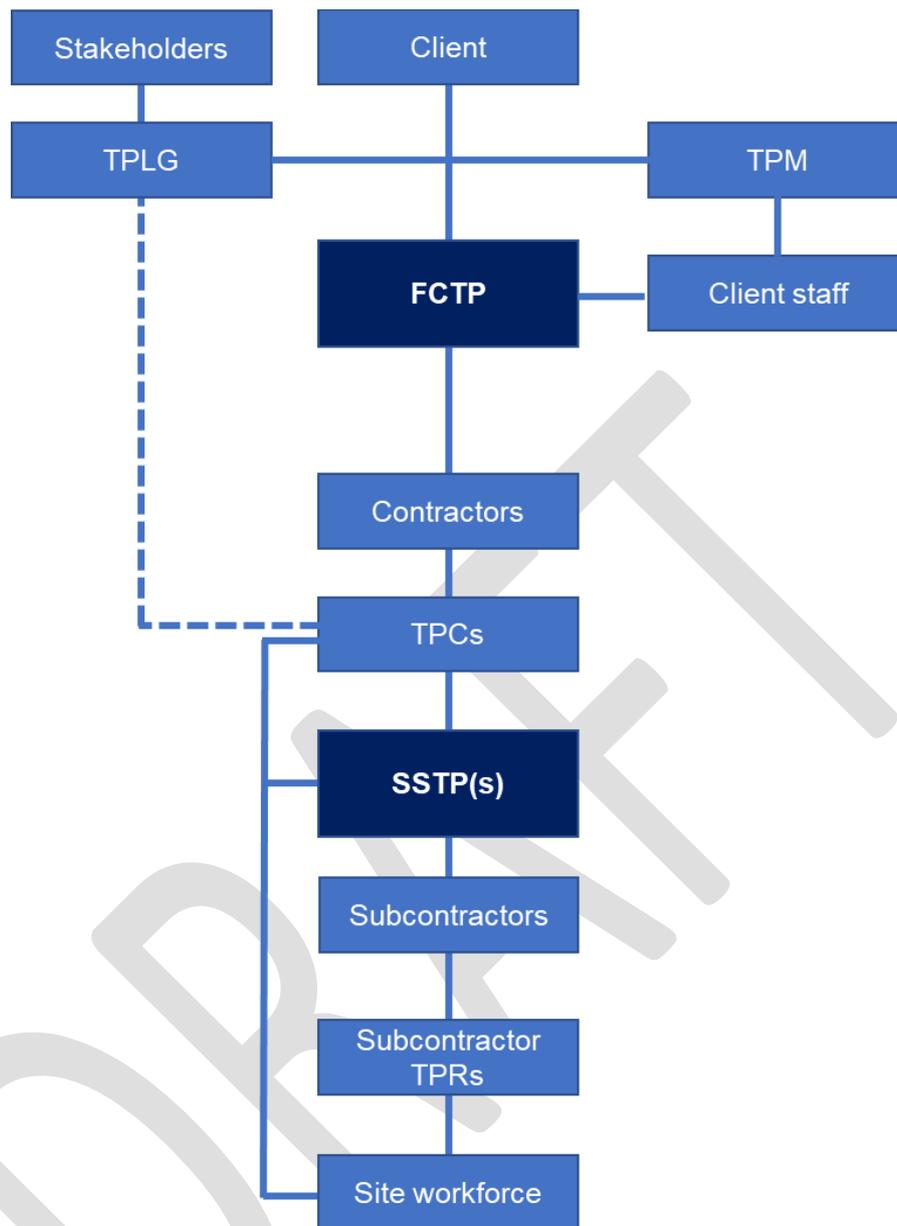
3.2.12 This highlights the importance of effective communication with and support from local planning and highway authorities throughout the process, ensuring local changes or updates have been taken into consideration, and that proposed measures and targets remain aligned with local policies.

4 Management and organisation

4.1 Introduction

- 4.1.1 This FCTP is owned by Highways England. The contractors would be required to commit to its principles as part of their appointment to the Project and would also be required to work in conjunction with Highways England to ensure that the SSTPs are implemented effectively and are reviewed on a regular basis.
- 4.1.2 In order to successfully achieve the objectives of this FCTP, a consistent and well-managed programme of action needs to be implemented. This would involve a number of key parties including Highways England, contractors working on the Project, subcontractors and suppliers, transport authorities and transport providers.
- 4.1.3 Plate 4.1 illustrates the management structure proposed for the implementation of the FCTP and SSTPs. The roles contained within this structure are explained below.
- 4.1.4 Highways England would manage the SSTPs through a TPM. Contractors and subcontractors would be required to identify nominated individuals within their organisations to manage Travel Plan activities for their sites.
- 4.1.5 A TPLG would be established, comprising stakeholder representatives such as public transport operators and local highway authorities, together with the TPM and Highways England representatives. The TPCs provided by the contractors would also be invited to attend the TPLG as necessary to discuss site-specific issues.

Plate 4.1 FCTP management structure



4.2 Highways England responsibilities

4.2.1 Highways England would appoint a TPM. The TPM would:

- ensure standards and best practice are applied across the project through coordination and information-sharing with the appointed contractors
- issue and explain the FCTP and the requirement to produce SSTPs, to each appointed contractor
- review and ensure the FCTP and SSTPs action plans are identified, appropriate and implemented
- support procurement and implementation of measures set out in the FCTP and SSTPs in conjunction with contractors

- e. assess, collate and report progress on the SSTPs' performance and determine amendments and further initiatives where required
- f. liaise and consult with the TPLG
- g. update the FCTP on a regular basis before and during the construction programme

4.2.2 As outlined in the CoCP, the construction works are expected to be split into three packages across the Project to enable appropriate management and phasing. Some of these packages will proceed concurrently with ongoing construction activities in either the same or different locations under the control of other contractors.

4.2.3 Highways England will therefore establish and chair a Joint Operations Forum (JOF), which will help coordinate the different activities undertaken by the contractors. It will help manage the interface between the different contractors efficiently, and maximise opportunities for reducing the overall impact on the surrounding communities and environment. The JOF will be attended by the contractors, which will meet regularly to discuss the internal interface between the contractors, as well as the potential interaction with other schemes and external stakeholders.

4.2.4 Furthermore, it will be required to coordinate several activities, one of which refers to monitoring the impact of the construction workforce on the community in its travel to and from work and its use of temporary accommodation. Other key tasks include the management of environmental effects, maintaining communication with the emergency response services, the coordination of construction phasing and logistics, traffic management and site access, alongside the coordination and communication between the contractors to deliver a consistent approach across the Project.

4.3 Contractor responsibilities

4.3.1 Each contractor would be required to appoint a TPC to develop and implement the relevant SSTPs. A contractor may choose to appoint a single TPC with responsibility for a number of construction areas and compounds. The appointed TPCs would be required to:

- a. develop an SSTP for each construction area or compound, or group of construction areas and compounds, in accordance with the contractual requirements and Travel Plan guidance set out in this FCTP, working with the TPM
- b. procure, implement, and actively promote Travel Plan measures in the SSTPs and support implementation of the FCTP
- c. act as a focal point on transport-related issues at the site/s being represented and ensure that contractors' staff comply with their responsibilities
- d. manage the monitoring, audit, and review of SSTPs

- e. liaise with other TPCs and representatives in order to share ideas, coordinate efforts and review progress
- f. ensure subcontractors and suppliers comply with their role and, where appropriate, appoint Travel Plan Representatives (TPRs)

4.4 Subcontractor and supplier responsibilities

- 4.4.1 Subcontractors and suppliers would be required to comply with the SSTP(s) that they work on and/or deliver to.
- 4.4.2 Depending on the amount of work that each subcontractor or supplier is contracted to do at each site, the TPC may require the appointment of a TPR.
- 4.4.3 The TPR will:
 - a. promote the SSTP(s) to their employees
 - b. act as a point of contact and liaison to the TPC
 - c. provide data as required to the TPC to aid with monitoring of the SSTP(s)

4.5 Worker responsibilities

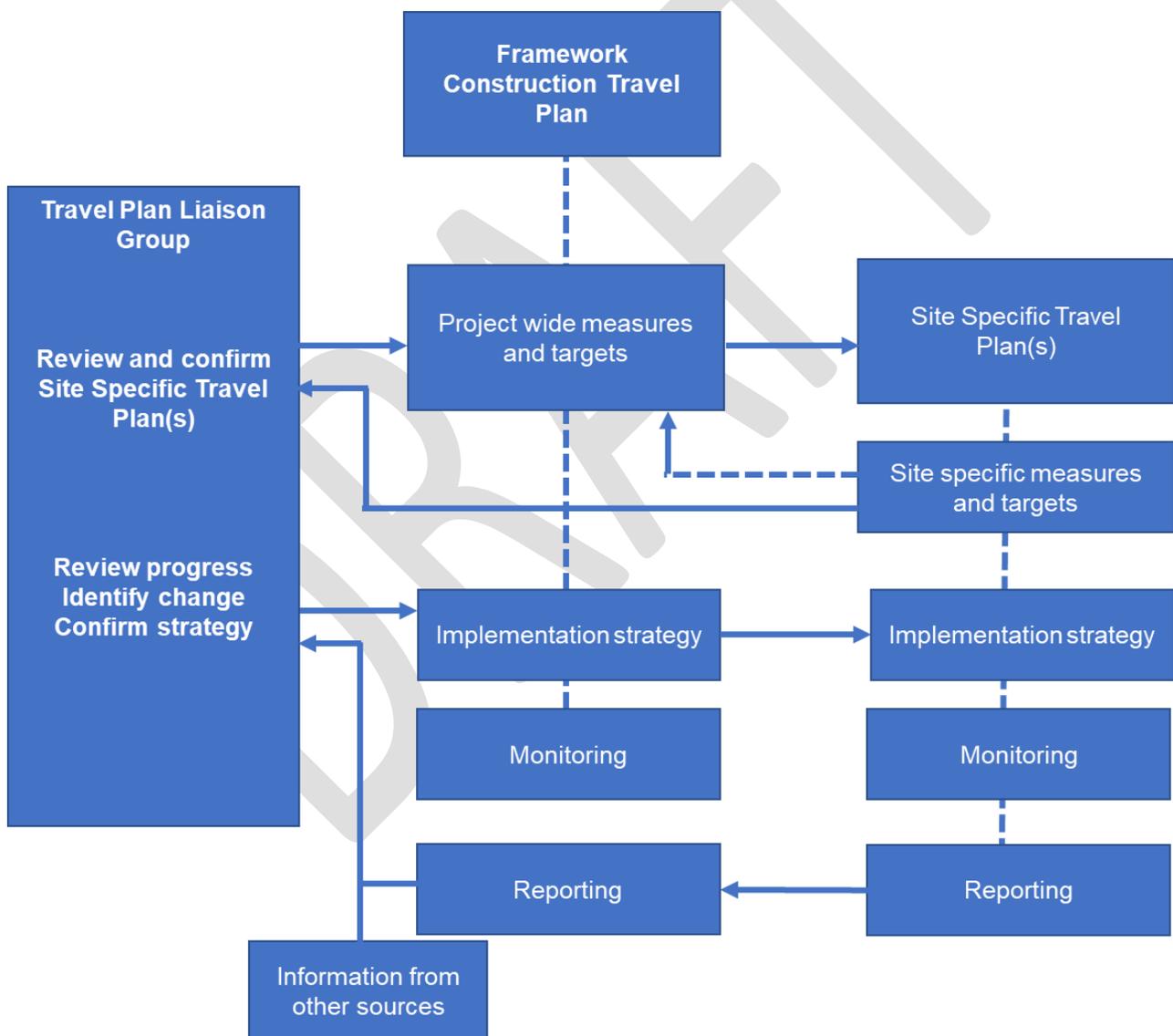
- 4.5.1 Each worker on the Project would be required to uphold and comply with the Travel Plan requirements and objectives. This would be implemented through an introductory session, with workers asked to agree and sign a commitment to their assigned responsibilities. Their responsibilities would be to:
 - a. consider all transport options available to them for travel to and from the site and ensure that adequate travel time is allowed for their journey
 - b. ensure they have all the necessary equipment to travel safely by their chosen mode of transport
 - c. report on the effectiveness of the SSTP applicable to them and raise concerns about any problems that become apparent
 - d. suggest ideas to their appointed representative on how to modify the plan to suit the workforce

4.6 Travel Plan Liaison Group

- 4.6.1 The TPM would be responsible for setting up and participating in the Travel Plan Liaison Group (TPLG), comprising stakeholder representatives (such as public transport operators, TfL, and local authorities) together with Highways England and the TPCs provided by the contractors. The TPLG would be constituted before the commencement of construction, with meetings held on a monthly basis.
- 4.6.2 The TPLG would be responsible for providing high-level support to, and critical review of, travel planning across the Project. It would support efforts towards achieving greater sustainable travel, monitoring, and reviewing progress and agreeing new or amended initiatives.

- 4.6.3 The TPM would be responsible for managing and coordinating the TPLG activities to promote partnership working. The TPM would prepare agendas, briefing papers, and minutes for TPLG meetings.
- 4.6.4 It would be for the TPLG to determine whether it is appropriate to set up sub-groups to deal with particular groups of sites with similar characteristics or particular interactions.
- 4.6.5 The role of the TPLG will ensure that Local Authorities and key stakeholders are consulted at the developmental stage prior to formal approval by the SoS.
- 4.6.6 Plate 4.2 details the consultative role of the TPLG and illustrates the SSTP process and how the success of the measures would feed into the FCTP targets.

Plate 4.2 The role of the TPLG



5 Project construction details and programme

5.1 Introduction

- 5.1.1 A summary of the Project's construction details and programme is outlined in this chapter, for both the main construction works and the utility works. The main construction works are related to construction elements associated with the permanent designed scheme (including earthworks, structures, roads, drainage etc). The utility works are works related to both the temporary utility works (eg temporary power to compounds) and the permanent utility works (eg diversion of assets, permanent power to the tunnels etc). There are many utility networks across the scheme which require temporary and/or permanent diversion to allow main construction works to proceed (eg power, gas, foul sewers, water, communications).
- 5.1.2 Further details are also provided in Chapter 2: Project Description of the Environmental Statement (REF TBC) which sets out a comprehensive overview of the construction activities, construction packages of work for delivery of the Project and the construction of the tunnel and approaches. It also provides a summary with regard to information on the construction compounds, haul routes, river transport for construction, working hours, waste and monitoring.
- 5.1.3 A more detailed description is also provided in Appendix 2.1: Construction Supporting Information (REF TBC) and presents a practical and achievable approach to the construction of the Project. It is still acknowledged however, that the methodology ultimately employed would be determined by the contractors, dependent on the detailed design and the construction methodology developed in accordance with the parameters and controls in the DCO.

5.2 Construction programme and phasing plan

- 5.2.1 The Project's construction programme is forecast to run from January 2024 through to December 2029. The construction of the Project would require the use of traffic management measures (such as narrow lanes and traffic signals to control traffic through contraflows) and so the phasing described in Table 5.1 has been based primarily on the different elements of traffic management scheduled across the Project's construction programme. The start and end date of each phase was set so that each phase represents the Project's proposed traffic management measures and their impact on the road network during that phase.
- 5.2.2 The proposed construction measures for the Project are outlined in further detail in the oTMPfc.
- 5.2.3 Table 5.1 sets out the location and programme dates associated with each of the 18 sites across the construction, operation and de-mobilisation phases of the programme.

Table 5.1 Main works construction programme and phasing

Compound	Borough	Start	End	Duration (months)
Marling Cross (CA1)	Gravesham	January 2024	April 2025	16
A2 (CA2)	Gravesham	January 2024	February 2029	66
Southern tunnel entrance (CA3)	Gravesham	January 2024	November 2028	63
A226 Gravesend Road (CA3a)	Gravesham	January 2024	December 2026	38
Milton (CA3b)	Gravesham	January 2024	December 2026	38
Northern tunnel entrance (CA5)	Thurrock	January 2024	January 2029	65
Station Road (CA5a)	Thurrock	July 2024	June 2027	38
Brentwood Road (CA6)	Thurrock	January 2024	May 2028	57
Stanford Road (CA7)	Thurrock	January 2024	December 2025	25
Long Lane A (CA8a)	Thurrock	February 2026	August 2027	20
Long Lane B (CA8b)	Thurrock	February 2026	August 2027	20
Stifford Clays Road West (CA9)	Thurrock	March 2026	March 2028	26
Stifford Clays Road East (CA10)	Thurrock	January 2024	February 2028	53
Mardyke (CA11)	Thurrock	April 2025	September 2027	32
Medebridge (CA13)	Thurrock	January 2024	November 2028	63
M25 (CA14)	Havering	January 2024	December 2028	64
Ockendon Road (CA15)	Havering	November 2024	January 2028	41
Warley Street (CA16)	Brentwood	May 2025	December 2027	34

5.3 Construction areas and compounds

5.3.1 The proposed locations of the construction areas and compounds are shown across four separate maps in Plate 5.1 to Plate 5.4. This includes the construction areas and compounds for both the main construction works and the utility works (known as Utility Logistic Hubs (ULH)).

Plate 5.1 Construction areas and compound sites (1 of 4)

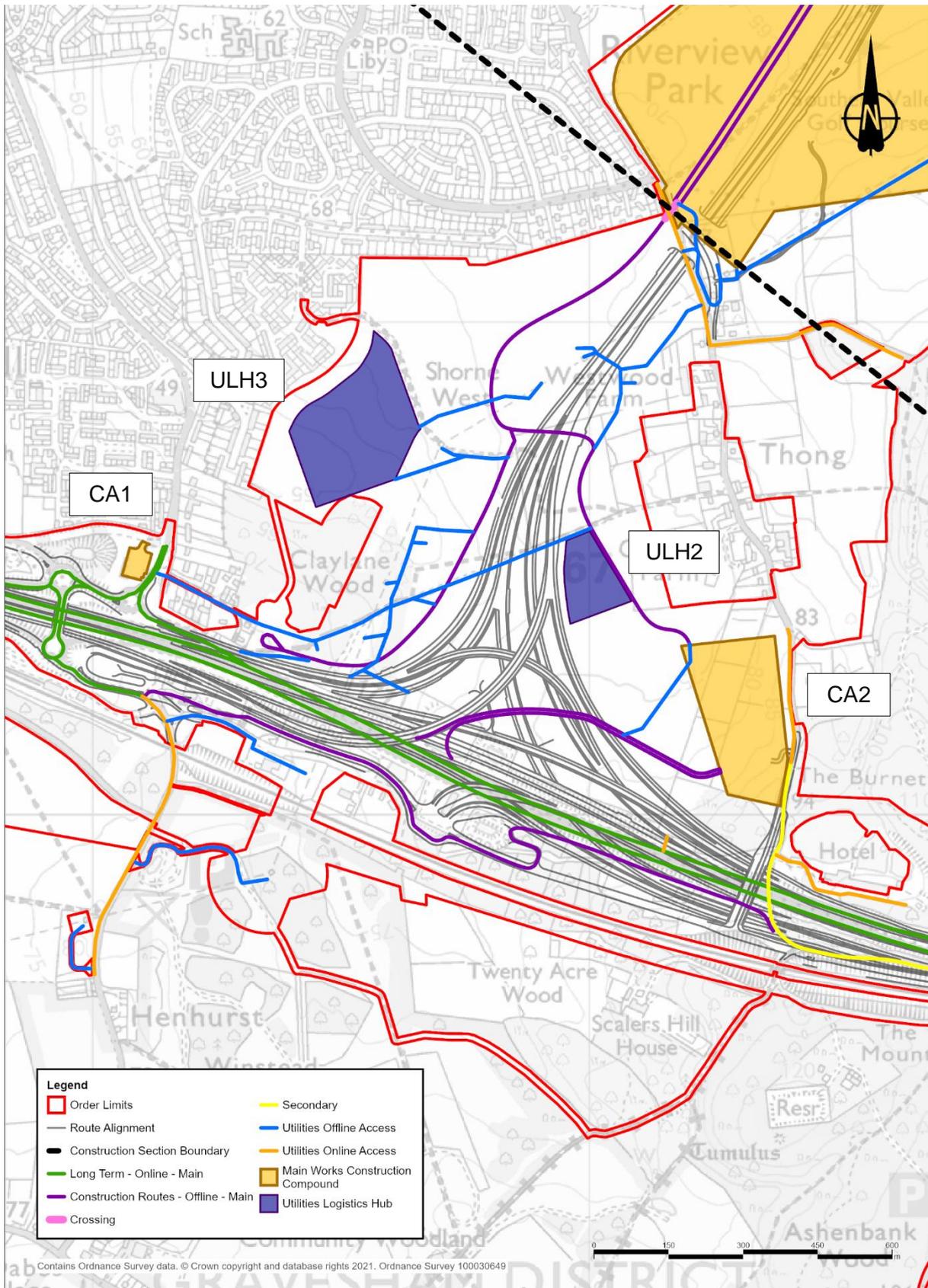


Plate 5.2 Construction areas and compound sites (2 of 4)

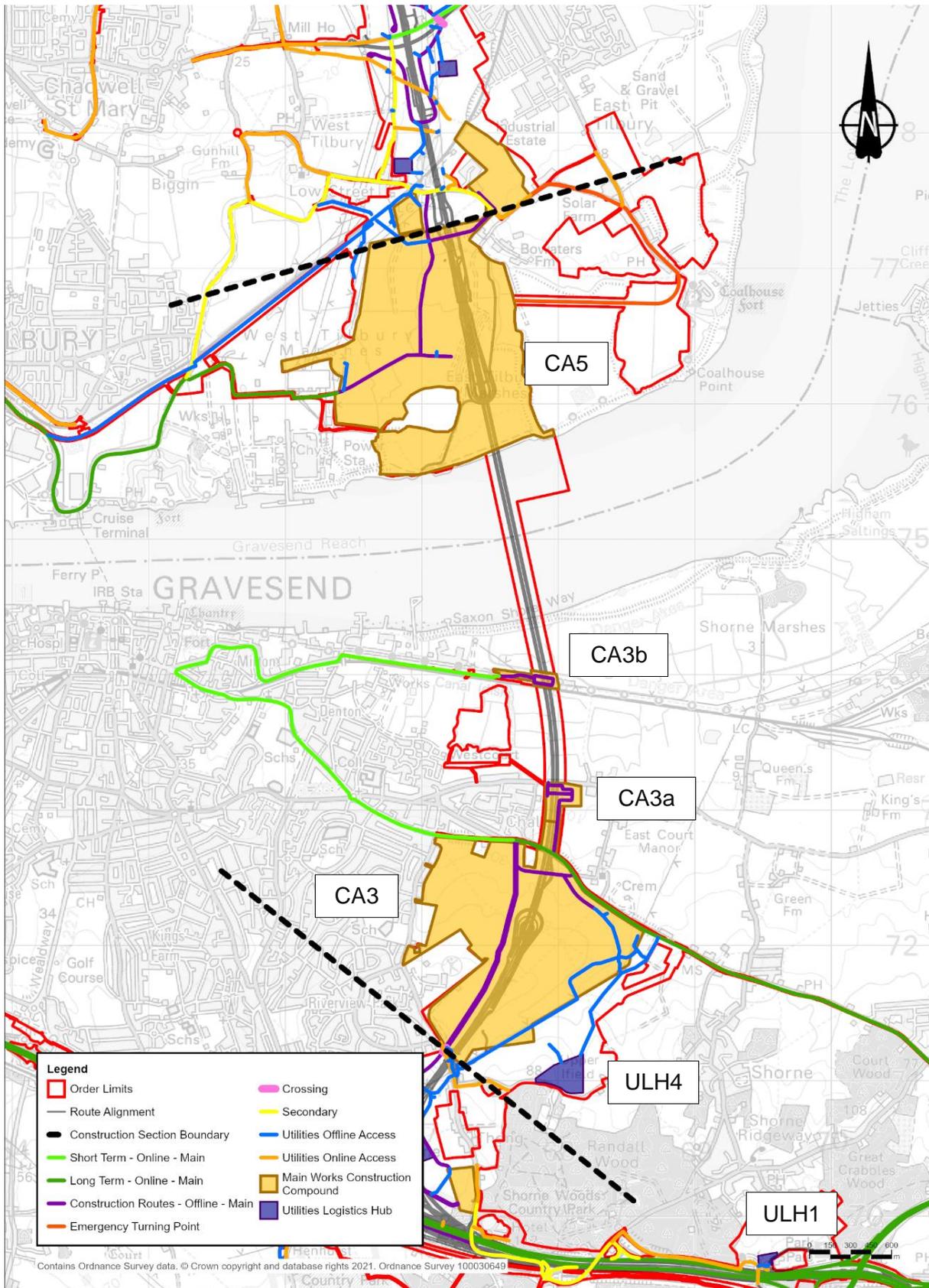


Plate 5.3 Construction areas and compound sites (3 of 4)

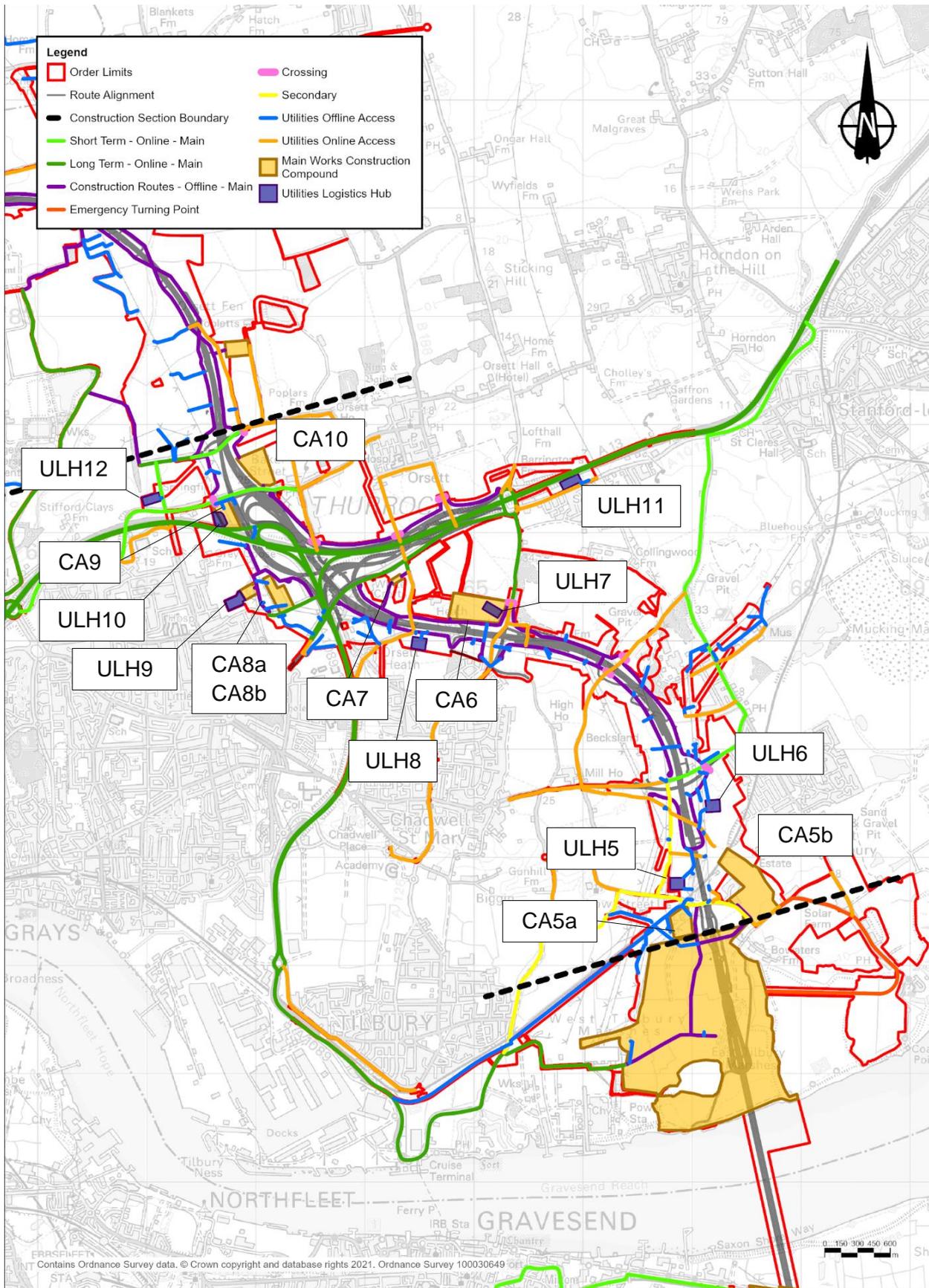
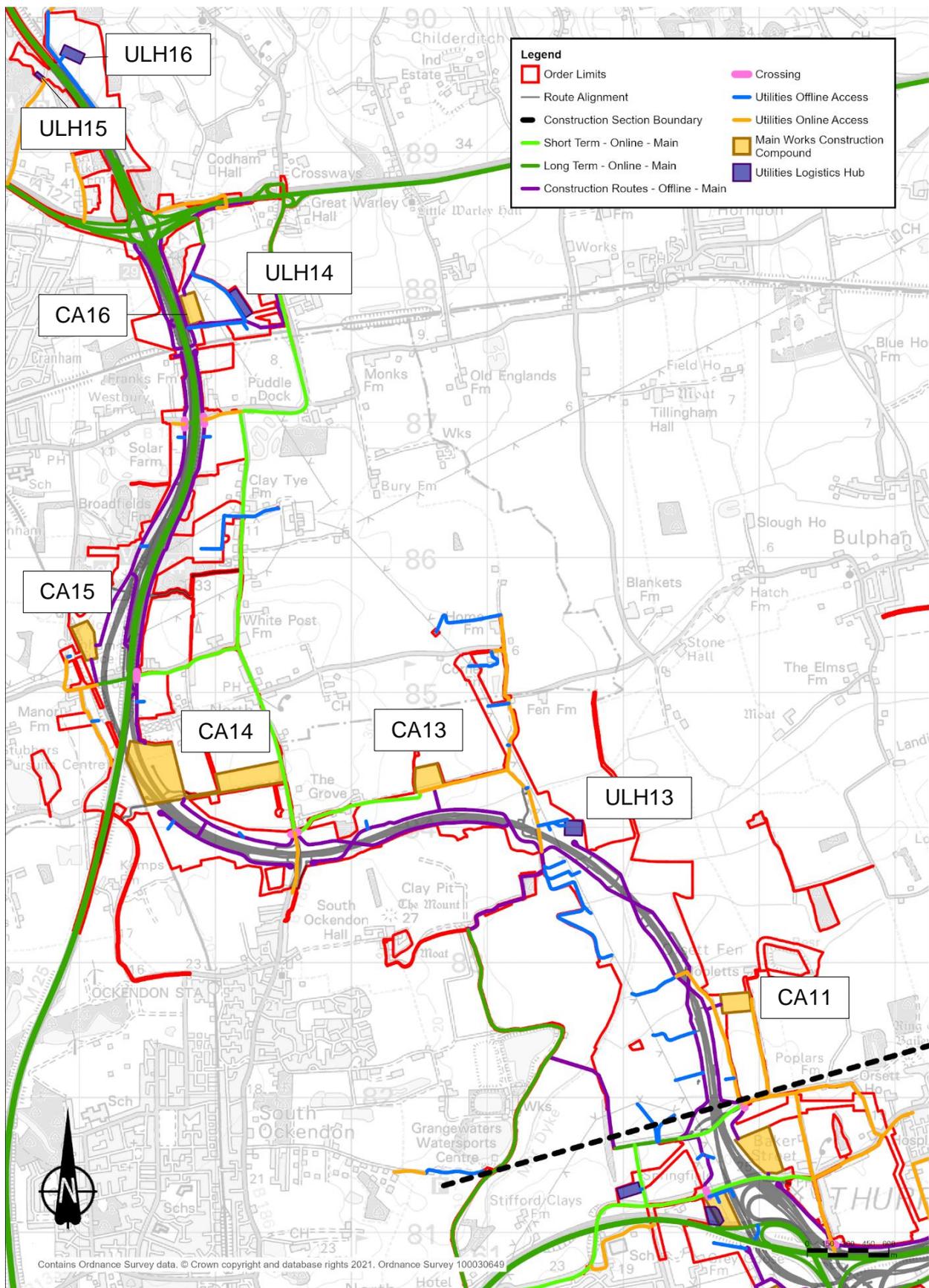


Plate 5.4 Construction areas and compound sites (4 of 4)



- 5.3.2 As shown above, the construction areas and compound sites fall within the Local Planning Authority areas of Brentwood Borough Council, the London Borough of Havering, Thurrock Council, and Gravesham Borough Council.

5.4 Compound access arrangements

- 5.4.1 The proposed access and egress arrangements for the compounds would be made up of a combination of temporary and existing junctions onto the existing highway network (some with infrastructure modifications), and haul roads.
- 5.4.2 Haul roads would provide a new link road between compounds and the existing road network where required, and generally follow the alignment of the Project. Some of these haul roads would also require localised traffic control measures to be created to enable construction traffic to access and egress the compounds and where the haul roads cross the existing local road network.
- 5.4.3 For some compounds, access arrangements would change in different phases of construction, and some compounds may include separate access points for workforce and HGVs, where required. More details of which compounds this would affect is set out in the oTMPfC.

5.5 Workforce details

Workforce numbers

- 5.5.1 Estimates of the number of workers at each compound on a month-by-month basis throughout the construction programme have been derived, for the main works. The total number of workers at the peak of construction is shown in Table 5.2. Some workers would be accommodated on site within the Northern tunnel entrance compound to the north of the River Thames. The remaining workers are expected to live within 60 minutes travel time from the construction sites.

Table 5.2 Workforce numbers

	North (at peak)	South (at peak)
Total workers	1,723	846
Home-based	311	212
Onsite	400	0
Hyperbaric	80	0
Requiring accommodation	932	634

Workforce shift arrangements

- 5.5.2 Most compounds would be expected to use the same time-based profile, thereby operating to the same shift pattern (08:00 – 18:00), arriving in the AM peak between 07:00 – 08:00 and departing in the PM peak between 18:00 – 19:00.
- 5.5.3 For compounds associated with tunnelling (the Southern tunnel entrance and the Northern tunnel entrance compounds) there would be three different shift patterns as follows:

- a. Daytime (arrivals between 07:00 – 08:00 and departures between 18:00 – 19:00)
- b. Extended daytime (50% of arrivals split between 07:00 – 08:00 and 13:00 – 14:00, 50% of departures split between 15:00 – 16:00 and 22:00 – 23:00)
- c. 24-hour shift (arrivals split equally (33% in each) between 06:00 – 07:00, 14:00 – 15:00 and 22:00 – 23:00, departures split equally (33% in each) between 07:00 – 08:00, 15:00 – 16:00 and 23:00 – 00:00)

Workforce travel arrangements

Onsite worker accommodation

- 5.5.4 There are forecast to be 400 onsite accommodation spaces available for workers to use, which would be located within the Northern tunnel entrance compound.
- 5.5.5 It is proposed that workers south of the River Thames would not have access to onsite accommodation.
- 5.5.6 If an employee is staying in the onsite accommodation, it is assumed that they would not make a journey to work trip.

Mode share

- 5.5.7 The baseline mode share applied in the modelling assessments (as set out in the Transport Assessment (REF TBC), has been assumed based on the number of available parking spaces at each compound and the likely vehicle occupancy without Travel Plan measures in place. The modal share assumptions are as follows:
 - a. For smaller compounds (if the maximum number of compound workers is fewer than 50), 100% single occupancy car mode share and 0% by other modes has been assumed
 - b. For medium-sized compounds (if the maximum number of compound workers is between 50 and 100), 80% single occupancy car mode share and 20% by other modes (including multi occupancy car trips) has been assumed
 - c. For large compounds (if the maximum number of compound workers is greater than 100) 70% single occupancy car mode share and 30% by other modes (including multi occupancy car trips) has been assumed
- 5.5.8 These baseline figures have been used to develop suitable targets for increasing the sustainable mode share for the construction workforce, as set out in detail in Chapter 8. They are considered to be a conservative assumption of the likely use of sustainable modes to access the compounds. As such, these are likely to provide a robust assessment of the likely impacts of construction of the Project on the highway network, which in reality would be bettered through the implementation of the FCTP and SSTPs.
- 5.5.9 In summary, Table 5.3 sets out the size, associated peak number of workers (as determined through the assessment of the likely construction period of the Project), the modal share assumptions applied in the assessment for each compound and the peak number of two-way hourly car trips (as input into the Project's transport model).

Table 5.3 Main works workforce numbers

Compound	Size	Peak number of workers	% cars	Peak number of two-way hourly car trips
Marling Cross	Medium	56	80	50
A2	Large	175	70	215
Southern tunnel entrance	Large	384	70	247
A226 Gravesend Road	Small	40	100	40
Milton	Small	11	100	10
Northern tunnel entrance	Large	797	70	245
Station Road	Medium	56	80	38
Brentwood Road	Large	140	70	140
Stanford Road	Medium	44	80	55
Long Lane A and B	Medium	55	80	44
Stifford Clays Road west	Medium	44	80	48
Stifford Clays Road east	Large	211	70	211
Mardyke	Medium	61	80	61
Medebridge	Large	126	70	137
M25	Large	302	70	254
Ockendon Road	Medium	85	80	59
Warley Street	Large	107	70	107

5.5.10 As shown in Table 5.3, half of the construction areas and compounds are considered as 'large' with a total of nine sites with a 70% car mode share in the baseline. A further seven construction areas and compounds (all compounds) are considered as 'medium', with an 80% car mode share in the baseline. The remaining two construction areas and compounds (all compounds) are considered 'small', with a 100% car mode share in the baseline.

Workforce distribution

5.5.11 An assessment has been undertaken to identify where the workforce trips are expected to originate when travelling to the various construction areas and compounds. Plate 5.5 to Plate 5.22 illustrate the geographical catchment of trips for each compound and how these trips are distributed across the wider area. This analysis has helped ensure that the transport hubs and the services provided at them are likely to be sufficient, and to identify where further measures may need to be considered to better align workforce movements with transport services provided.

5.5.12 Plate 5.5 to Plate 5.10 present the information for all main works compounds located south of the River Thames.

Plate 5.5 Marling Cross compound workforce origin locations

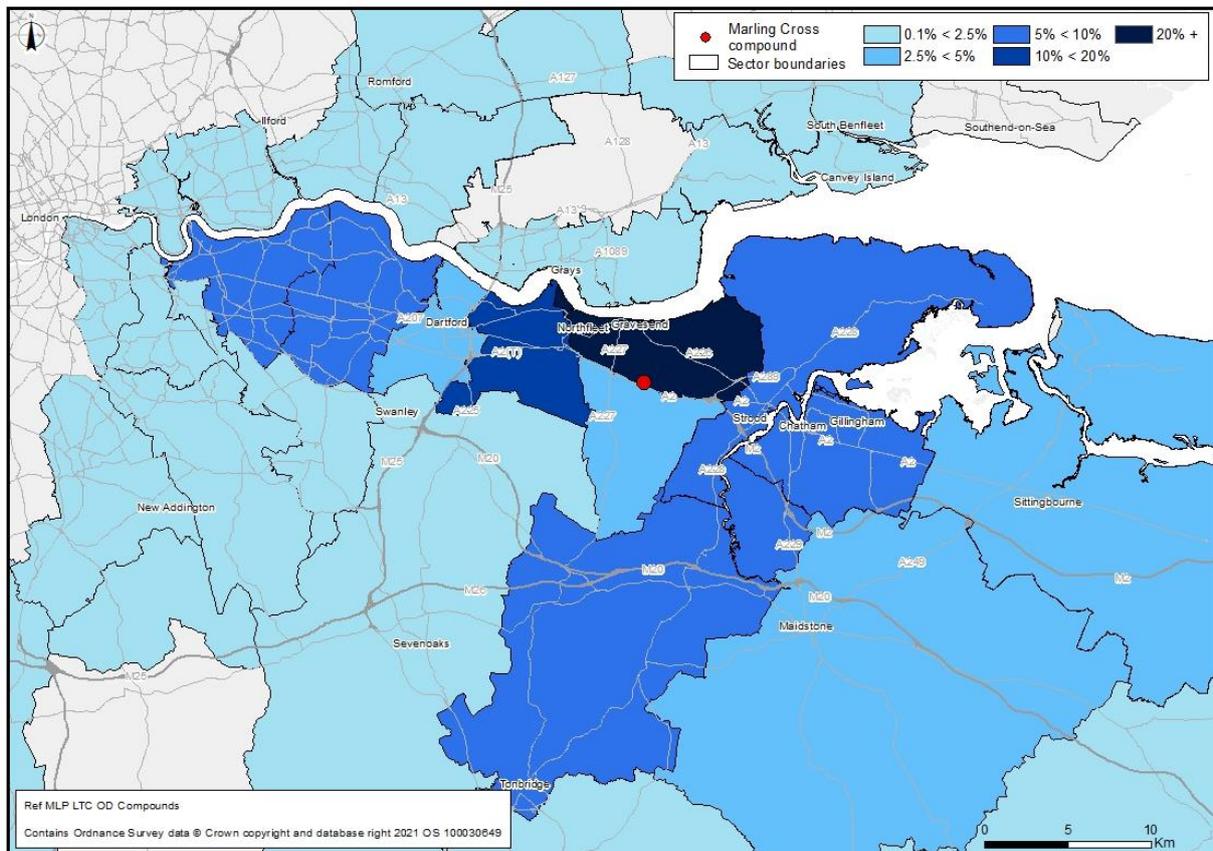


Plate 5.6 A2 compound workforce origin locations

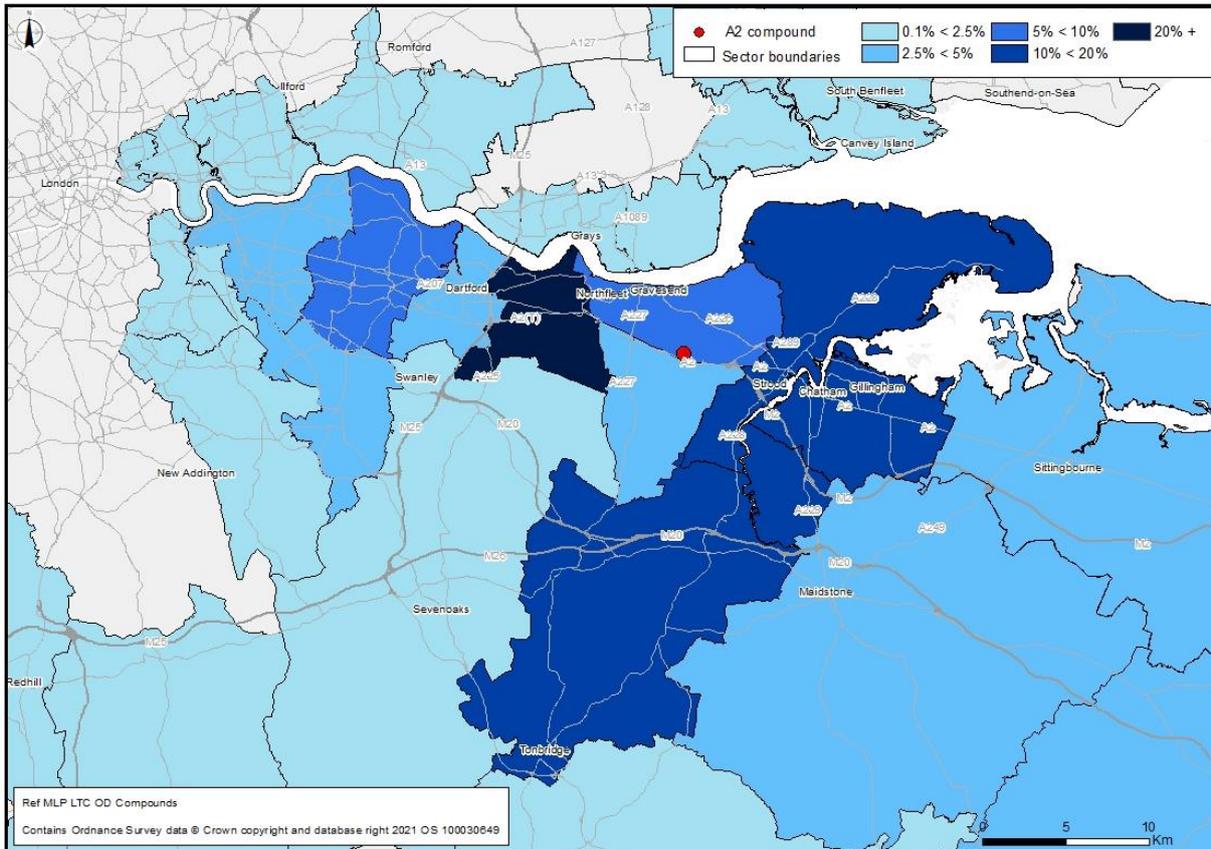


Plate 5.7 Southern tunnel entrance compound workforce origin locations

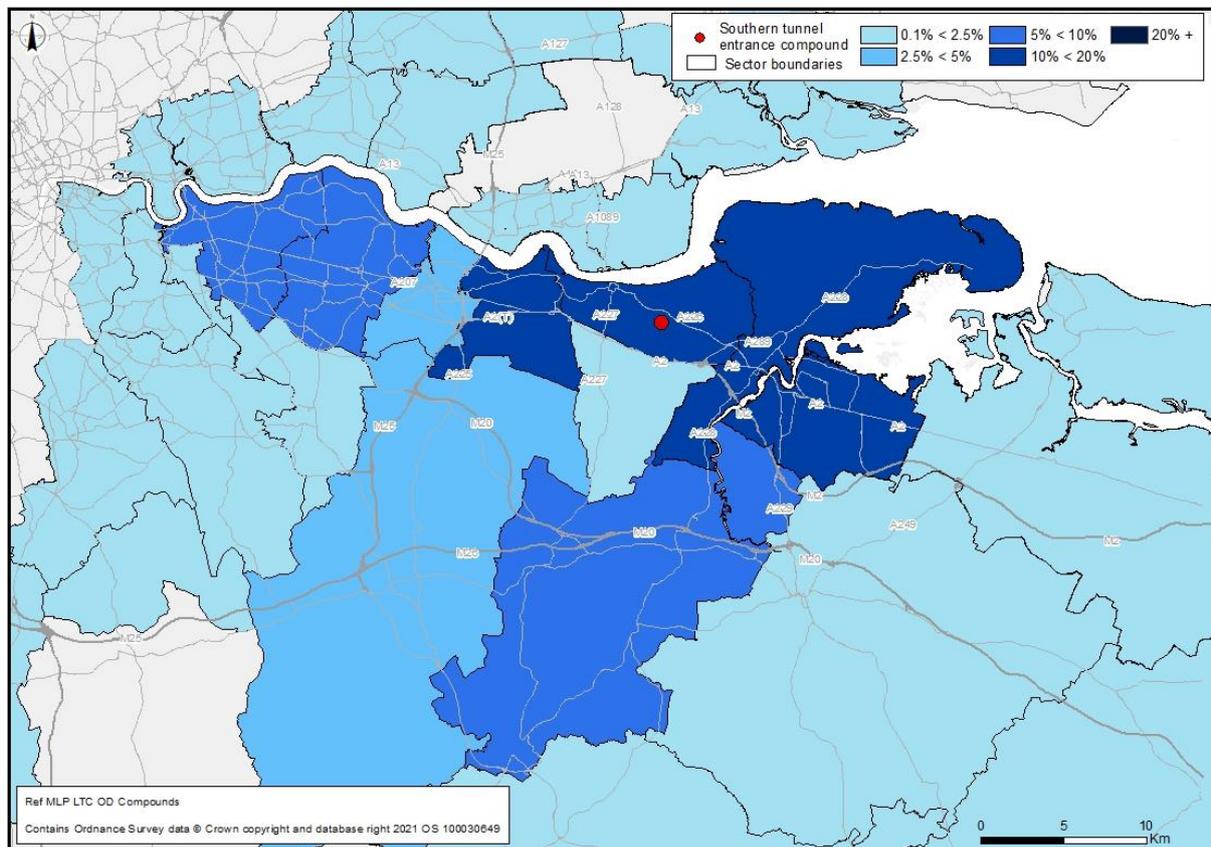


Plate 5.8 A226 Gravesend Road compound workforce origin locations

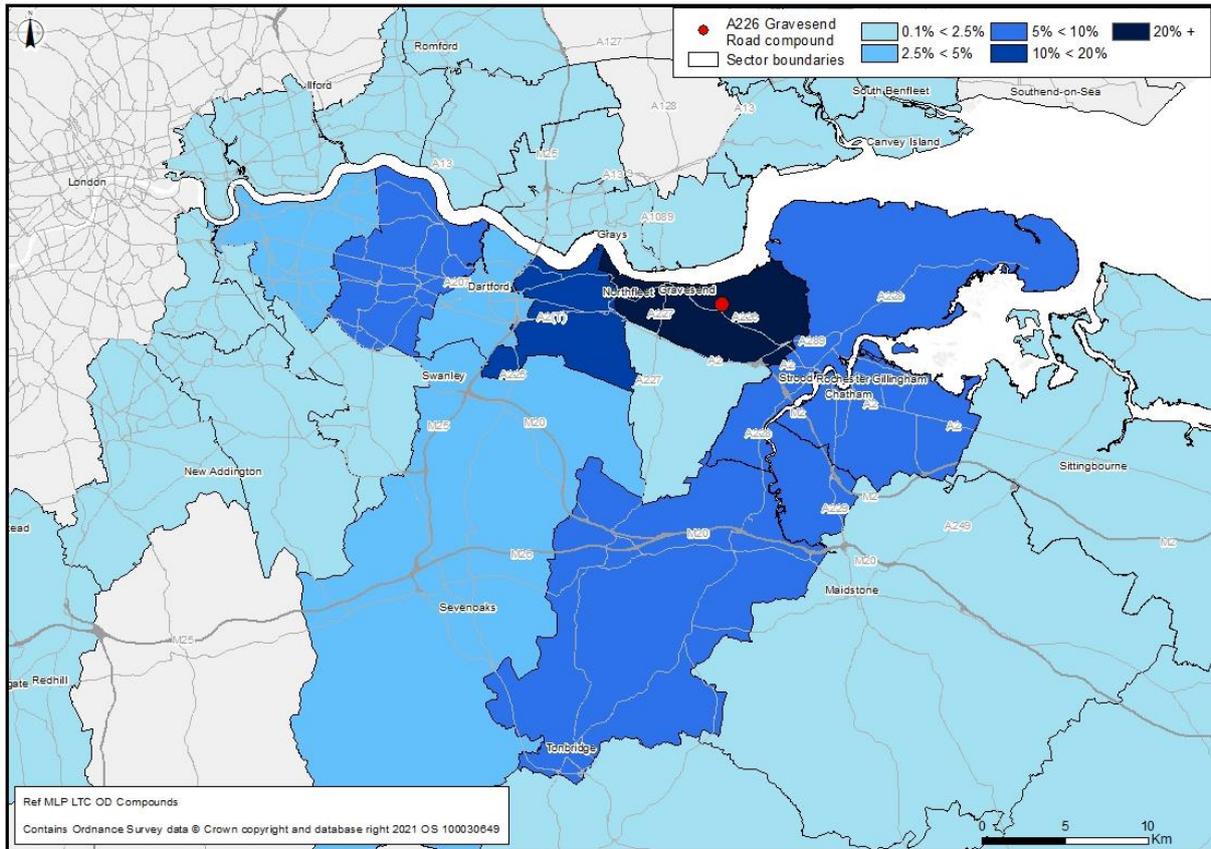


Plate 5.9 Milton compound workforce origin locations

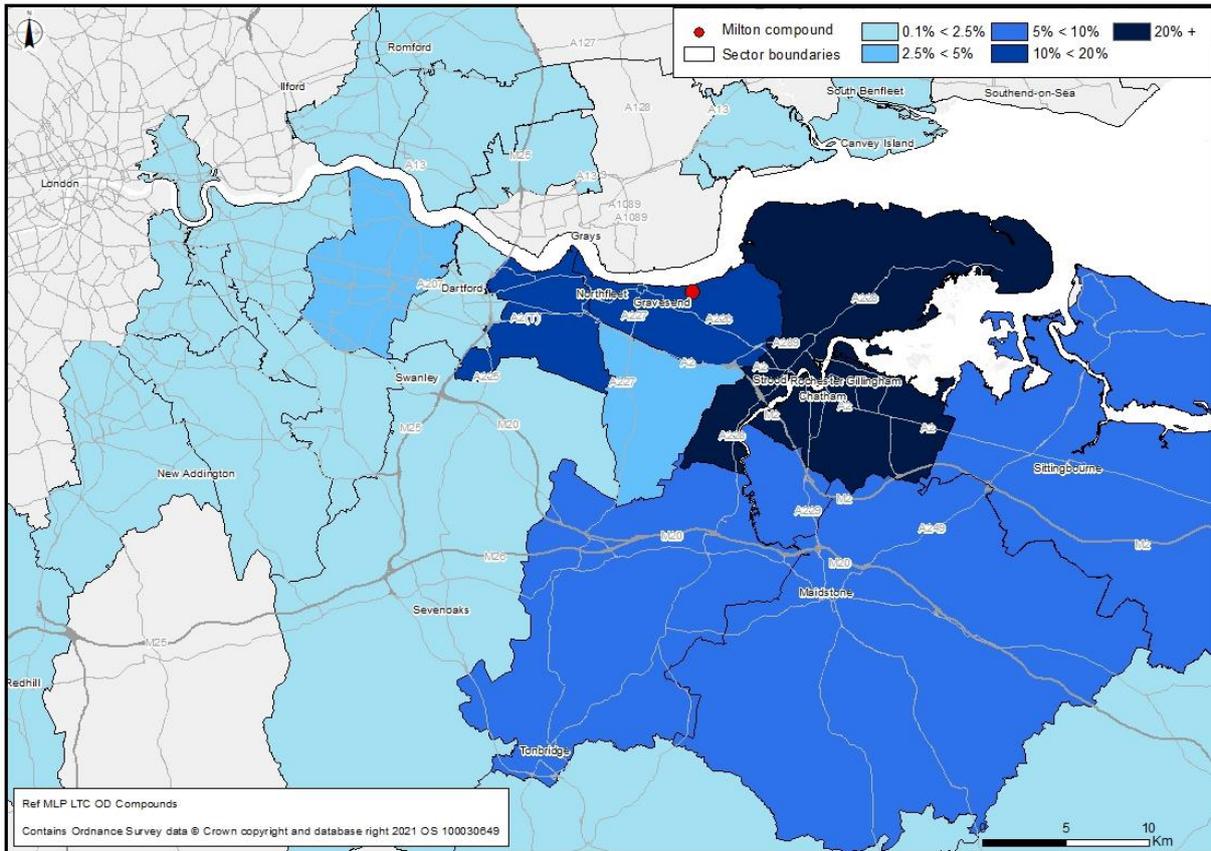
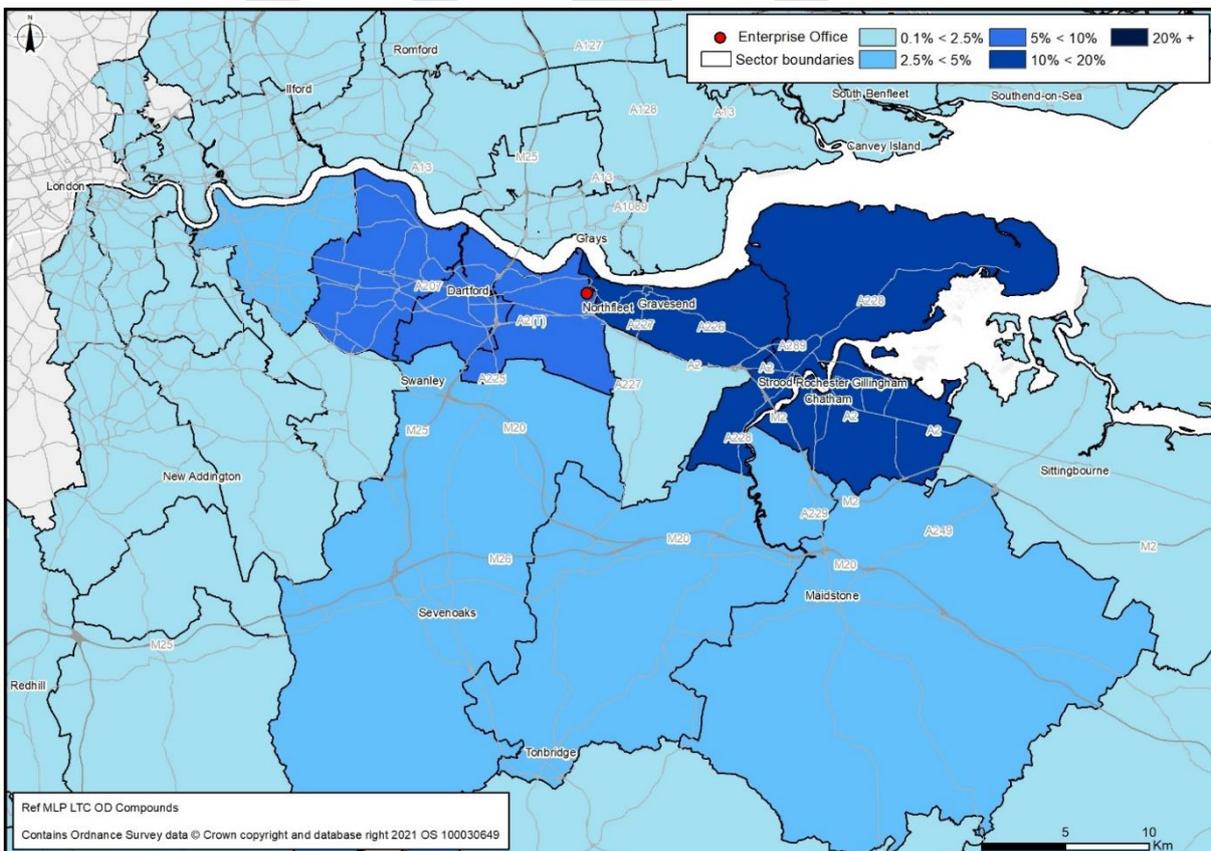


Plate 5.10 Enterprise Office workforce origin locations



- 5.5.13 For all compounds located south of the River Thames (and the enterprise office) the majority of trips origins are concentrated in the Medway Towns, Gravesend and Dartford sector boundaries (all located in Kent) with each of them expecting 20%+ trips across the different locations.
- 5.5.14 The Southern tunnel entrance compound and the enterprise office are shown to only expect a maximum of 10% - 20% of trips origins from across the different sector boundaries, this is spread out over a greater area south of the River Thames in comparison to the sector boundaries that expect 20%+ trips.
- 5.5.15 Plate 5.11 to Plate 5.22 present the information for all main works compounds located north of the River Thames.

Plate 5.11 Northern tunnel entrance compound workforce origin locations

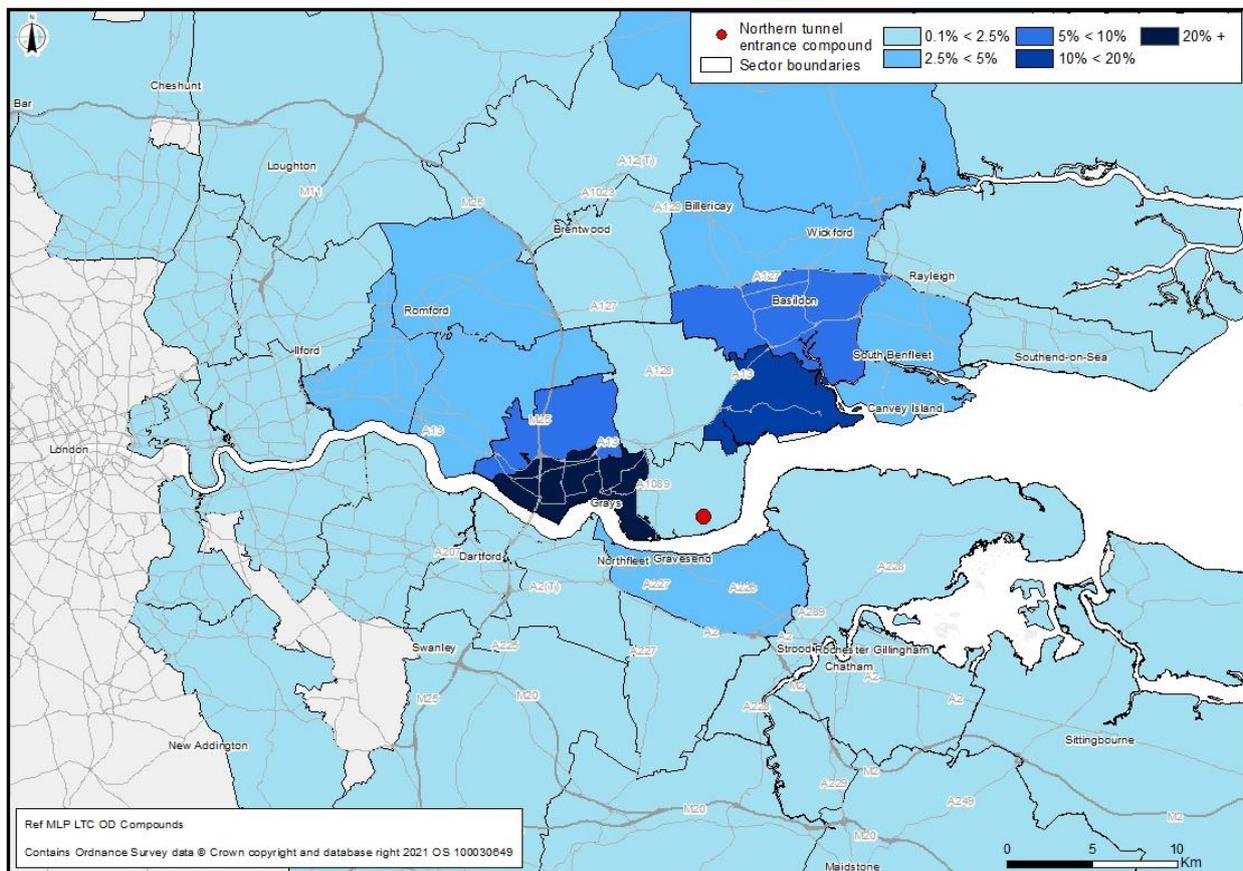


Plate 5.12 Station Road compound workforce origin locations

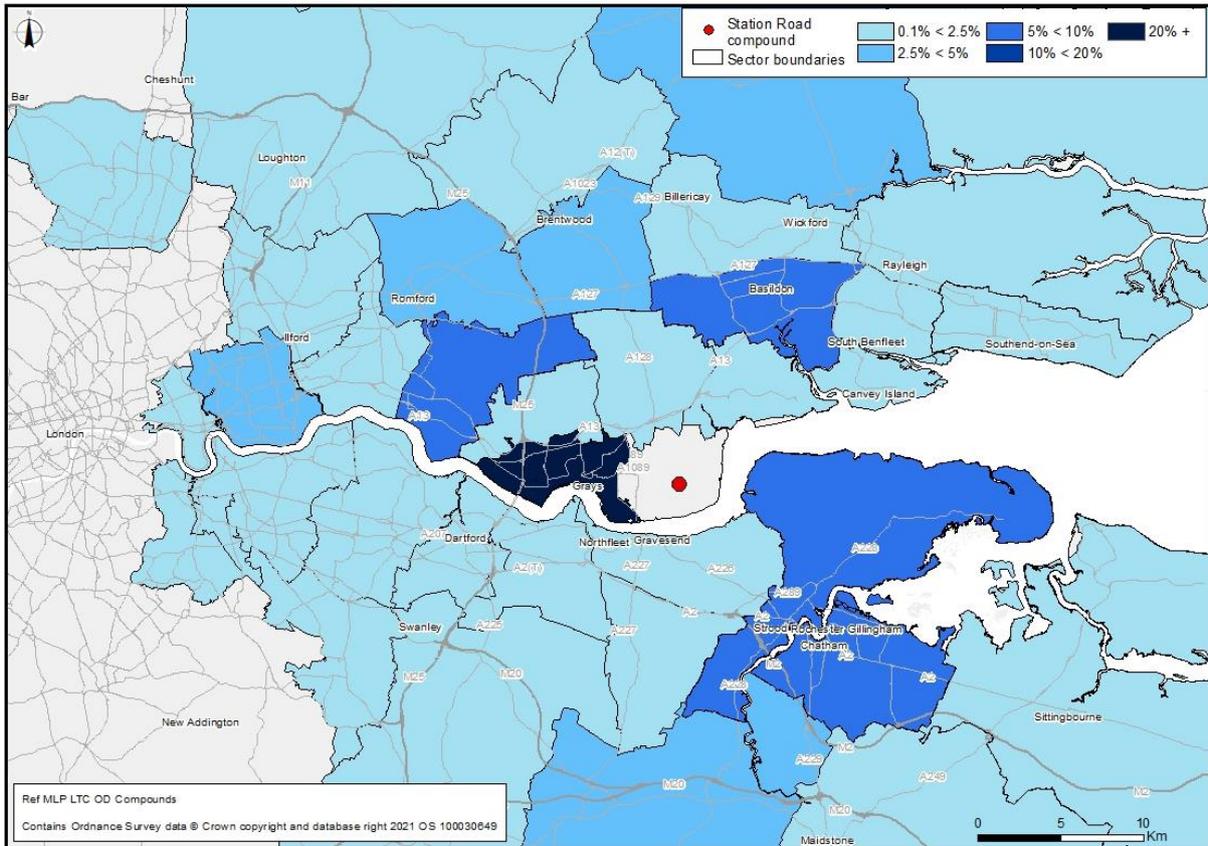


Plate 5.13 Brentwood Road compound workforce origin locations

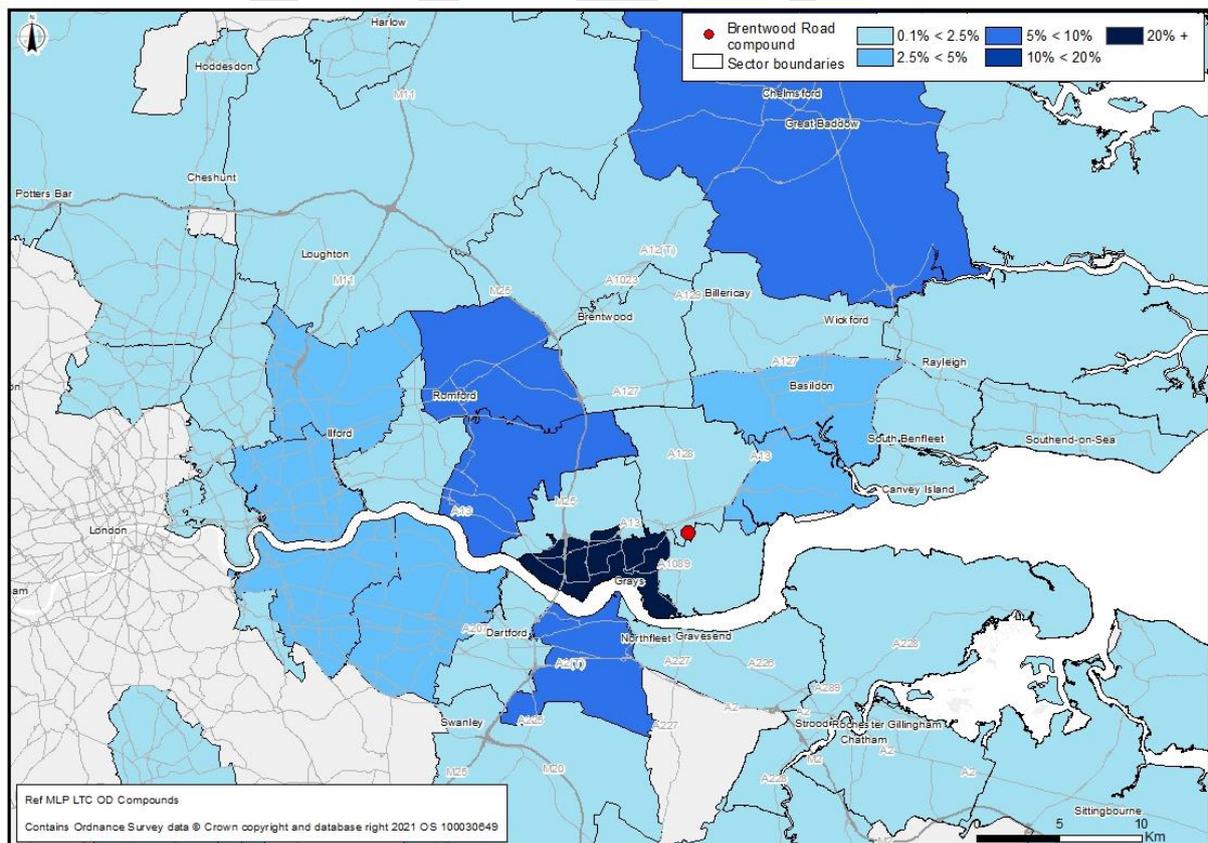


Plate 5.14 Stanford Road compound workforce origin locations

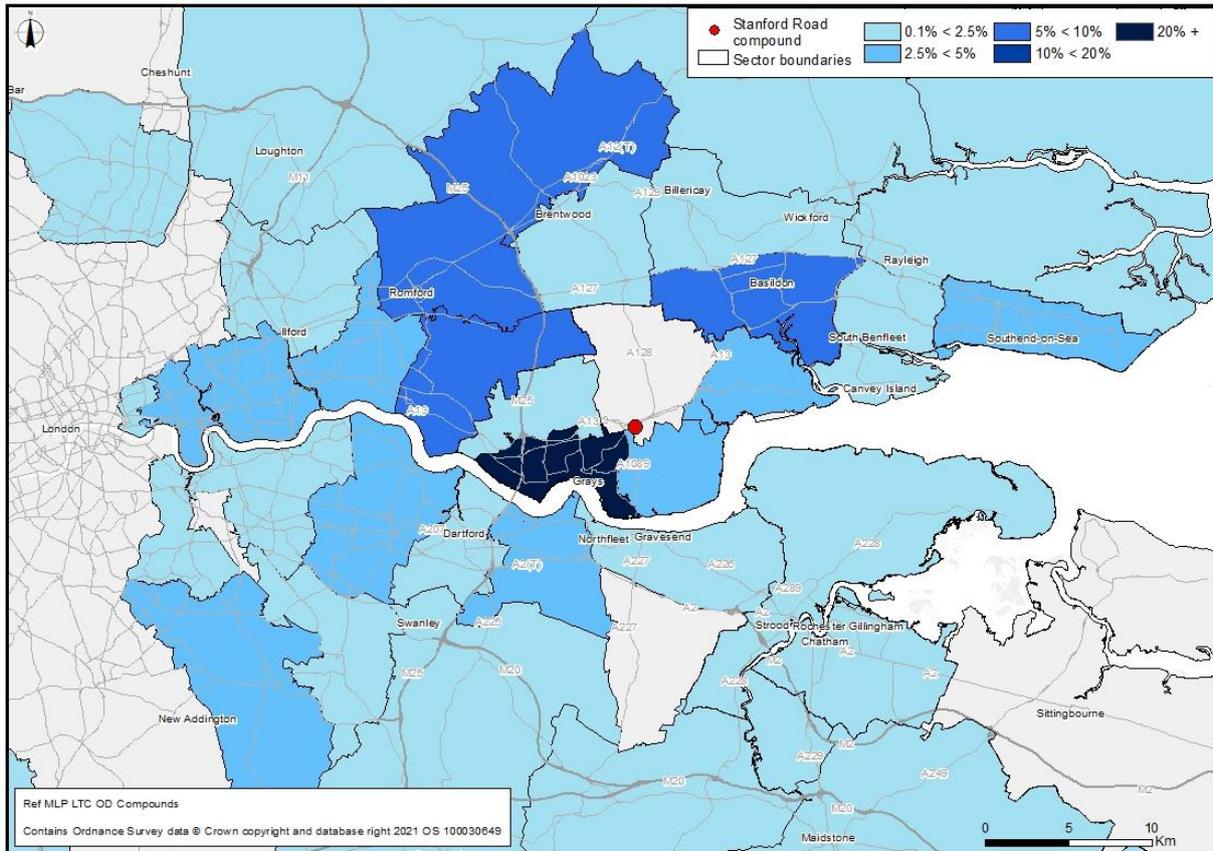


Plate 5.15 Long Lane A and B compound workforce origin locations

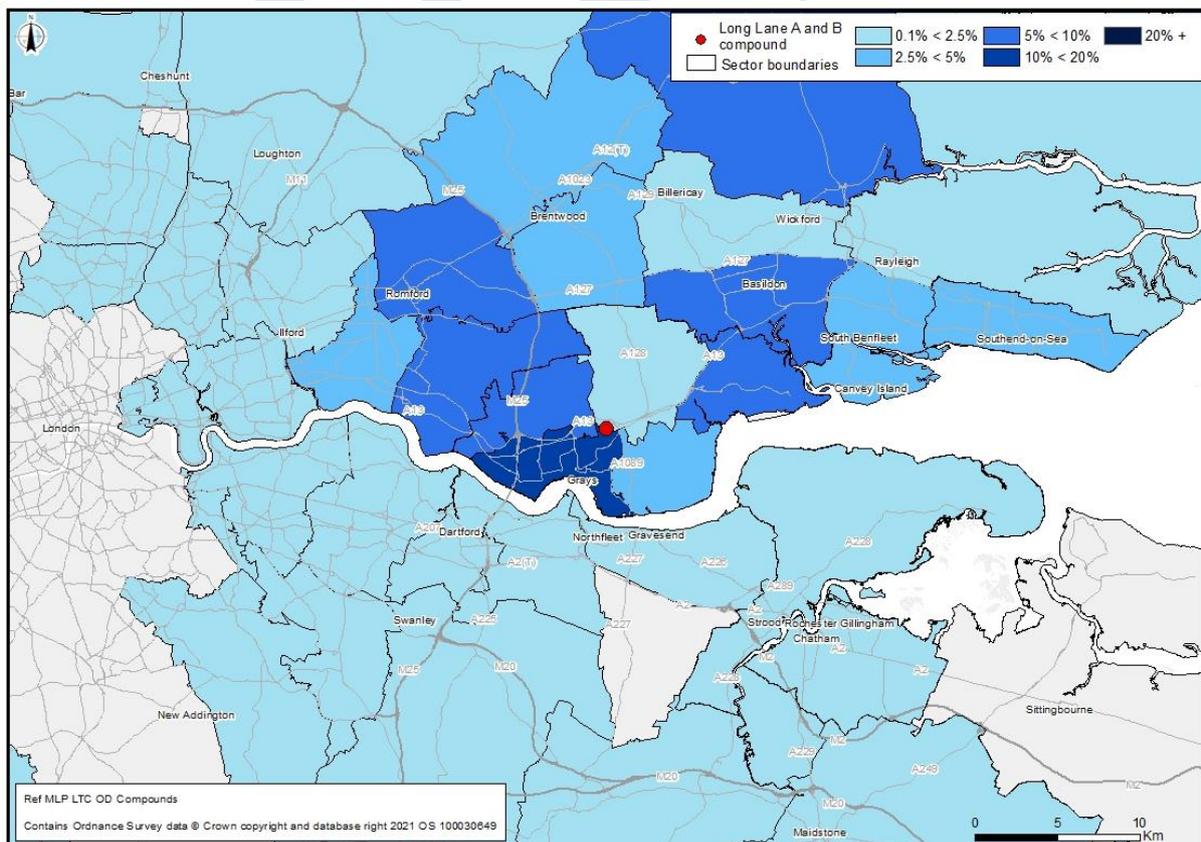


Plate 5.16 Stifford Clays Road west compound workforce origin locations

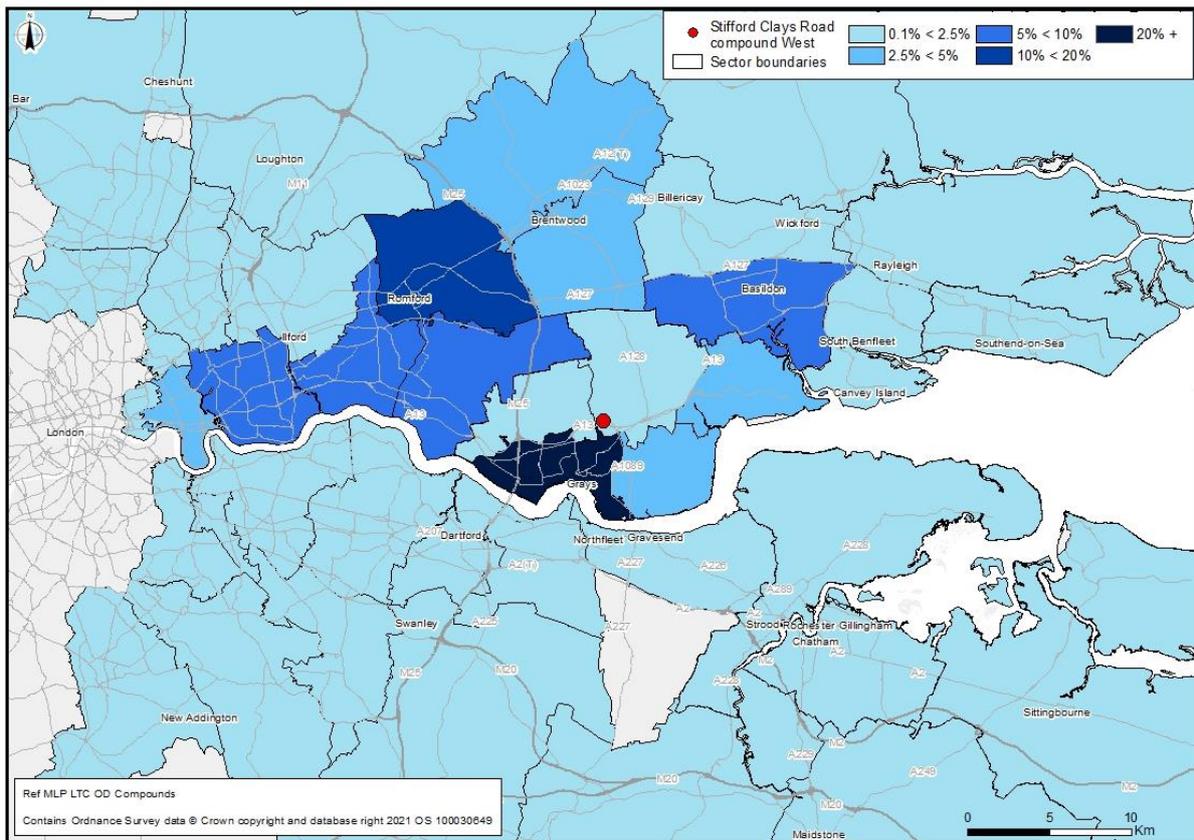


Plate 5.17 Stifford Clays Road east compound workforce origin locations

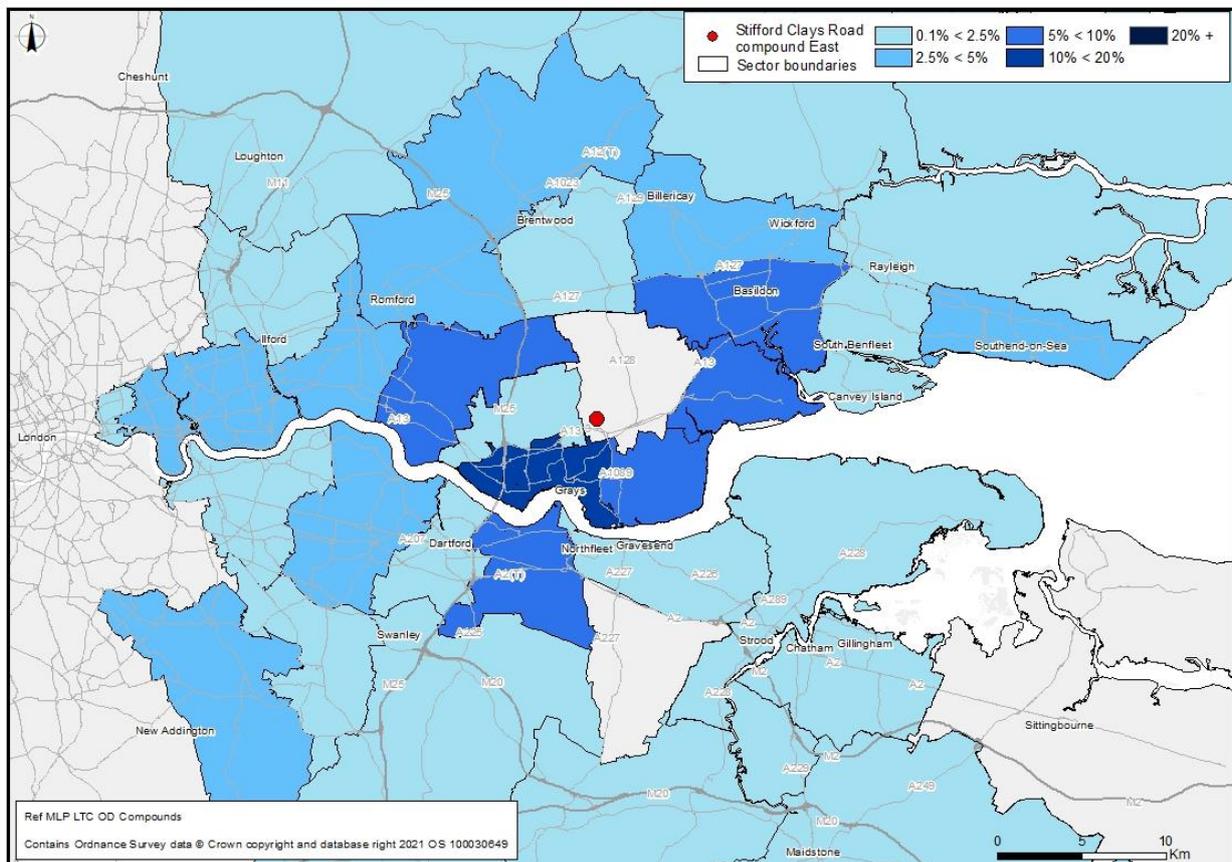


Plate 5.18 Mardyke compound workforce origin locations

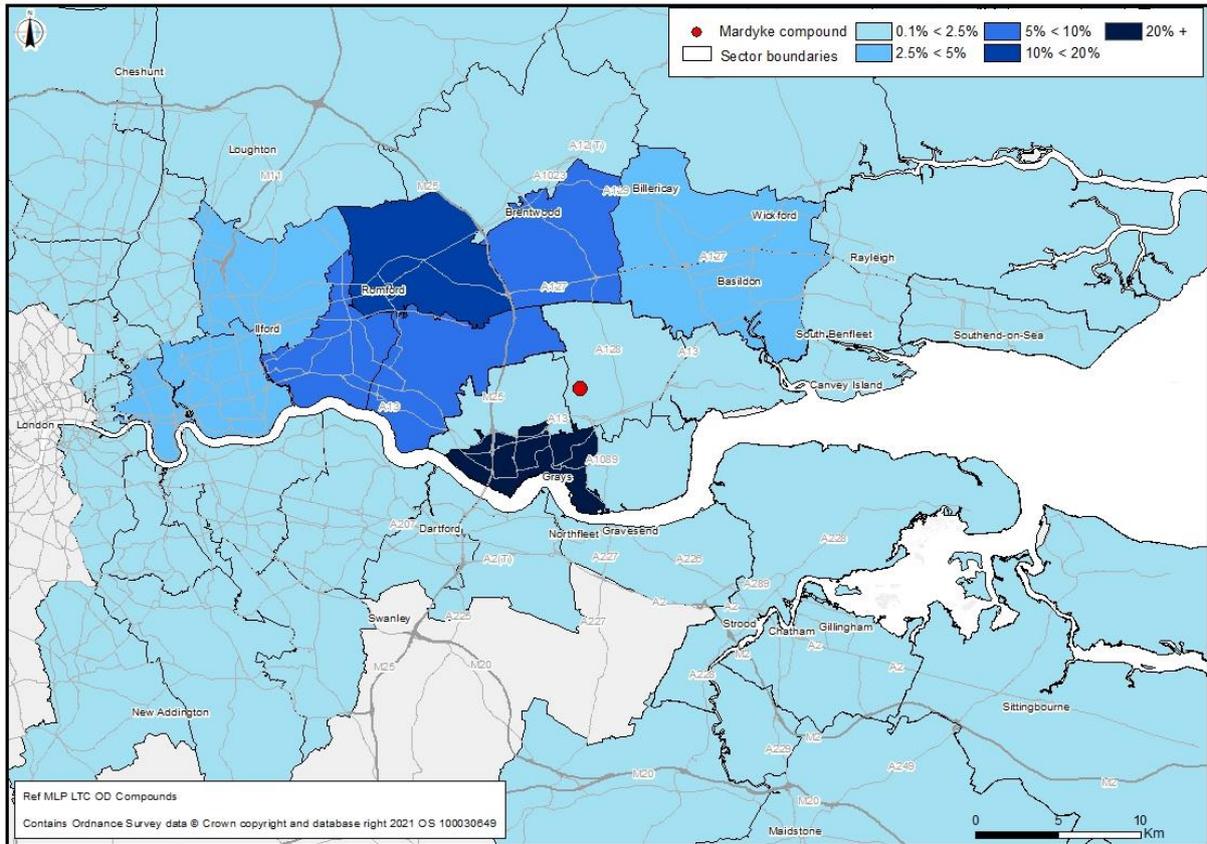


Plate 5.19 Medebridge compound workforce origin locations

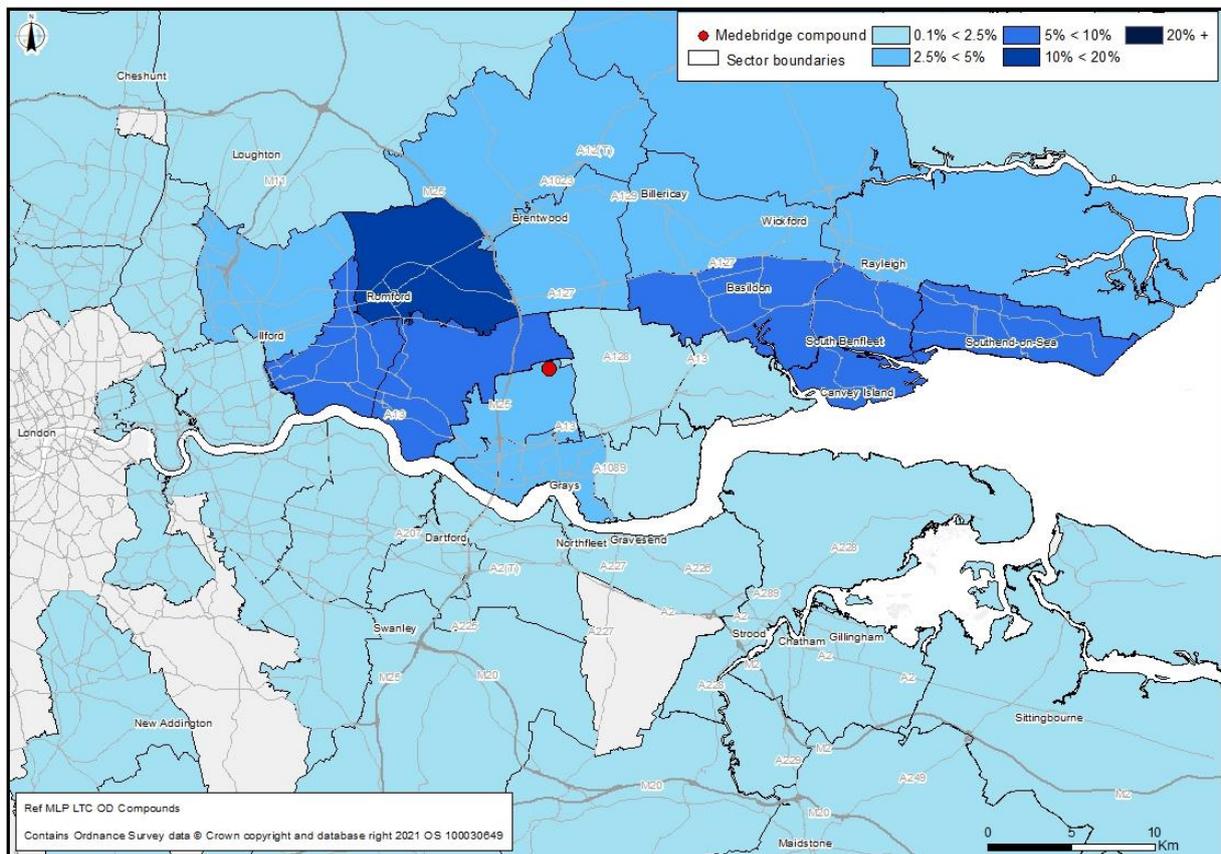


Plate 5.20 M25 compound workforce origin locations

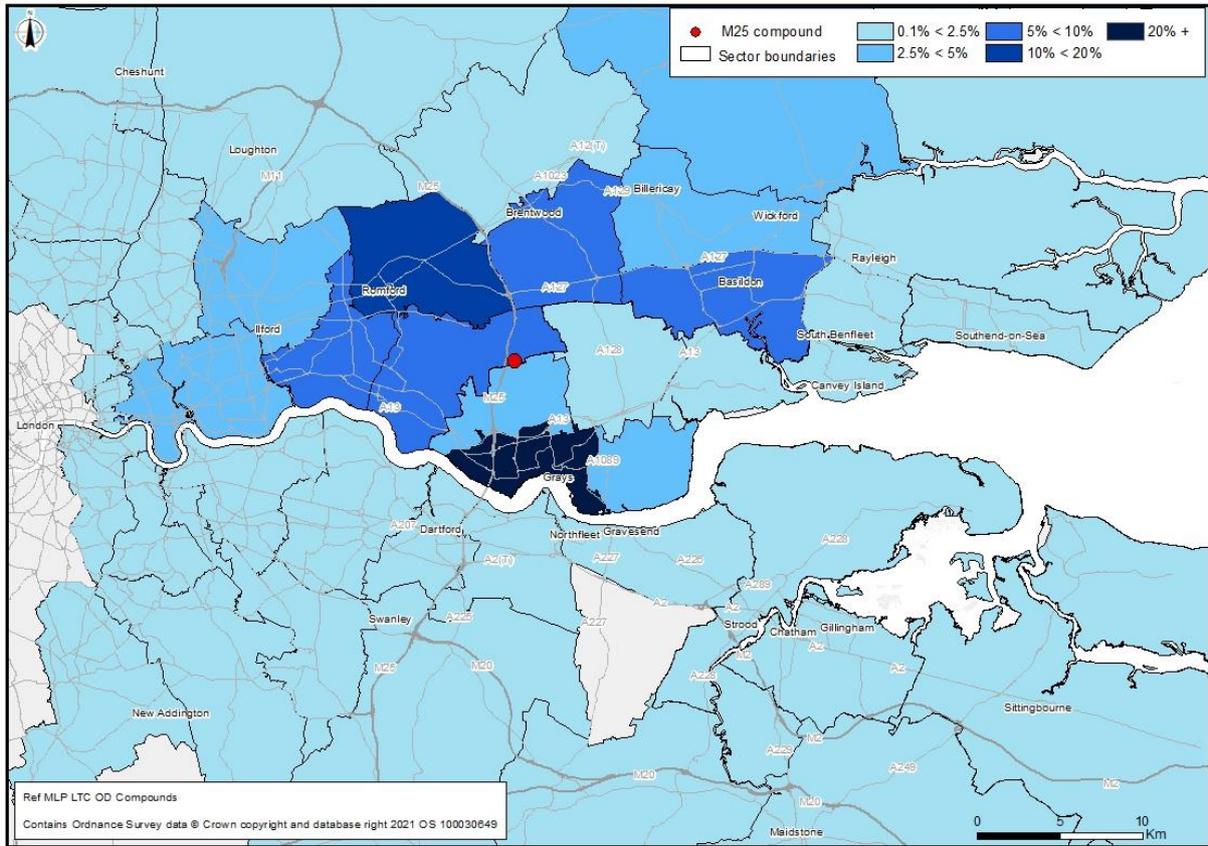


Plate 5.21 Ockendon Road compound workforce origin locations

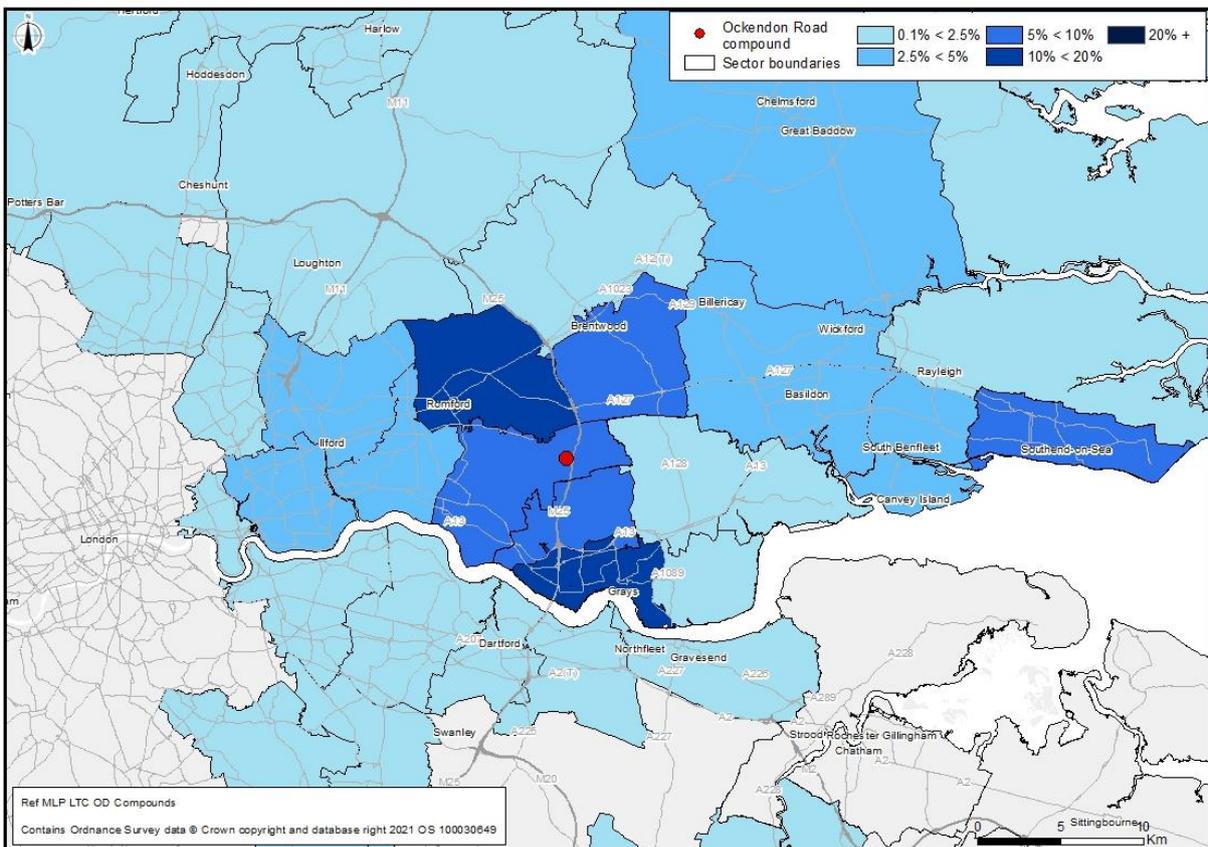
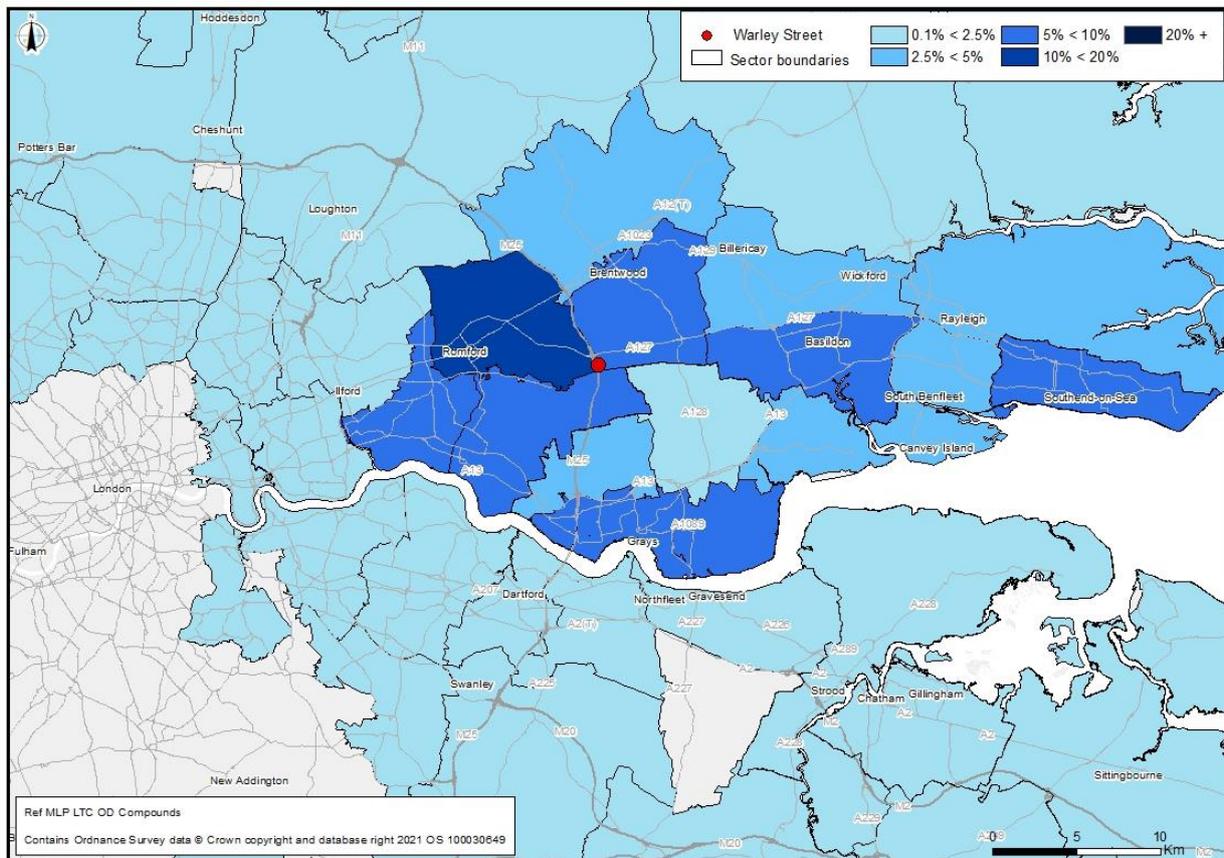


Plate 5.22 Warley Street compound workforce origin locations



- 5.5.16 For most compounds located north of the River Thames, the majority of trips are shown to be concentrated within the Grays sector boundary, with almost all of these locations expecting 20%+ of all trips to originate in this area. Other noticeable areas include the London Borough of Havering and Essex (in particular Basildon, Brentwood, Chelmsford, Billericay, Wickford, South Benfleet, Canvey Island, Southend-on-Sea).
- 5.5.17 For the Warley Street and Medebridge compounds, the sector boundary that falls within the northern part of the borough of Havering indicates the highest concentration of trips, albeit this is still only 10%-20% of expected trips.
- 5.5.18 For the Long Lane (A and B) and Stifford Clays Road compounds, while Grays is still identified as the most concentrated area for trip origins, these are the only instances where the Grays sector is shown with trips lower than 20% of trips (10%-20%).
- 5.5.19 Whilst the majority of trips to these compounds originate from north of the River Thames, for the Station Road, Brentwood Road, Stanford Road and Stifford Clays Road compounds some trips are shown to originate from Kent (in particular Dartford, Gravesend, Rochester and Gillingham and the Medway Towns, and Maidstone).
- 5.5.20 The maps also identify a low number of trips (up to 2.5%) that are expected to originate from a significant catchment area in the wider vicinity of the compound locations (as indicated by the lightest blue marker).

5.6 Statutory Undertaker arrangements

- 5.6.1 This section provides a summary of the Statutory Undertakers (SUs) Utility Logistic Hub (ULH) arrangements. These are construction areas that would be operated by SUs, but undertaking work that would be required to facilitate the construction of the Project.
- 5.6.2 Table 5.4 sets out the location and programme dates associated with each of the 16 sites across the construction, operation and de-mobilisation phases of work.

Table 5.4 Utility works construction programme and phasing

Utility Hub	Location	Start	End	Duration (months)
Park Pale (ULH1)	West of Harlex Haulage, north of Park Pale	July 2024	September 2026	28
A2 East (ULH2)	West of Thong on the eastern side of the Project	October 2025	January 2027	16
A2 West (ULH3)	West of Thong Lane, north of Claylane Woods	January 2024	December 2025	25
Shorne Ifield Road (ULH4)	East of Thong Lane, north of Shorne Ifields Road	January 2024	December 2025	25
Low Street Lane (ULH5)	West of the Project, 950m south of Muckingford Road	January 2024	February 2025	14
Muckingford Road (ULH6)	East of the Project, 400m south of Muckingford Road	January 2024	February 2025	14
Brentwood Road (ULH7)	North of the Project, west of Brentwood Road	February 2024	February 2025	13
Hornsby Lane (ULH8)	South of the Project, 700m west of Brentwood Road	January 2024	September 2026	35
Long Lane (ULH9)	West of the Project, north of Long Lane	January 2024	September 2026	35
Stifford Clays Road (ULH10)	West of the Project, south of Stiffords Clay Road	January 2024	September 2026	35
Stanford Road (ULH11)	North of Stanford Road, to the east side of the Orsett Cock junction	February 2024	April 2026	28
Green Lane (ULH12)	West of Green Lane, north of Stiffords Clay Road	February 2024	April 2026	28
Medebridge (ULH13)	2km to the east of the B186 North Road	January 2024	September 2026	35
Folkes Lane (ULH14)	South-eastern side of M25 junction 29	June 2024	May 2025	12

Utility Hub	Location	Start	End	Duration (months)
Warley Street (ULH15)	1km north of M25 junction 29 (western side)	April 2026	April 2027	13
Beredens Lane (ULH16)	1km north of M25 junction 29 (eastern side)	April 2026	April 2027	13

5.6.3 The proposed locations of the ULH are shown in Plate 5.1 to Plate 5.4 above, with the main construction works construction area and compound site locations.

5.6.4 The access arrangements extend from the highway network, with a mixture of standalone sites and combined sites (where a number of ULH sites have been grouped together with a single access point). A number of the ULH sites would also have a shared access with the main works compounds.

5.6.5 Table 5.5 shows the peak number of workers at each ULH.

Table 5.5 Utility works workforce numbers

Utility hub	Size	Peak number of workers
Park Pale	Small	11
A2 East	Small	11
A2 West	Medium	30
Shorne Ifield Road	Medium	30
Low Street Lane	Small	11
Muckingford Road	Small	11
Brentwood Road	Medium	30
Hornsby Lane	Small	11
Long Lane	Small	11
Stifford Clays Road	Small	11
Stanford Road	Medium	30
Green Lane	Medium	30
Medebridge	Small	11
Folkes Lane	Medium	30
Warley Street	Small	4
Beredens Lane	Medium	30

6 Baseline networks

6.1 Introduction

6.1.1 This chapter provides a summary of the existing baseline conditions along the highway and walking, cycling and horse-riding (WCH) networks, in the vicinity of the Project. Details of the public transport network are also provided, in relation to the proposed ‘transport hubs’.

6.2 Highway network

6.2.1 Key routes on the highway network (situated in proximity to the Project’s construction sites) that are expected to be used for workforce travel include:

- a. The M25 (between junction 27 north of the River Thames and junction 2 to the south of the River Thames)
- b. The A127
- c. The A13
- d. The A1089
- e. A282 Dartford Crossing
- f. The A2/M2

6.2.2 The M25 motorway is a dual four-lane carriageway from junction 27 to junction 30, before reaching the A282 Dartford Crossing. The A127 runs east-west from M25 junction 29 and is dual two-lane between M25 junction 29 and the junction with Progress Road in Eastwood. The A13 also runs east-west from M25 junction 30, with the carriageway predominantly dual three-lane between M25 junction 30 and the A128 junction. The section between the A128 and the A1014 is currently a two-lane dual carriageway, but Thurrock Council is in the process of widening this section to dual three lanes. An improvement scheme on the A13 at M25 junction 30 was completed in early 2017. The A1089 is a link between the A13 and Tilbury Port. The majority is two-lane dual carriageway with the southern end a single carriageway.

6.2.3 South of M25 junction 30 the route is identified as the A282 Dartford Crossing, which provides four lanes for traffic in each direction across the River Thames between Dartford and West Thurrock. The four lanes northbound are provided in two tunnels, each with two lanes. The four lanes southbound are provided over the Queen Elizabeth II Bridge. There is a charge for using the Dartford Crossing which is collected remotely. South of the A282 Dartford Crossing, the M25 motorway is dual four lanes to junction 2 with the A2. The A2 runs east-west from M25 junction 2 and is dual four-lanes from the A282 to M2 junction 1, except for a dual three-lane section through the Bean junction. The A2 meets the M2 at junction 1 between Gravesend and Strood, extending eastwards through Kent to junction 7 just east of Faversham. The M2 is a dual four-lane carriageway between junction 1 and junction 3, predominantly dual three-lane carriageway between junction 3 and junction 4, and dual two-lane carriageway between junction 4 and junction 7.

6.3 Walking, cycling and horse-riding network

- 6.3.1 There is an extensive walking, cycling and horse-riding network (situated in proximity to the Project’s construction sites) that would be expected to be used for workforce travel.
- 6.3.2 There are pedestrian footways adjacent to many of the local roads in the proximity of the Project’s construction sites. There are also roads without footpaths used by pedestrians. There is a network of advisory cycle routes and traffic-free routes, particularly around Thurrock, including two National Cycle Network (NCN) routes and two Regional Cycle Routes.
- 6.3.3 In addition to the pedestrian facilities on the public roads, there are PRowS linking local communities.
- 6.3.4 Many of these existing PRowS have been severed by the construction of major roads, including M25, A13, A2, as well as the HS1, adjacent to the A2. There are also numerous bridleways in the vicinity of the Project construction sites.
- 6.3.5 Table 6.1 and Table 6.2 provide details of the existing cycleways, footpaths and bridleways within the vicinity of the Project’s construction sites to the south and north of the River Thames respectively.

Table 6.1 WCH routes south of the River Thames

Facility	Route/Ref	Description
Cycleway	National Cycle Route 1	Runs along the disused Thames and Medway Canal, bordering a number of marshes near the River Thames. It connects Lower Higham and Gravesend, along the A2260 through Ebbsfleet to Bluewater
	Regional Cycle Route 177	Runs parallel north of the A2 from the A2260 Northfleet into Strood, Rochester and crosses the A2 at Park Pale bridge. The route is mixed on-road and partially traffic-free along Watling Street. It is connected to National Cycle Route 1 (NCR1) at A2260 Northfleet
	Jeskyns Community Woodland Network	Formed of a number of cycle tracks in close proximity, to the south of the A2, in the vicinity of Henhurst Road and Jeskyns Road
	NS195 Thong Lane	Thong Lane overbridge over the A2
	Gravesend Road (A226)	Accommodates an on-road cycle lane from Strood via Higham to Gravesend
Bridleway	NU48	Crosses the A2 at the Hog Lane overbridge, located to the west of Cyclopark. It connects to NU27 from Istead Rise to Perry Street housing estate via Downs Road/Northfleet Green Road
	NS174	Originating from NG17 by the Gravesend East junction and finishing halfway up footpath NS167
	NS318	Originates at NG2 (the disused Thames and Medway Canal) and ends at NG1 by the Shornemead Fort
Footpath	NG22	Crosses the A2 east of Gravesend Central junction, via a footbridge from Roman Road to Wrotham Road

Facility	Route/Ref	Description
	NS359	Crosses the A2 west of Gravesend East junction via a footbridge from Hever Court Road and Church Road
	NS183	Passes under the M2 at Albatross Avenue, connecting RR28 and NS183
	NS359	Crosses the A2 via a footbridge west of Gravesend East junction, connecting Church Road and Hever Court Road
	NS167	Route links Thong and the A2 via Thong Lane and Valley Drive
	NS170 and NS355	Both routes stem from NS167 north, joining onto Shorne Ifield Road
	NS169	Route connects FP NS167 and Riverview Park housing estate
	NG17	Originates from Valley Drive/Franklin Road, passes through a small group of houses just off the Gravesend East junction and ends when it joins the footpath along the A2
	NS367	Originates from Henhurst Road and looks to have been previously connected to NG17, but has been severed by the A2 construction
	NS177	Route is located south of the A2 connecting Cobham and Henhurst Road, just south of the Gravesend East junction of the A2
	NS177A	Joins NS177 to Henhurst Road, but further south of where NS177 meets Henhurst Road
	NS311 and NS195	Originating from Cobham, they merge within Ashenbank Wood and use the Thong Lane bridge to cross the A2
	NS178	Originates in Cobham, travels through Ashenbank Wood and joins the roundabout connecting Halfpence Lane, Thong Lane and Brewers Road
	NS179	Originates at Halfpence Lane in Cobham, travels north to the A2 then runs parallel to the A2 before joining Park Pale. NS179, NS180, NS161 all converge at this point
	NS180	Originates at Lodge Lane in Cobham, travelling through Rochester & Cobham Park Golf Club and joins NS179 and NS161 at Park Pale
	NS161	Originates at Knights Place Farm Equestrian Centre, travels through Rochester & Cobham Park Golf Club and then joins the roundabout connecting Halfpence Lane, Thong Lane and Brewers Road. It looks to have been connected to NS161 north of the A2, heading towards Shorne Ridgeway, before the A2 was constructed
	NS183	Passes under the M2 at Albatross Avenue and joins onto RR28
	NS1563	Route links NS182; via Knights Place Farm Equestrian Centre and crossing over a rail track, to a service road connecting to an A2 slip road heading westbound

Facility	Route/Ref	Description
	NG8, NG9, NG7, NS165, NS164, NS163 and NS163A	Collection of footpaths that form part of a network of PRowS that cross fields between Shorne and Gravesend. NG7 goes across several fields from Thong Lane/A226 Gravesend Road to Shorne at Crown Lane. NG8 goes across the Southern Valley Golf Club from Riverview Park and ends at the A226 Gravesend Road
	NG3 and NG4	Run parallel to one another in a north to south direction, starting at Lower Higham Road and finishing at the Thames and Medway Canal
	NG1	Runs right along the edge of the River Thames from Cliffe to Gravesend
	NG2	Runs parallel to the south of the disused Thames and Medway canal

Table 6.2 WCH routes north of the River Thames

Facility	Route/Ref	Description
Cycleway	National Cycle Route 13	The eastern section connects Tilbury town via the A1089 at Tilbury docks, with East Tilbury at Coalhouse Fort. This route is also partly footpath (FP146). The western section connects Wouldham Road to Tilbury Power station. National Route 13 is in development and will connect Tower Bridge in London with Fakenham in Norwich
	Regional Cycle Route 137	An entirely traffic-free path that follows the route of the Mardyke River from the south of Aveley to North Stifford. The route starts just off Ship Lane and under the M25 and the A13. It travels through Davy Down Riverside Park before finishing at the B186 just outside North Stifford. Here the route connects to local cycle routes that continue on into Chafford Hundred and skirt the Grays Chalk Quarry Nature Reserve
	Stifford Road	Route in the vicinity of M25 providing a connection to NCR137 and the Mar Dyke Bridleway
	Route from NCR137	Route from B186 Pilgrims Lane, B186 Burghley Road, B186 Fenner Road to the junction of the A126 and Lakeside Shopping Centre. The route crosses under the A13
	London Road	Located south of Lakeside, parallel to A282, along the A1306 Arterial Road West Thurrock, A1306 Arterial Road North Stifford, Lodge Lane, A1013 Stanford Road to Stanford-le-Hope, where it meets London Road. The cycle route has connections from Lodge Lane along Hogg Lane to Grays Chalk Quarry Nature Reserve and also Hathaway Road to Little Thurrock
	Little Thurrock and Horndon-on-the-Hill	Connects Little Thurrock and Horndon-on-the-Hill, via Blackshots Lane and Stifford Clays Road, passing under the A13, through Orsett. The route splits north and south at Rectory Road providing a link to the on-road cycle lane on the A1013 Stanford Road. The route also provides a wider

Facility	Route/Ref	Description
		loop between Little Thurrock and Horndon-on-the-Hill, via Stanford-le-Hope, connecting via the A1013 Stanford Road cycle route
	A1089	Route linking Ferry Road, Dock Road, across the A1089 Asda roundabout, adjacent to A1089, A126 Marshfoot Road, passing over the A1089, connecting into Tilbury via A126 St Chad's Road, Chadwell Hill. There is also a connection between B149 Chadwell By-Pass along Wood View Road and Chadwell Road, linking Chadwell St Mary and Little Thurrock, crossing over the A1089
Bridleway	BR187	Runs along the edge of the River Thames from Coalhouse Fort NCR146
	BR161	Green Lane bridleway and farm track
	BR58	Route (also referred to as Coal Road) begins at the point where Station Road meets Love Lane, then crosses over the rail line; via a level crossing, crosses Low Street Lane, joins onto BR66 and ties into Muckingford Road
	BR63	Connects to BR58 and provides access onto Muckingford Road
	BR233	Connects the A1013 and Long Lane, passing through a travellers' site
	BR206 and BR94	Route links a private track owned by the Foxhounds Riding School and Baker Street (B188) running parallel to the edge of the A13
	Heath Road	An unknown bridleway starts at Heath Road, runs parallel to the edge of the A1089 and connects to a footpath
	Orsett Heath	Unknown bridleway connects Orsett Heath Crescent (Orsett) and King Edward Drive (Little Thurrock), via a footbridge over the A1089
Footpath	FP193 & 98	Connect Tilbury Fort with Fort Road
	FP144	Connects Fort Road and Brunel Close, running along the edge of the Port of Tilbury vehicle handling centre
	FP200	Originates at Coalhouse Fort, travels through the East Tilbury Marshes and connects into Station Road
	FP68	Route links Gun Hill and Church Road
	FP72	Route links Biggin Lane and Turnpike Lane
	FP71, FP69 and FP70	A small network of footpaths that occupy a field between Turnpike Lane and Blue Anchor Lane
	FP74	Routes links Turnpike Lane and Linford Road
	FP66	Route link Blue Anchor Lane and Muckingford Road, crossing over BR58 (Coal Road)
	FP61	Route originates at Princess Margaret Road and connects to Low Street Lane and BR58 (Coal Road) at the point where they intersect

Facility	Route/Ref	Description
	FP60	Connects FP61 and Muckingford Road
	FP65 and FP64	Both link High House Lane to Hoford Road at different points. FP65 to the south and FP64 to the north
	FP75	Route links Linford Road to Cole Avenue (housing estate)
	FP78	Originates at High House Lane, crosses Brentwood Road and joins onto FP79 at the most northern point of Chadwell St Mary
	FP79	Originates in northern Chadwell St Mary, crosses FP78 and joins the A1013 at Rectory Road bridge
	FP95	Originates at the end of FP78 and ends at the start of FP107
	FP108	Route links Heath Road and an unknown footpath (Orsett Heath Crescent; Orsett, and King Edward Drive; Little Thurrock), via a footbridge over the A1089
	FP107	Originates at the end of FP95 and ties into Hornsby Lane
	FP43, FP45, FP46, FP106 and FP105	These paths connect to one another to create a route from Buckingham Hill Road, around the edge of Orsett Golf Centre, to the A1013 where the Rectory Road bridge is located
	FP105	Links the A1013 at Rectory Road bridge to Brentwood Road
	FP97	Originates at Long Lane, heading in a north direction but has no final destination, ending where it is intersected by the A13
	FP104	Connects the A13 Brentwood junction to Rectory Road as it enters Orsett
	FP93	Route links Mill Lane to Rectory Road at the point where it crosses the A13
	FP82	Route starts at School Lane but has no final destination, ending where it is intersected by the A13
	FP96	Connects Mill Lane and Baker Street (B188)
	FP207	Originates at Baker Street (B188) but ends where the A13 link road onto the A1089 intersects it

6.3.6 The oTMPfC makes reference to the development of a 'PRoW management plan' which would set out a list of all WCH routes expected to be impacted by the construction phase. Alternative temporary diversions would be provided prior to the closure for construction purposes, subject to engagement with the relevant local authority to ensure the measures put in place are fully informed.

6.4 Public transport network

6.4.1 Existing transport hubs (offering a point of interchange between different transport modes) located on both sides of the River Thames have been identified as important locations to provide onward transport services for the Project workforce (in the form of a shuttle bus service) to and from the construction areas and compounds. These hubs will provide an interchange point between the existing public network services, and the shuttle bus service.

The identified hub locations have been selected given the range of public transport provision available, as well as surrounding urban areas providing opportunities for walking and cycling. The selected hubs are:

- a. Gravesend (Bus, HS1, National Rail)
- b. Grays (Bus, National Rail)
- c. Upminster (Bus, National Rail, London Underground, London Overground)

Rail network

6.4.2 The frequency, described as trains per hour (tph), of rail services at the proposed hub locations are detailed in Table 6.3. These are correct as of March 2021.

Table 6.3 Frequency of rail services

Hub	Route	Frequency
Gravesend	Southeastern Highspeed	2tph Highspeed to London St Pancras 2tph Highspeed to Faversham 1tph extended to Margate, Ramsgate, Deal and Dover Priory
	Southeastern Charing Cross - Gravesend	2tph London Charing Cross via Sidcup
	Southeastern Victoria - Gravesend	2tph London Victoria via Bexleyheath
	Thameslink Luton - Rainham	2tph Luton 2tph Rainham
Grays	C2C London-Tilbury-Southend	4tph London Fenchurch Street: - 2tph via Rainham - 2tph via Ockendon 2tph Southend Central
Upminster	London Underground District Line	6tph to Richmond 6tph to Ealing Broadway
	London Overground Romford - Upminster	2tph to Romford
	C2C London - Tilbury - Southend	6tph London Fenchurch Street 2tph Southend Central via Ockendon 4tph Shoeburyness via Basildon

Bus and coach networks

6.4.3 The frequency of bus and coach services for the hub locations is detailed in Table 6.4. These are correct as of March 2021.

Table 6.4 Frequency of bus and coach services

Hub	Route	Frequency
Gravesend	3 Sole Street Station - Cobham - Gravened (via Gravesend Station)	1 service Thursday AM
	190 Chatham Waterfront Bus Station - Gravesend Station (via Chatham and Rochester Stations)	20 minutes (08:00-16:00) (30 minutes before 08:00 and after 16:00)
	306 Bluewater Bus Station - Gravesend - Borough Green - Sevenoaks (via Swanscombe, Northfleet Arriva Depot, Gravesend and Borough Green Stations)	2-3 evening services (19:00-23:00)
	308 Sevenoaks Bus Station - Gravesend Station (via Sevenoaks and Borough Green Stations)	9 services per day (07:00-19:00)
	455 Valley Drive - Gravesend Station	2 services per day
	480 (Sapphire) Riverview Park Cascades Leisure Centre - Dartford (via Gravesend, Northfleet Arriva Depot and Bluewater Bus Stations)	30 minutes (07:00-19:00)
	481 Riverview Park Cascades Leisure Centre - Bluewater Bus Station (via Gravesend and Ebbsfleet International Stations)	35 minutes (08:00-18:00) (120 minutes before 08:00 and after 18:00)
	483 Gravesend - Bluewater Bus Station (via Gravesend and Ebbsfleet International Stations)	30 minutes (07:00-17:00) (60 minutes from 17:00)
	489 Gravesend - New Ash Green (via Gravesend and Longfield Railway Stations)	7 services per day (07:00-17:00)
	490 (Sapphire) Singlewell - Dartford (via Gravesend and Bluewater Bus Station)	30 minutes (07:00-19:00)
	B Fastrack Gravesend Station - Temple Hill (via Ebbsfleet International, Greenhithe and Bluewater Bus Stations)	10-15 minutes (07:00-19:00)
Grays	22 Aveley - Grays Bus Station (via Lakeside and West Thurrock)	30 minutes (08:00-17:00)
	33 Chafford Hundred Station - Grays Bus Station	60 minutes (06:00-17:00)
	44 Lakeside - Grays Bus Station (via Purfleet and West Thurrock)	30 minutes (08:00-17:00) (60 minutes before 08:00 and after 17:00)
	66 Grays Bus Station - Tilbury (via Tilbury ASDA and Civic Square)	30 minutes (07:00-17:00)
	73 Lakeside - Tilbury (via Grays Bus Station and Chadwell St Mary)	30 minutes (08:00-17:00)

Hub	Route	Frequency
	77 Aveley - Tilbury (via South Ockendon, Lakeside, Grays Bus Station and Chadwell)	3 peak hour services (AM and PM)
	77A Aveley - Tilbury (via South Ockendon, Lakeside, Grays Bus Station and Chadwell)	30 minutes (evening only from 19:00-23:00)
	83 Lakeside - Chadwell St Mary (via Grays Bus Station and Socketts Heath)	30 minutes (08:00-19:00)
	88 Stifford Clays - Grays Bus Station (via Socketts Heath)	60 minutes (07:00-18:00)
	265 Grays - West Horndon Station	1 service Mon, Wed, Fri only
	269 Grays Bus Station - Brentwood (via Ockendon and Brentwood Stations)	4-5 services per day (07:00-18:00)
	374 Grays Bus Station - Basildon Bus Station (via Stanford-le-Hope Station)	8 services per day (07:00-18:00)
	Z1 Tilbury (Amazon) - Aveley (via Tilbury Station, Grays and Lakeside Bus Stations)	4 x AM peak hour services and 2 x PM peak hour services
Upminster	248 Romford Market - Cranham (via Romford, Upminster Bridge and Upminster Stations)	6-10 minutes (07:00-19:00)
	346 Upminster Station - Cranham	15 minutes (08:00-18:00) (30 minutes before 08:00 and after 18:00)
	347 Romford Station - Ockendon Station (via Harold Wood and Upminster Stations)	4 services per day
	370 Romford - Lakeside Bus Station (via Romford, Emerson Park, Upminster Bridge and Upminster Stations)	15 minutes (07:00-19:00)
	648 Romford Market - Cranham (via Romford, Upminster Bridge and Upminster Stations)	1 service per day

River network

- 6.4.4 A regular ferry service operated by Jetstream Tours runs from Monday to Saturday between Tilbury riverside and Gravesend. Tilbury sailings are to and from the Tilbury Riverside pontoon, off Ferry Road, Tilbury. On the Gravesend side, all sailings are to and from the Town Pier.
- 6.4.5 Crossings take between five and 10 minutes depending on river traffic and run from both sides approximately every 30 to 60 minutes between 05:00 and 19:00 (correct as of March 2021).

Construction impacts

- 6.4.6 The oTMPfC sets out details of how impacts arising from Project construction activities on public transport services during the construction period would be managed. This would take place alongside discussions with stakeholders, including public transport users, operators and local authorities.
- 6.4.7 The oTMPfC sets out that the Project would take the following considerations and objectives into account:
- a. Maintain existing routes (as far as reasonably practicable)
 - b. Provide temporary diversions, temporary bus stops when and where required
 - c. Seek view of local authorities when designing diversion routes and temporary bus stops
 - d. Reduce impact on the rail network and schedule
 - e. Engage with rail companies on proposed works and programme to reduce impacts

6.5 Hub accessibility

- 6.5.1 Plate 6.1 to Plate 6.3 illustrate the catchment area for travelling to each of the proposed hub locations by train or underground within a maximum one-hour travel time. For the Gravesend hub, south of the River Thames, the one-hour travel time catchment extends to St Albans in Hertfordshire to the north-west, Maidstone to the south and Whitstable to the east, both in Kent.
- 6.5.2 For the hubs north of the River Thames (Upminster and Grays) these show a similar catchment area extending out to central London to the west, and Southend-on-Sea to the east. As indicated by the green and blue markers, there is also a considerable catchment area within a maximum of 30 minutes' travel time by rail, with the majority of locations in east London, Thurrock and parts of Essex within only 15 minutes travel time to Upminster, and within 30 minutes travel time to Grays.

Plate 6.1 Rail accessibility to Gravesend transport hub

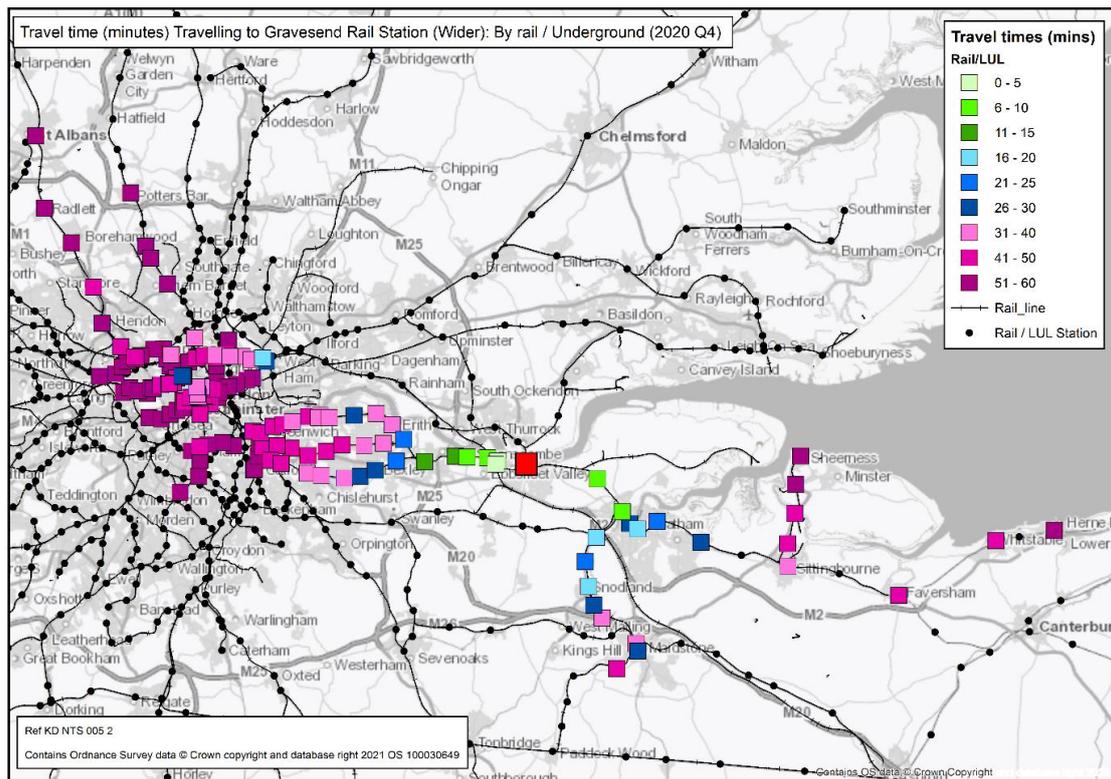


Plate 6.2 Rail accessibility to Grays transport hub

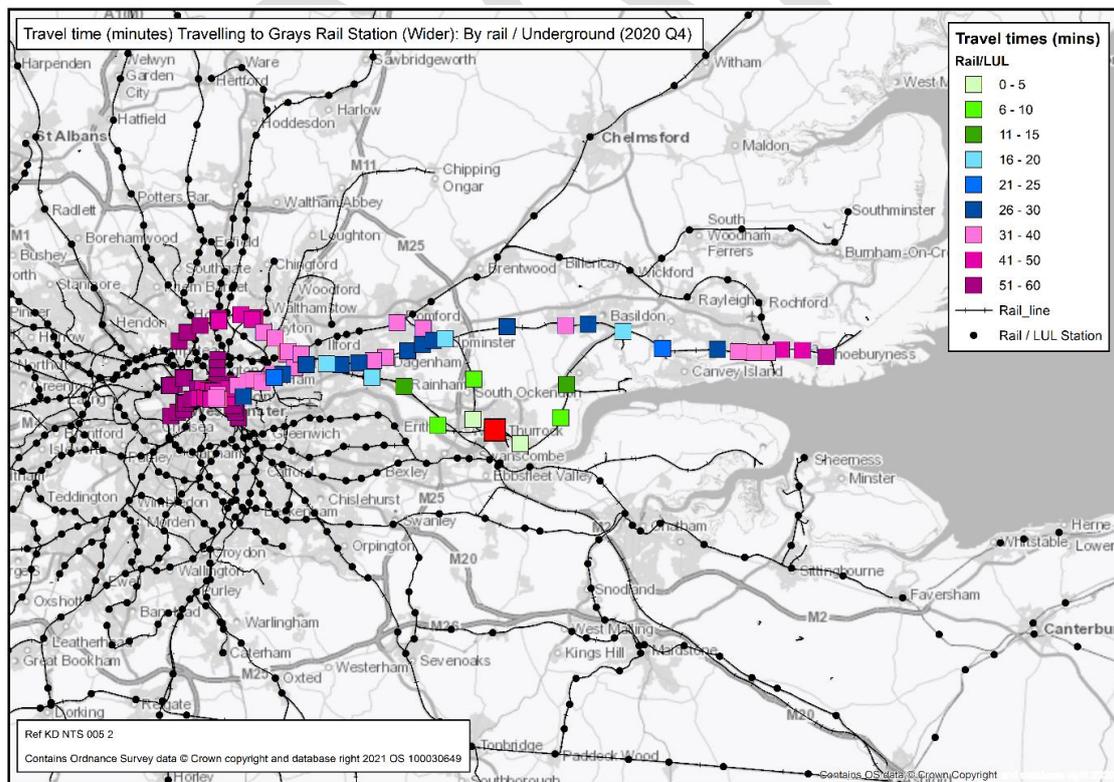
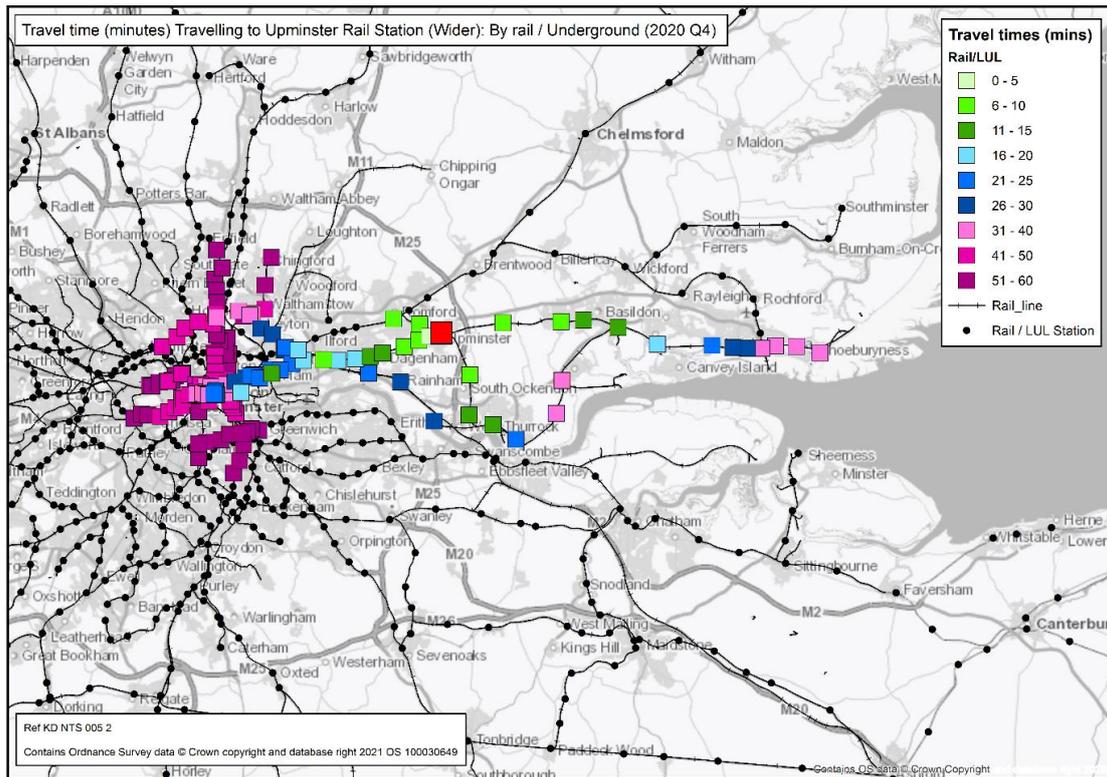


Plate 6.3 Rail accessibility to Upminster transport hub



6.5.3 Plate 6.4 to Plate 6.9 illustrate the walking and cycling routes in proximity to all three proposed hub locations, and the travel time associated with these modes of travel for trips up to 30 minutes. For walking, this appears to capture a distance of approximately 2km from each of the hubs while for cycling this extends to a distance of approximately 5-7km comprising a number of towns and suburban areas situated in the wider vicinity of the hub locations.

Plate 6.4 Walking times to Gravesend transport hub

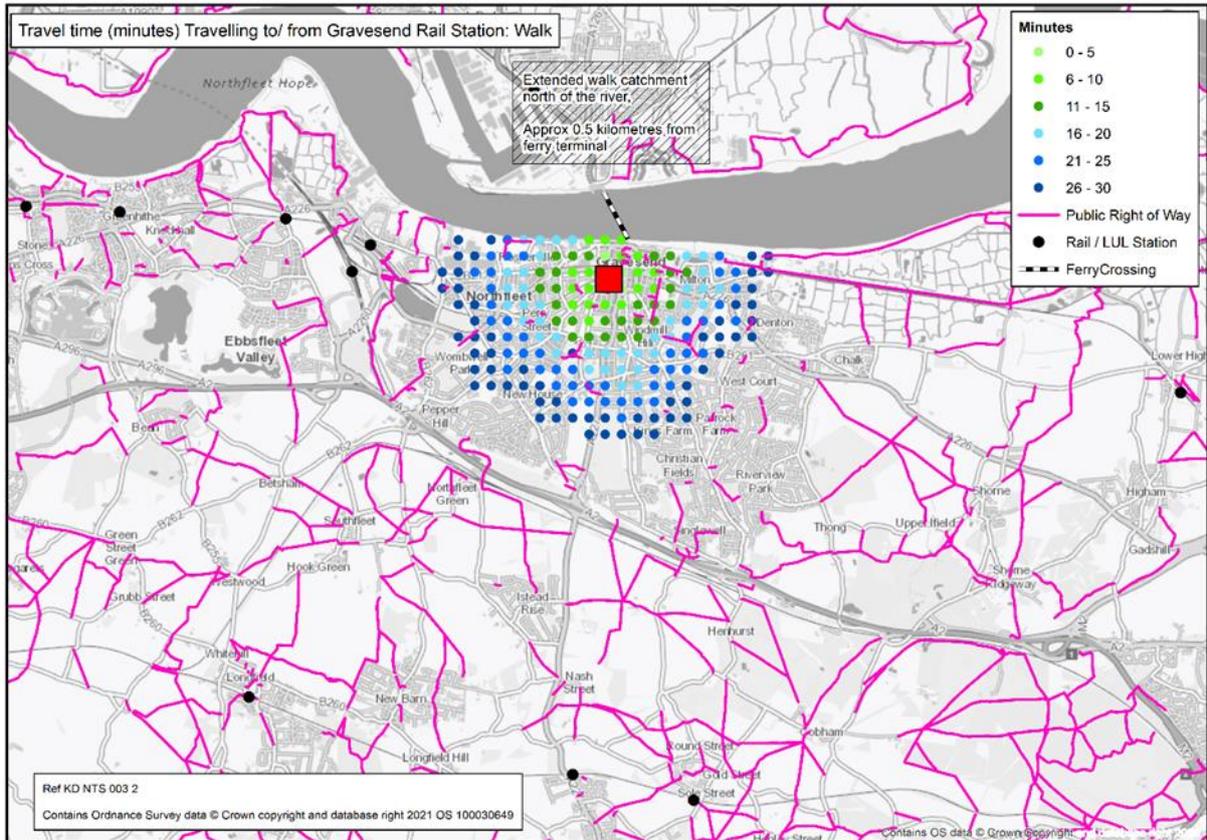


Plate 6.5 Walking times to Grays transport hub

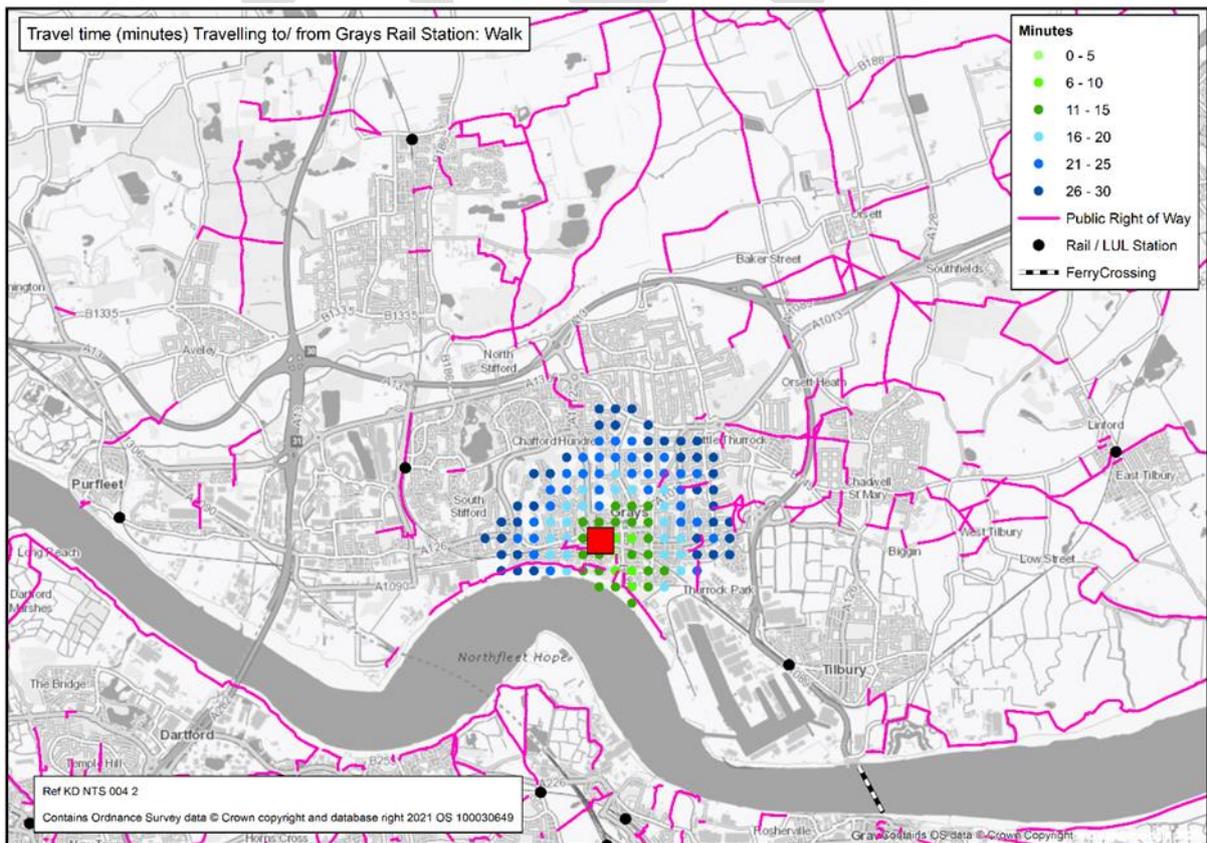


Plate 6.6 Walking times to Upminster transport hub

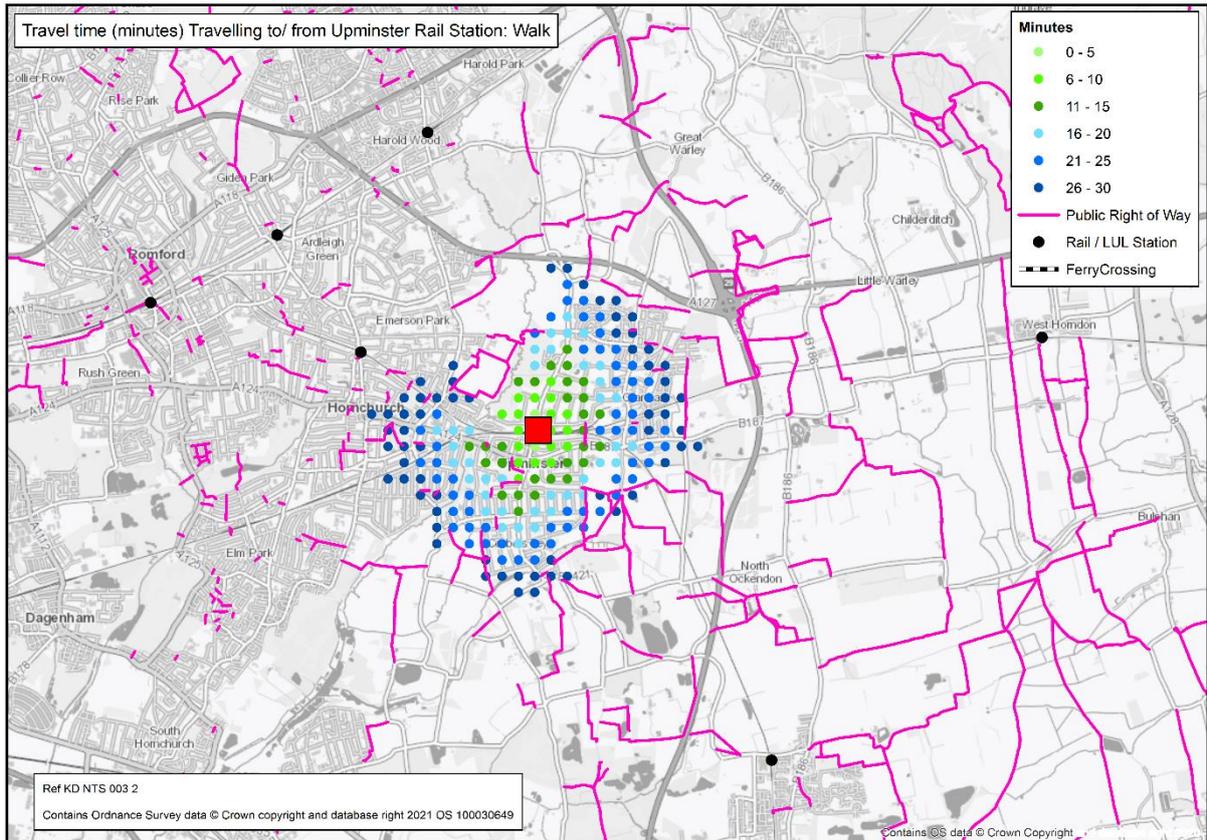


Plate 6.7 Cycle times to Gravesend transport hub

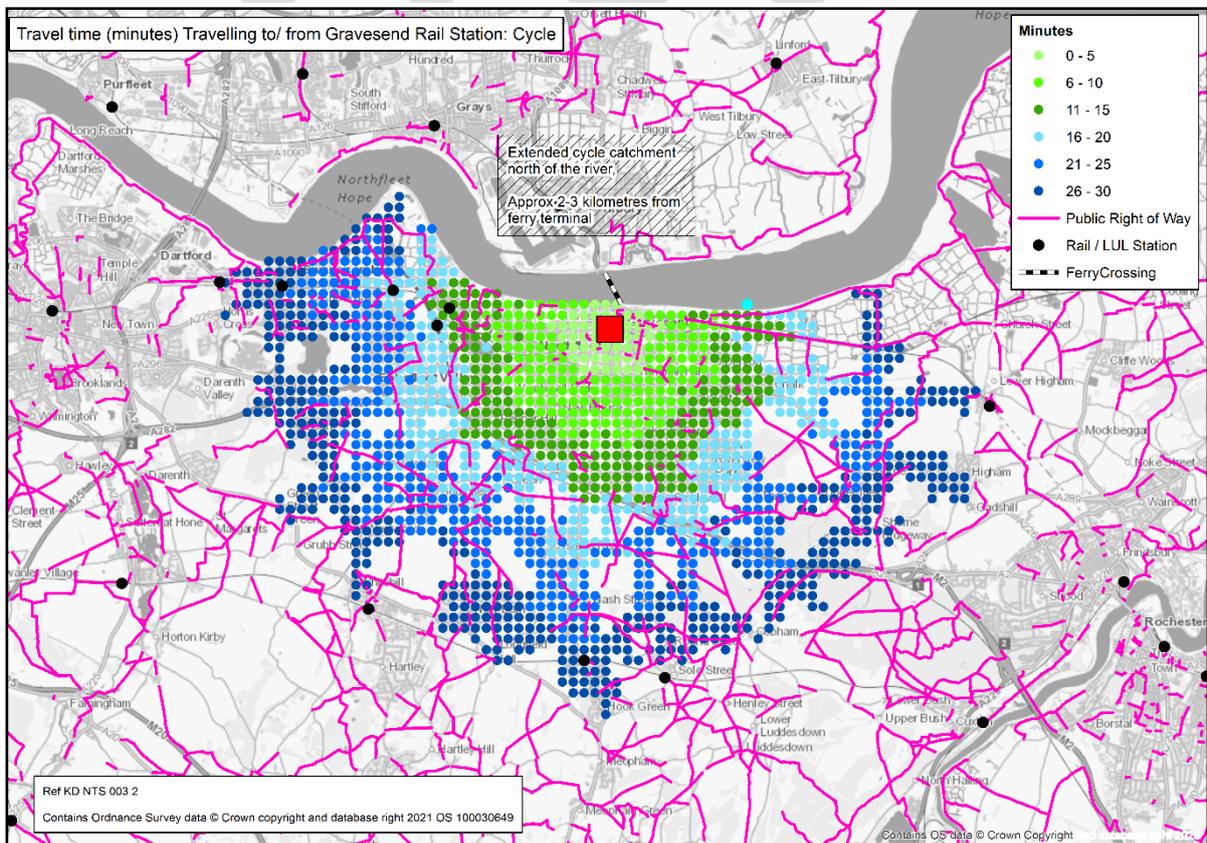


Plate 6.8 Cycle times to Grays transport hub

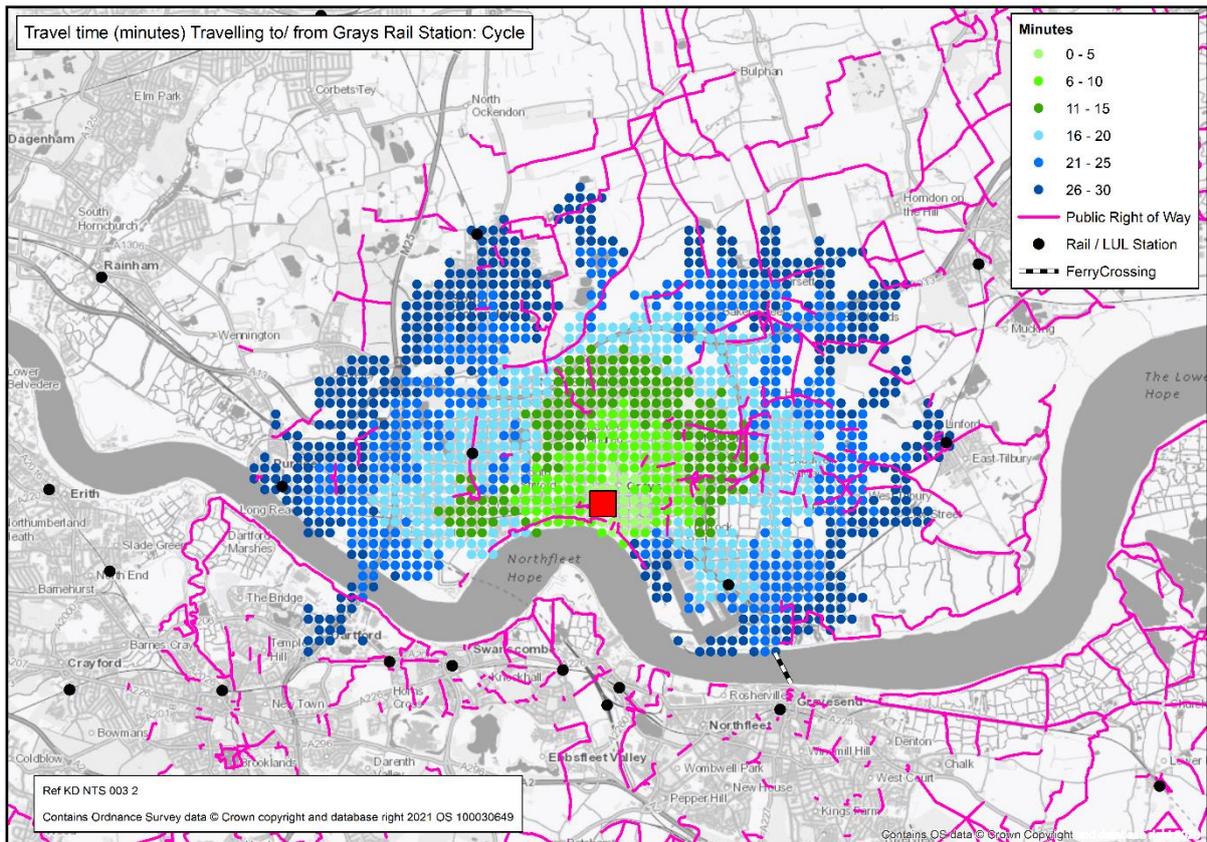
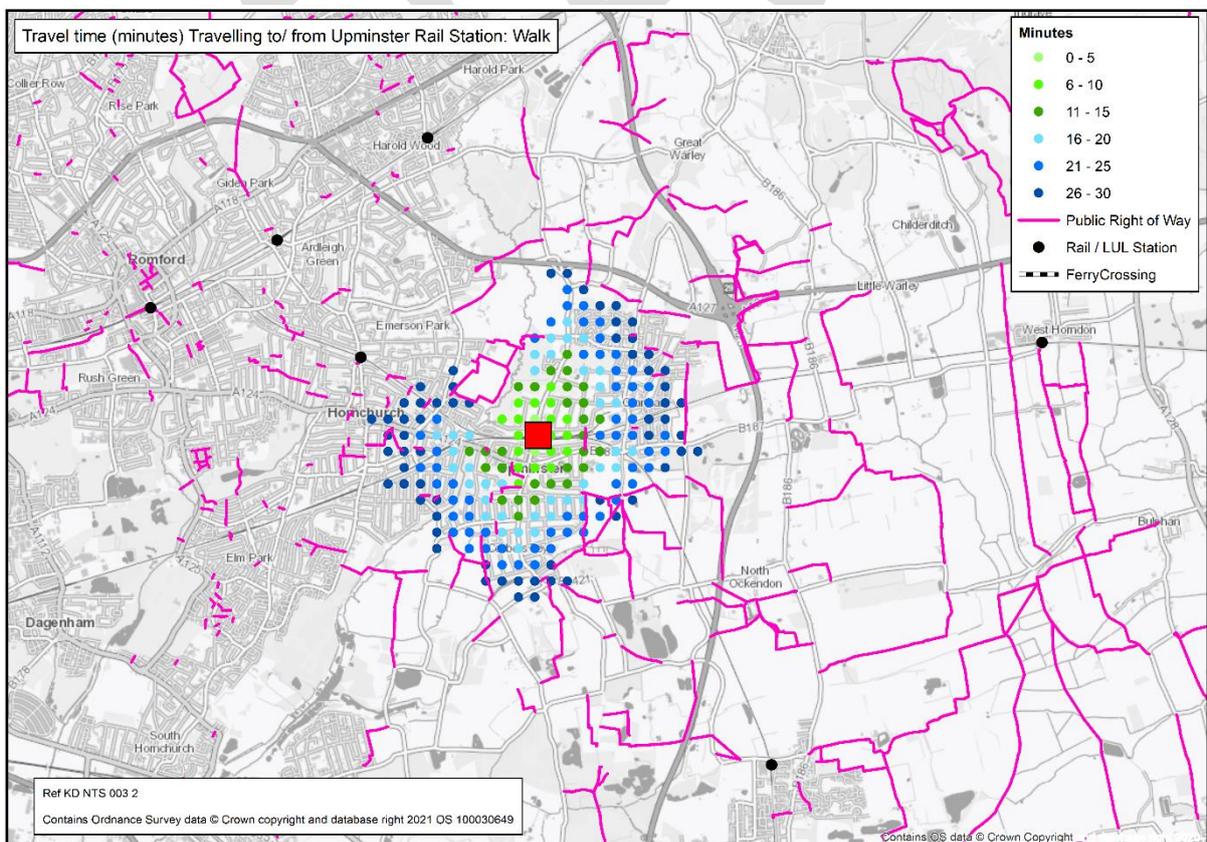


Plate 6.9 Cycle times to Upminster transport hub



- 6.5.4 Plate 6.10 to Plate 6.12 illustrate the catchment area for travelling to each of the hub locations by public transport modes other than rail (namely bus and ferry services) within a maximum 30-minute travel time (rail services are shown to identify how these public network routes interrelate across a multimodal transport system). At Gravesend, the catchment extends to Dartford to the west; south of the A2; and across to Higham in the east. There is also a small catchment opportunity to the north of the River Thames in Tilbury as a result of the ferry service available. Similarly to the cycle network, bus services also comprise a number of towns and suburban areas situated in the wider vicinity of the hub locations, extending a slightly greater distance of approximately 10km in some instances.
- 6.5.5 For Upminster, bus routes are focused within the London Borough of Havering, extending out to East Horndon to the east and South Ockendon and Grays to the south. This is mirrored for Grays, with the majority of its catchment focused in Thurrock, albeit extending to Upminster to the north, Rainham to the west and East Tilbury to the east.

Plate 6.10 Public transport accessibility to Gravesend transport hub

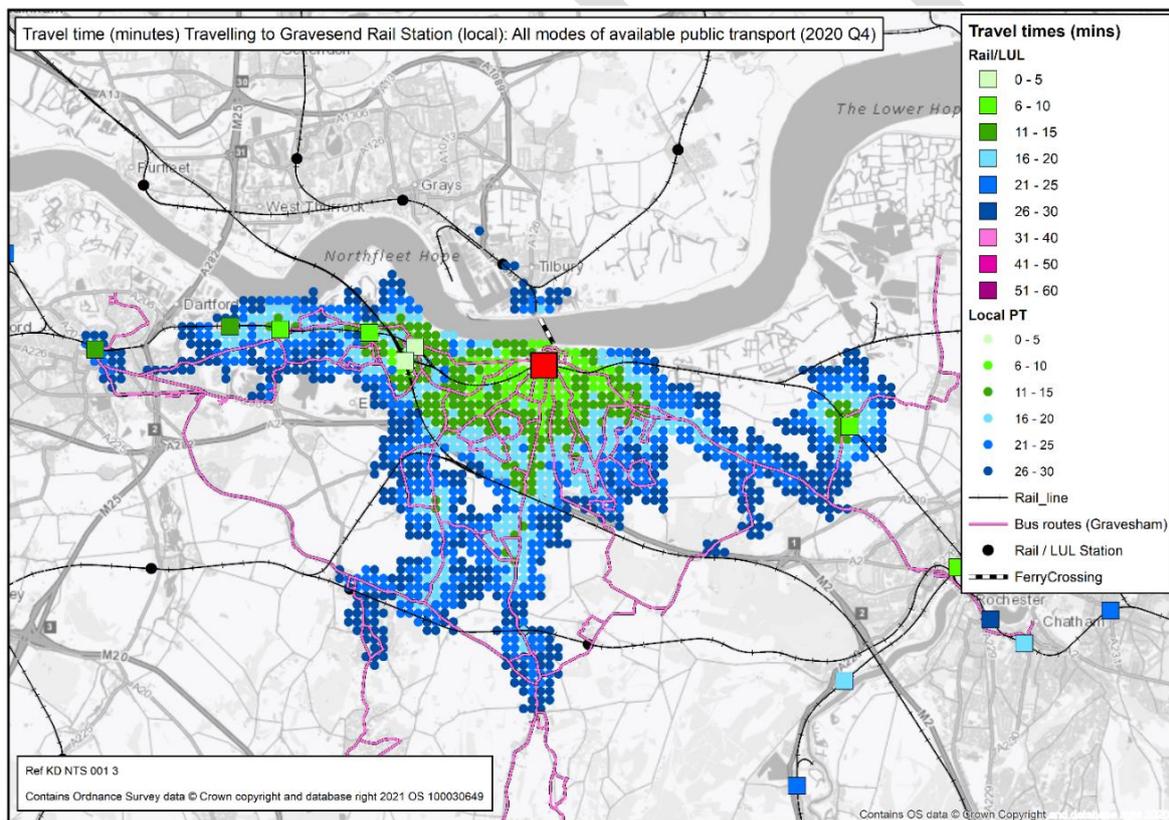


Plate 6.11 Public transport accessibility to Grays transport hub

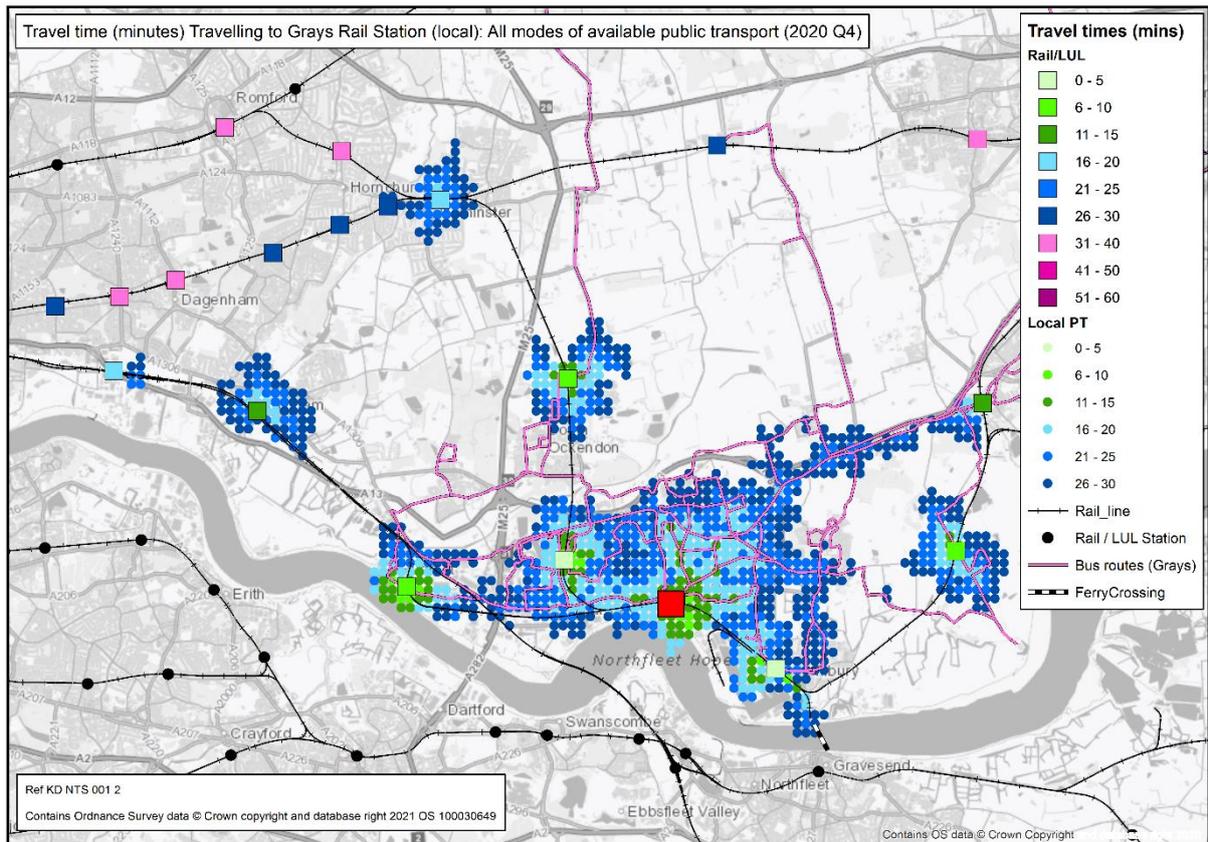
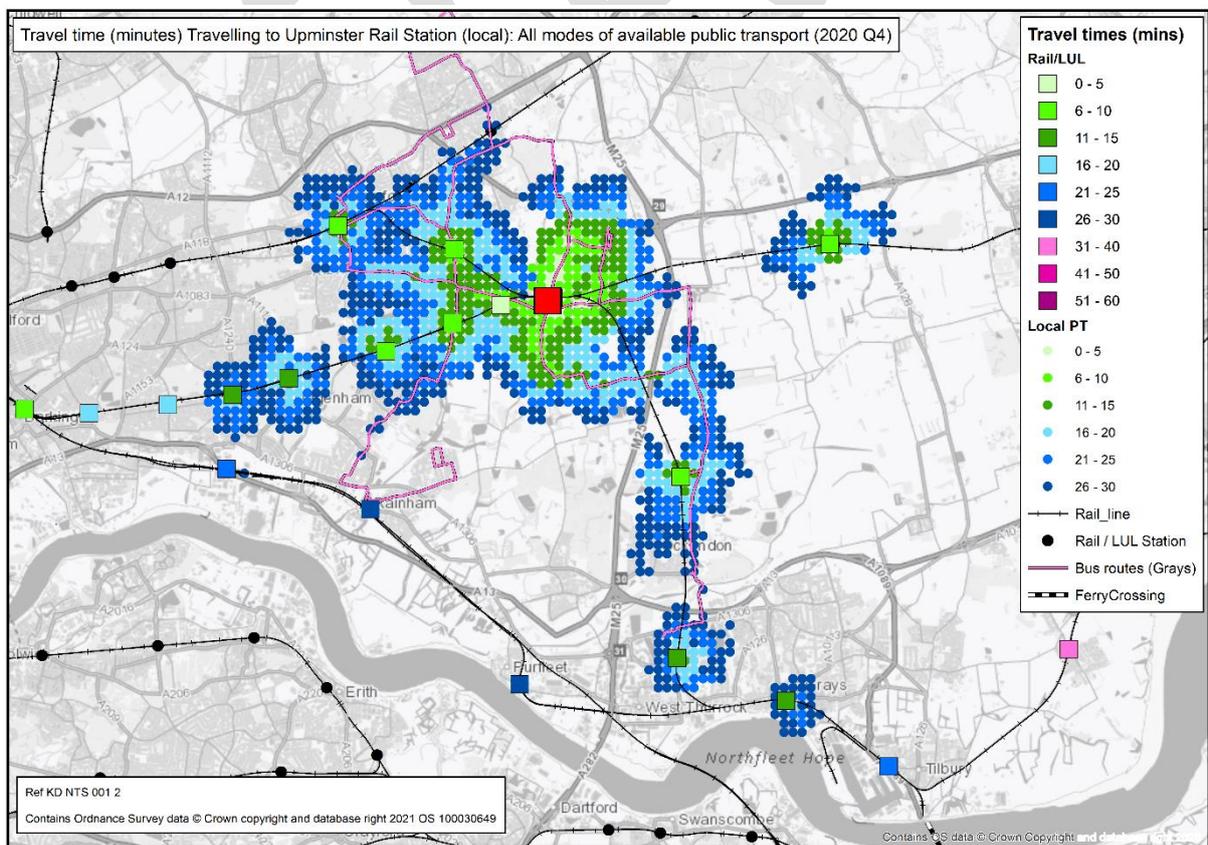


Plate 6.12 Public transport accessibility to Upminster transport hub



- 6.5.6 The wider highway connections to each of the proposed hub locations have also been identified. As shown above, trips originating from the Medway Towns, Gravesend and Dartford would be expected to utilise the hub located in Gravesend, also located south of the River Thames. This hub can be accessed via Singlewell Road which runs north to south from the station through the town towards the A2 which spans the southern edge of the town. The M2 links the A2 for journeys from the Medway Towns to the east, while the A282 and the A296 both link to the A2 for journeys from Dartford to the west.
- 6.5.7 For those travelling to the proposed Grays transport hub via road, the A13 spans to the north of the town, with both the A226 and the A1012 connecting the SRN southwards into the central area where Grays railway station is located. As shown in the plates above, a significant number of workforce trips are expected to originate within the local area, in close proximity to the proposed transport hub at Grays station.
- 6.5.8 For trips originating in Romford (or the wider Havering Borough area), the closest transport hub is Upminster with the A125/A124 connecting the Romford ring road to Upminster via Hornchurch.

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7 Policy and guidance

7.1 Introduction

7.1.1 This chapter provides a summary on the latest planning policy (national and local level), and guidance and best practice documents available with regard to travel planning. These (together with any new or updated guidance) would be referred to by the contractors, when producing the SSTPs for each construction area or compound, or group of construction areas and compounds, unless updated and replaced by government or the relevant local authorities. While it is acknowledged that a large majority of the guidance is set within the context of development sites rather than construction areas and compounds, it is expected the overall principles for implementing sustainable travel will be still be applicable to be used as a guide for the SSTPs.

7.2 National planning policy

7.2.1 This section outlines national planning policies in relation to travel planning requirements set out in the National Policy Statement for National Networks (NPSNN) and the National Planning Policy Framework (NPPF).

National Policy Statement for National Networks (NPSNN)

7.2.2 Paragraph 5.208 states that, where appropriate, the applicant should prepare a travel plan including management measures to mitigate transport impacts. The applicant should also provide details of proposed measures to improve access by public transport and sustainable modes where relevant, to reduce the need for any parking associated with the proposal and to mitigate transport impacts.

7.2.3 This is set out specifically in regard to strategic rail freight interchange developments, however, paragraph 5.209 goes on to state that for schemes impacting on the SRN, applicants should have regard to DfT Circular 02/2013 'The Strategic Road Network and the delivery of sustainable development' (or prevailing policy) which sets out the way in which the highway authority for the SRN, will engage with communities and the development industry to deliver sustainable development and, thus, economic growth, whilst safeguarding the primary function and purpose of the SRN.

Overarching National Policy Statement for Energy (EN-1)

7.2.4 This document sets out the overarching national policy for energy infrastructure, and applies to the full suite of energy NPSs and any associated development (referred to as energy NSIPs).

7.2.5 The policy acknowledges that the transport of materials, goods and personnel to and from a development during all project phases can have a variety of impacts on surrounding transport infrastructure and potentially on connecting transport networks, for example through increased congestion.

7.2.6 Paragraphs 5.13.3 to 5.13.5 set out that if a project is likely to have significant transport implications, a travel plan should be prepared where appropriate, including demand management measures to mitigate transport impacts. Details referring to proposed measures to improve access by public transport, walking and cycling, and to reduce the need for parking associated with the proposal and to mitigate transport impacts should also be provided.

National Policy Statement for Gas Supply Infrastructure and Gas and Oil Pipelines (EN-4)

- 7.2.7 This document, taken together with the Overarching Energy NPS (EN-1) sets out the national policy for the gas supply infrastructure and gas and oil pipelines, and follows the same high-level objectives, policy and regulatory framework for new nationally significant infrastructure projects, as set out in the Overarching Energy NPS (EN-1). This includes the key principles to be followed, policy on good design, and the assessment and handling of generic impacts that are not specific to particular technologies, as set out in the Overarching Energy NPS (EN-1).
- 7.2.8 Consistent with the instructions and guidance set out in the Overarching Energy NPS (EN-1), if a project is likely to have significant transport implications, a travel plan should be prepared where appropriate.

National Policy Statement for Electricity Networks Infrastructure (EN-5)

- 7.2.9 This document, taken together with the Overarching Energy NPS (EN-1) sets out the national policy for the electricity networks infrastructure, and follows the same high-level objectives, policy and regulatory framework for new nationally significant infrastructure projects, as set out in the Overarching Energy NPS (EN-1). This includes the key principles to be followed, policy on good design, and the assessment and handling of generic impacts that are not specific to particular technologies, as set out in the Overarching Energy NPS (EN-1).
- 7.2.10 Consistent with the instructions and guidance set out in the Overarching Energy NPS (EN-1), if a project is likely to have significant transport implications, a travel plan should be prepared where appropriate.

National Planning Policy Framework (NPPF)

- 7.2.11 Paragraph 111 of the NPPF states that all developments which will generate significant amounts of movement should be required to provide a travel plan, supported by a transport statement so that the likely impacts of the proposal can be assessed.
- 7.2.12 Travel plans therefore support national planning policy, which provides that planning should actively manage patterns of growth in order to make the fullest possible use of public transport, walking and cycling, and focus significant development in locations which are or can be made sustainable.

7.3 Local planning policy

- 7.3.1 This section outlines local travel planning policies, guidance and current schemes in relation to travel plans, as determined by the local highway authorities in proximity to the Project. This highlights the existing approach undertaken in each area, and the measures currently provided. SSTPs would also be expected to demonstrate compliance with up-to-date local travel planning policies, guidance and schemes in relation to travel planning.

Medway Council

- 7.3.2 The Medway Local Plan (2003)² sets out the Council's guidance on travel planning within Policy T14: Travel Plans. It states that Travel Plans will be required for all developments which require a Transport Assessment or as otherwise required by the Council's vehicle parking standards. This includes all substantial developments comprising employment, retail, leisure and/or service floorspace, smaller developments which would generate additional traffic movements in or near to an air quality management area, new or expanded educational facilities and where a local traffic problem would otherwise lead to a refusal of planning permission. A Travel Plan coordinator is also employed by the Council and can provide advice to existing companies and potential applicants for new built developments.
- 7.3.3 Medway Council promotes the use of company travel plans through their transport plans and policies guidance³ both to reduce the number of trips made by private cars in connection with business and to reduce the overall need to travel. The adoption of a company travel plan is a key element in the Council's strategy. The Council has set out to establish a forum of major employers in Medway to share initiatives around travelling to work. Medway Council's own Travel Plan offers a range of incentives (including the Medway carshare scheme and bus ticket and bicycle discounts) as well as supporting schemes to allow more flexible working and reduce the need to travel (including nine-day fortnight, reduced office attendance and increased homeworking). The reduction in traffic congestion and the improvement of air quality that should result from Travel Plans are essential elements of the council's core values.
- 7.3.4 Travel also forms an important part of Medway's Local Transport Plan (LTP). The third LTP, which runs from 2011, includes the development of a new travel strategy with a greater focus on cycling initiatives. During the second LTP period (2006-2011) 16 workplace Travel Plans were adopted, targeting in excess of 15,000 employees.

Kent County Council

- 7.3.5 Kent County Council has been working with a variety of partners to secure sustainable and active travel funding, to support its sustainable travel⁴ ambitions and sustainable transport projects across Kent. These projects aim to promote sustainable transport options, active travel (walking and cycling) and encourage the switch to alternatively fuelled vehicles. Kent County Council is committed to making sustainable travel an attractive, realistic choice for journeys which will help to improve air quality, reduce congestion on the roads, and promote health and wellbeing in Kent.
- 7.3.6 Among these projects are schemes to improve sustainable travel for education, adult cycle training, access to the 'liftshare' platform to help commuters find car share members, access to 'KentConnected' a free journey planner app, and a number of walk and cycle to work schemes and initiatives.

² https://www.medway.gov.uk/downloads/file/2400/medway_local_plan_2003

³ https://www.medway.gov.uk/info/200161/travel/545/transport_plans_and_policies/3

⁴ <https://www.kent.gov.uk/about-the-council/strategies-and-policies/transport-and-highways-policies/transport-and-highways-funding/sustainable-transport-projects>

Gravesham Borough Council

- 7.3.7 The Gravesham Local Plan Core Strategy (2014)⁵ sets out Gravesham Borough Council's guidance on travel planning within Policy CS11: Transport. It states that new developments are to prepare and adopt Transport Assessments and Travel Plans (as appropriate) using Kent County Council's guidance, Transport Assessments and Travel Plans, October 2008. This will ensure new developments mitigate their impact on the highway and public transport networks as required, and ensure the delivery of travel choice and sustainable opportunities for travel.

Thurrock Council

- 7.3.8 The Thurrock Core Strategy and Policies for Management of Development (2015)⁶ sets out the Council's guidance on travel planning within Policy PMD10: Transport Assessments and Travel Plans. This ensures new developments play their role in implementing travel planning measures and the intensive application of Smarter Choices (which has been found to reduce car use by up to around 10%). The purpose of the policy is to encourage safe, healthy and sustainable travel options. By reducing car travel, the Council consider that Travel Plans/Assessments can improve health and wellbeing, free up car parking spaces, and contribute positively to mitigating adverse transport, environment and amenity impacts. Travel plans must be consistent with the Council's policies, and ensure it is clear the development can provide adequate provision for existing or planned transport infrastructure and other proposed measures. The objectives within the Travel Plans will be monitored, and must include targets, coupled with penalties if outcomes are not being met.
- 7.3.9 Thurrock Council travel planning guidance⁷ is set out into four key areas; workplace, rail stations, school, and development-related travel planning, in order to provide suitable and tailored advice for the different development types.
- 7.3.10 The guidance clearly sets out the importance of travel planning in line with development planning, which provides a long-term strategy to mitigate and monitor the negative transport impacts of development, promote sustainable development, and maximise the potential for sustainable travel behaviour. Thurrock Council also provides Travel Plan assessment guidance and a checklist to assist with the development of the documents.
- 7.3.11 The workplace travel plan guidance provides support to businesses looking to promote and encourage sustainable travel use among their staff members. The example set out by Thurrock Council highlights the benefits available to both employers and employees when effective workplace travel planning is implemented, including lower costs for travel, increased staff productivity and health and wellbeing, and reducing parking issues by encouraging staff to travel by other means.

⁵ <https://drive.google.com/file/d/1bJTqQLmhbzjqZFibl-5WFb2tbvixXpLk/view>

⁶ https://www.thurrock.gov.uk/sites/default/files/assets/documents/core_strategy_adopted_2011_amended_2015.pdf

⁷ <https://www.thurrock.gov.uk/travel-planning/workplace-travel-plans>

- 7.3.12 The rail operator c2c works with Thurrock Council and others to develop rail station Travel Plans for the stations in Thurrock, in order to reduce congestion around the station, lessen the station's effect on the environment and encourage more travel by rail. A station Travel Plan will include information on the site and surrounding area, details of any problems, passenger and operator views, and information on how passengers travel to and from the station.

Transport for London

- 7.3.13 The 2021 London Plan⁸ sets out the Greater London Authority (GLA) guidance on travel planning within Policy T4: assessing and mitigating transport impacts. With regard to national or local guidance, Travel Plans should be produced alongside Transport Assessments and/or Transport Statements as part of development proposals, to ensure that impacts on the capacity of the transport network (including impacts on pedestrians and the cycle network), at the local, network-wide and strategic level, are fully assessed. This should focus on embedding the Healthy Streets Approach within, and in the vicinity of, new development. The phasing of development, and the use of travel plans, and freight strategies will help reduce negative impacts of development on the transport network and bring about positive outcomes.
- 7.3.14 The 2018 Mayor's Transport Strategy⁹ focuses on a new type of thinking, to put into practice the theory of reducing car dependency and increasing active, efficient and sustainable travel. This requires an understanding of how Londoners interact with their city, what defines their quality of life, especially in relation to streets. High-quality public transport services will also be required to provide alternatives to car use, connecting seamlessly to other forms of active, efficient and sustainable travel. The central aim is for 80 per cent of all trips in London to be made on foot, by cycle or using public transport by 2041.
- 7.3.15 Transport for London (TfL) provides travel planning guidance¹⁰ in line with national, regional and local policy, highlighting the need to reduce car dependency, increase travel choices and encourage sustainable travel. This guidance was produced in 2013, and an update was expected in 2020, but has not yet been published.
- 7.3.16 The guidance details a number of benefits that can be achieved through travel planning, which have a significant impact on the road network. This includes road safety improvements, reduced highway capacity issues and environmental improvements through reduced levels of congestion, carbon emissions, pollution, and noise. Other benefits away from the highway network include increased opportunities for active healthy travel, and improved travel choice, quality, and affordable access to services. Benefits for employers include the reduced demand for parking spaces (enabling land to be put to more cost-effective or commercially beneficial use and freeing space for active travel initiatives) and increased opportunities to feed into corporate social responsibility or sustainability initiatives.

⁸ https://www.london.gov.uk/sites/default/files/the_london_plan_2021.pdf

⁹ https://www.london.gov.uk/about-us/londonassembly/meetings/documents/s69151/PUB18_001_MTS_TheChallenge_Vision_230218-1.pdf

¹⁰ <https://tfl.gov.uk/info-for/urban-planning-and-construction/transport-assessment-guide/travel-plans>

- 7.3.17 The guidance states that the overarching purpose of a Travel Plan should be to encourage behaviour change and should aim to address any issues identified within the associated transport assessment. This should be done through setting out a package of measures, that clearly contribute to achieving the targets and meeting the objectives of the Travel Plan. To help set targets in context, the current Mayor's Transport Strategy (at the time this guidance was produced) aims to:
- a. achieve a 5% modal share for cycling (from the baseline of 2%)
 - b. significantly increase walking mode share above the baseline of 24%
 - c. reduce private motorised transport by 4% from the baseline of 43%
 - d. achieve a 60% reduction in London's CO₂ emissions by 2025
 - e. balance capacity and demand for public transport
- 7.3.18 The guidance states that including a timetable and action plan for delivering the measures (and a means of communicating this to the ultimate site users), along with an appointed Travel Plan Coordinator, is crucial in order to secure and enforce Travel Plan targets. This should be followed by monitoring and surveys, to ensure the site achieves the targets and objectives set out in the Travel Plan. A clear monitoring programme should be provided detailing what and how frequently surveys will be undertaken, who will be responsible and how this information will be reported.

London Borough of Havering

- 7.3.19 The London Borough of Havering Local Plan Proposed Submission (2016-2031)¹¹ sets out the Borough's guidance on travel planning within Policy 23: Transport Connections. It states that Travel Plans will be required for development as set out in TfL's latest Guidance on Travel Plan requirements, and that they will continue to promote the benefits of and support the development, delivery and monitoring of school, residential and workplace Travel Plans. Travel Plans submitted through the planning application process will be reviewed and monitored to ensure that developers are meeting their targets for modal shift. The Council will engage with local business to encourage the use of travel planning to increase modal shift to and from work, away from the private vehicle, minimising the need for car-based travel.
- 7.3.20 The London Borough of Havering currently provides transport and travel advice online¹², in particular advice for businesses on sustainable travel options such as cycling workplace schemes, promoting ultra-low emission vehicles and electric vehicles and the use of their 'Stravel' reward scheme. This website and app provides a platform to encourage new and current employees to travel more actively and sustainably with employees able to log journeys, compete on leader boards and team challenges to earn rewards. The 'airTEXT' alert system is also encouraged, designed to alert users to when air pollution levels are expected to be elevated the following day, and provide users with suitable health advice.

¹¹ [https://www.havering.gov.uk/download/downloads/id/1909/lbhp1 - proposed submission local plan 2016-2031.pdf](https://www.havering.gov.uk/download/downloads/id/1909/lbhp1_-_proposed_submission_local_plan_2016-2031.pdf)

¹² <https://www.havering.gov.uk/downloads/20027/travel>

- 7.3.21 Key information and supporting maps are also available for cycling routes within Romford town centre, and along heritage cycle routes. There is also information on the ‘Walking for Health’ national scheme, which started in 2003 and encourages people to exercise for the benefit of their health. There are over 20 trained walk leaders and 19 walk venues.

Essex County Council

- 7.3.22 Essex County Council’s (ECC) sustainable travel guidance¹³ sets out how ECC aims to use its roads and transport network to promote sustainable economic growth in Essex, alongside guidance for creating Travel Plans for new developments, businesses, and schools.
- 7.3.23 ECC’s Travel Plan guidance aims to promote greener modes of transport for new developments, workplaces or new and expanding schools. ECC is committed to working with developers, businesses and consultants to create and deliver Travel Plans for new or expanding developments, and provide guidance notes, templates and other resources where required. ECC also has a dedicated Travel Plan Coordinator to help conduct site visits, promote the Travel Plan, monitor, and review residential Travel Plans, and supply and distribute travel information packs for these developments. The ‘smarter travel for Essex network’ scheme also promotes active and sustainable travel for organisations, offering support with issues such as car park management, making alternative travel modes an attractive option for employees, and entry into a National Accreditation Scheme.
- 7.3.24 ECC also has a number of sustainable travel initiatives for the wider area, including its ‘sustainable modes of travel strategy’ which outlines what ECC is doing to make it easier to travel around Essex, while reducing dependence on the private car and improving the environment. ECC also promotes an information page on their website ‘getting around in Essex’¹⁴ which provides details on travelling around the county by all transport modes, including cycle routes, PRowS and bus timetables. Other partnerships include working with the local rail operators to improve the local rail network (as part of the Rail strategy and the Community Rail Partnership) as well as working with Southend and Thurrock councils to deliver the South Essex Active Travel (SEAT) project, which aims to boost active travel and improve access to jobs, learning and skills in south Essex.

Brentwood Borough Council

- 7.3.25 The Brentwood Local Plan (2005)¹⁵ sets out Brentwood Borough Council’s guidance on travel planning within Policy T1: Travel Plans. It states that the Council will promote the widespread use of Travel Plans by businesses, schools, hospitals and other uses. All applications for proposals which are likely to give rise to significant transport implications (either of themselves or in conjunction with other proposals) will be required to provide a travel plan, incorporating measures to reduce travel to and from the site by car, provision of onsite facilities for cyclists, contributions to the improvement or expansion of public transport provision, the promotion of safe cycle and pedestrian routes, and provide for more environmentally friendly delivery and freight movements.

¹³ <https://www.essex.gov.uk/sustainable-travel>

¹⁴ <https://www.essexhighways.org/getting-around>

¹⁵ <https://www.brentwood.gov.uk/pdf/30102013165238u.pdf>

- 7.3.26 Travel Plans should be provided for major commercial and leisure developments or smaller developments in sensitive locations, new or expanded school facilities, and where they may address local traffic problems. Such plans should have measurable outputs, which relate to Local Transport Plan targets and arrangements for enforcement, in the event that agreed targets are not met. Applicants will be expected to enter into a legal agreement setting out how such measures are to be achieved.

7.4 Guidance and best practice

Government guidance

- 7.4.1 The Government guidance ‘Travel Plans, Transport Assessments and Statements’¹⁶ provides advice on when Travel Plans are required, and what they should contain. Travel plans are defined as ways of assessing and mitigating the negative transport impacts of development and are required for all developments which generate significant amounts of movement. Travel Plans should, where possible, be considered in parallel with development proposals and readily integrated into the design rather than retrofitted.
- 7.4.2 The primary purpose of a travel plan is to identify opportunities for the effective promotion and delivery of sustainable transport initiatives such as walking, cycling, public transport and tele-commuting, in order to reduce the demand for travel by less sustainable modes. It is noted, however, that while sustainable travel is the focus for Travel Plans, they should not be used to cut provision for cars in a way that is unsustainable and could have negative impacts on the surrounding areas.
- 7.4.3 These initiatives should be based on evidence of the anticipated transport impacts of development, and specific targets should be set against the baseline conditions before measures can be put in place to promote and encourage sustainable travel. Explicit outcomes should be set rather than just the identification processes to be followed and should address all journeys resulting from a proposed development by anyone who may need to visit or stay.
- 7.4.4 This is facilitated through the production of long-term management strategies for integrating proposals for sustainable travel into the planning process. Clear future monitoring and management arrangements need to be set out, with the consideration of any additional measures that may be required to offset unacceptable impacts if the targets should not be met.
- 7.4.5 The length of time over which monitoring will occur, and the frequency of monitoring should be proportional to the nature and scale of the development and should be agreed as part of the travel plan. Monitoring requirements should only cease when there is sufficient evidence for all parties to be sure that the travel patterns of the development are in line with the objectives of the travel plan. This includes meeting the agreed targets over a consistent period of time. At this point, the Travel Plan would become a voluntary initiative.

¹⁶ <https://www.gov.uk/guidance/travel-plans-transport-assessments-and-statements>

- 7.4.6 In summary, travel plans should evaluate and consider the following:
- a. Benchmark travel data including trip generation databases
 - b. Information concerning the nature of the proposed development and the forecast level of trips by all modes of transport likely to be associated with the development
 - c. Relevant information about existing travel habits in the surrounding area
 - d. Proposals to reduce the need for travel to and from the site via all modes of transport
 - e. Provision of improved public transport services

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8 Targets

8.1 SMART targets

- 8.1.1 Guidance from TfL and best practice, is that Travel Plan targets should be SMART: ‘Specific, Measurable, Attainable, Realistic and Time-bound’ (SMART).
- 8.1.2 At present there are a number of unknown factors and considerations including the locations from and to which construction workers would commute on a daily basis and details about individual members of the workforce.
- 8.1.3 Additionally, the nature of construction work would change over time. Initially work would involve more generalised civil engineering activities, where labour may be sourced locally. However, as construction progresses, the proportion of workers with specific skills (in tunnelling, for example) would increase and this in turn may influence the catchment area from which such workers can be drawn.
- 8.1.4 At this stage, the Project-wide targets within this FCTP can be categorised as changing the modal split and travel behaviour. This will set out the high-level aspirations for the SSTP targets, which will be refined as appropriate for each construction area and compound, to be developed further as ‘SMART’ targets.
- 8.1.5 The initial focus of changing the modal split and travel behaviour will be driven through the following aspirations:
- Minimising the number of single-occupancy vehicle journeys made to and from each site
 - Maximising the proportion of workers using public transport to travel to and from each site
 - Promoting health and active travel through encouraging workers to walk or cycle to and from the site where safe and practical
 - Reducing the distance travelled by workers
 - Reducing the need to travel for workers where practical
- 8.1.6 As noted above, given the uncertainties, setting specific mode share targets at a Project-wide level is difficult especially prior to undertaking initial baseline travel surveys (which will provide real-world data from the Project’s workforce). Project-wide targets would also be related to site-specific targets, which have not yet been prepared, and will be developed and included within the SSTPs.
- 8.1.7 As details of the workforce travel patterns would not be available until construction commences, 2011 Census Journey to Work data would be used as a basis for setting initial targets. Consideration will be made to the 2021 Census, but it is expected that the data would be impacted by the temporary changes required to travel, as a result of the Covid-19 pandemic. As a result, alternative sources of data may be utilised following discussions with the TPLG. More accurate mode share data would be derived after the baseline travel survey at each site has been conducted. This would be done within three months of the start of construction at that site.

8.1.8 The site-specific targets would be reviewed and agreed with the relevant stakeholders following analysis of the baseline travel survey results. It is proposed that the analysis of the survey will be completed within three weeks from the date of the survey and would be incorporated into the relevant SSTPs within six weeks of that date, unless otherwise agreed with the TPLG. This is detailed further in Chapter 4.

8.1.9 The mechanism for implementing these targets is set out in Chapter 10.

8.2 Changing the forecast modal split

8.2.1 Within the Transport Assessment (REF TBC), baseline assumptions have been made regarding the car driver mode share for each construction area and compound, depending on its size.

8.2.2 The difference between the car driver mode share and the total number of trips made to each site includes an allowance for car sharing, public transport, workforce transport (shuttle buses) and walking and cycling.

Reduction in single-occupancy vehicle trips

8.2.3 Targets in this area would seek to increase the share of multiple-occupancy car trips made to construction areas and compounds, through car-sharing incentives.

Increased use of sustainable modes of transport

8.2.4 Targets in this area would seek to increase the share of sustainable trips made, whether through public transport, workforce transport, walking or cycling.

Promoting health and active travel

8.2.5 The health of the workforce would be promoted through targets which focus on increasing walking and cycling trips to construction areas and compounds, either as part of the journey or for the full trip.

8.2.6 Any walking and cycling trips to sites will only be encouraged where these modes can be used safely.

8.3 Influencing travel behaviour

Reduced distance travelled

8.3.1 The Project's workforce is likely to be transient in nature, with some specialist labour moving into the area for a temporary period whilst other elements of the workforce will be sourced from the existing broader labour pool in the south-east.

8.3.2 Whilst some of the workforce will remain at home, a proportion of workers would likely move into the local area to take advantage of closer proximity to the Project. In addition, some of the workforce would be accommodated onsite within the Northern tunnel entrance compound.

8.3.3 For those moving into the local area, the consequent reduction in distance travelled to work is expected to positively affect the modal choices made by the workforce to further reduce the impact on the highway network.

Reduced need to travel

- 8.3.4 Reducing the need for trips to occur at all is the ultimate way in which the impact of workforce trips can be reduced.
- 8.3.5 It is appreciated that, for most construction areas and compounds, the scope for this would be limited, given that the workforce will need to be present onsite in order to undertake their work.
- 8.3.6 However, there would be some limited opportunities at the enterprise office to encourage home or remote working, especially for meetings, to reduce the number of trips made.
- 8.3.7 In addition, the workforce staying in the onsite accommodation within the Northern tunnel entrance compound would also make fewer trips overall, given the lack of a need to make a daily journey to work trip.
- 8.3.8 In addition, on other sites, there may be opportunities for trip consolidation, ensuring that all trips made are necessary.

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9 Measures

9.1 Introduction

- 9.1.1 Measures and incentives are a vital part of a Travel Plan, as they set out how it is proposed that targets would be met.
- 9.1.2 Given this is an FCTP, the measures set out in this chapter are indicative and will be developed further by the TPLG, Travel Plan Manager (TPM) and TPCs for incorporation into the SSTPs.
- 9.1.3 However, it would be expected that many, if not all of the measures here would be incorporated into the SSTPs, but adapted as necessary to ensure they would have the most impact against the targets.

9.2 Compound measures

Methodology

- 9.2.1 As set out in Chapter 5, the Project construction compounds would be of varying sizes. This, alongside the existing levels of accessibility and location of a particular compound, will have a bearing on the measures that it would be possible to successfully implement at each construction area or compound.
- 9.2.2 Depending on these varying elements, for each of the compounds covered by an SSTP, a tier would be allocated to that compound. The TPC for each SSTP would agree the tier to be used with the TPM, following suitable consideration of each of the varying elements.
- 9.2.3 The tiers provide a framework for the proposed measures, and sites in higher tiers would be expected to incorporate measures from the lower tiers. As such, the measures contained within tier 1 should be seen as a minimum set of interventions that would be applied across all sites.
- 9.2.4 Further measures for SSTPs would be proposed as part of their development and would need to be agreed with the TPLG.

Tier 1

- 9.2.5 The measures set out within this tier should be seen as the base level of measures that would be implemented across all construction areas and compounds:
- a. An SSTP site-specific welcome pack, noticeboard and intranet/website page providing details of the SSTP, key contacts, the measures in force at that construction area or compound, and local public transport information
 - b. Access to an accommodation helpdesk, providing support and assistance to obtain accommodation
 - c. Access to schemes such as cycle to work and season ticket loans
 - d. Exploration of subsidised or discounted public transport

- e. Facilities for walkers and cyclists (secure cycle parking, changing facilities, showers and lockers)
- f. Onsite vending machines providing a range of snacks and drinks plus provision for making hot drinks plus chilled food storage provision
- g. A car park management scheme which would seek to ensure car parking spaces meet demand (ideally reducing the number over time)
- h. A car-sharing scheme, enabling staff to sign up to offer or look for car-sharing opportunities
- i. Priority car parking for car-share scheme users
- j. Minibus shuttles to and from local public transport hubs and between construction areas and compounds

Tier 2

9.2.6 Measures in tier 2 would apply in addition to those outlined in tier 1, and include:

- a. Additional facilities for walkers and cyclists (laundry facilities)
- b. Personalised travel planning services for the whole workforce

Tier 3

9.2.7 Measures in tier 3 would apply in addition to those outlined in tiers 1 and 2, and include:

- a. Onsite canteen providing hot meals
- b. EV charging points for electric vehicles

9.3 Enterprise office measures

9.3.1 The enterprise office would operate throughout the construction programme, and the hours that the majority of staff would work would be different to those in place at construction compounds – in that the majority would be onsite for standard office hours.

9.3.2 The enterprise office would comply with all the measures set out in tiers 1 and 2 above, with further consideration to be given for additional measures as determined through the SSTP for the office.

9.4 Securing process

9.4.1 The measures set out here will be secured by way of Schedule 2 Requirement, to ensure that there is commitment to their delivery.

10 Implementation strategy and action plan

10.1 Introduction

- 10.1.1 This FCTP sets out an overarching action plan for key tasks and measures, alongside associated timescales and responsibilities, to be achieved across all construction areas and compounds during the construction period of the Project. This is set out in Table 10.1. and represents all tasks required to be undertaken as a minimum.
- 10.1.2 This overarching action plan aims to provide clear guidance on the responsibilities of the TPCs and TPM and where wider involvement is required from the TPLG, throughout the Project's construction period.
- 10.1.3 The overarching action plan also identifies a programme of regular scheduled activities and monitoring for the TPCs to carry out during the Project's construction period. This will identify which measures are the most effective for the TPCs to implement.
- 10.1.4 The TPCs will also be required to set out separate action plans within the SSTPs, to include short, medium, and long-term activities. These may need to include additional tasks where required, in order to ensure effective implementation of site-specific measures and targets. In addition, modifications may need to be made throughout the Project's construction period to respond to changing requirements and circumstances.

10.2 Overarching action plan

- 10.2.1 Table 10.1 sets out the key tasks required as a minimum to be achieved across all construction areas and compounds during the Project's construction period.

Table 10.1 Project action plan

Item	Action	Designated responsibility	Indicative timeframe for completion
1	Appointment of TPCs (provide contact details to TPLG)	Highways England/ contractors	At least six months prior to construction commencement
2	Meet with the TPLG to discuss the initial timeframes associated with the measures set out	TPCs/TPM/ TPLG	At least six months prior to construction commencement
3	Develop an effective communications strategy to support implementation of the SSTPs (marketing and branding)	TPCs	At least six months prior to construction commencement
4	Organise and hold recurring (monthly) TPLG meetings	TPCs/TPM/ TPLG	At least six months prior to construction commencement
5	Establish a central database for organising workforce travel arrangements, obtaining staff postcodes to examine travel patterns and distribution	TPCs	At least six months prior to construction commencement

Item	Action	Designated responsibility	Indicative timeframe for completion
6	Organise a car-share scheme (align with planned shift patterns and workforce numbers) including contractual agreements	TPCs/TPM	At least six months prior to construction commencement
7	Organise transport hub shuttle bus services (align with planned shift patterns and workforce numbers) including contractual agreements	TPCs/TPM	At least six months prior to construction commencement
8	Develop car park management strategy (align with planned shift patterns and workforce numbers) for both on site and off site car parking.	TPCs/TPM	At least six months prior to construction commencement
9	Arrange onsite staff facilities (including showers, lockers, changing facilities, welfare areas)	TPCs/TPM	At least six months prior to construction commencement
10	Set out dates for regular reviews of periodic actions to ensure effective implementation	TPCs	At least six months prior to construction commencement
11	Desktop-based research to collate the necessary local transport network information	TPCs	Within three months prior to construction commencement
12	Review active travel (walking and cycling) facilities within the vicinity of the site	TPCs	Within three months prior to construction commencement
13	Prepare welcome packs and construction area and compound noticeboards	TPCs	Within three months prior to construction commencement
14	Implementation of travel surveys	TPCs	Within three months prior to construction commencement
15	Analysis of travel surveys	TPCs	Within three months prior to construction commencement
16	Analysis of workforce origin locations to identify journey to work patterns (where available)	TPCs	Within three months prior to construction commencement
17	Develop travel initiatives and incentives in line with SMART targets and initial analysis and survey findings	TPCs/TPM/ TPLG	Within the first three months of construction
18	Monitor travel patterns through use of multiple data sources	TPCs	Within the first three months of construction
19	Repeat travel survey	TPCs	Within the first three months of construction
20	Review travel survey and implement remedial measures	TPCs/TPM	Within the first three months of construction

Item	Action	Designated responsibility	Indicative timeframe for completion
21	Review shuttle bus services and construction area and compound facilities	TPCs	Within the first six months of construction (repeat every three months)
22	Review car-share scheme and car parking arrangements	TPCs	Within the first six months of construction (repeat every three months)
23	Review maintenance of agreed walking/cycling routes	TPCs	Within the first six months of construction (repeat every three months)
24	Maintain and review the communications strategy	TPCs	Within the first six months of construction (repeat every three months)
25	Maintain public transport information	TPCs	Within the first six months of construction (repeat every three months)
26	Repeat travel survey	TPCs	Within the first six months of construction (repeat every six months)
27	Hold ad hoc steering group meetings with workforce	TPCs	Within the first six months of construction (repeat every three months)
28	Adapt initiatives and incentives in line with SMART targets	TPCs/TPM/ TPLG	Within the first six months of construction (repeat every three months)
29	Review of FCTP and SSTPs and make modifications where needed	TPCs/TPM/ TPLG	Within the first six months of construction (repeat every three months)

10.3 Funding

- 10.3.1 Highways England would fund the preparation, implementation, and operation of the FCTP, including the TPM role and activities related to the implementation of the FCTP and the TPLG.
- 10.3.2 Highways England would also fund the role of the contractors (who would be required to provide the TPC roles, preparation of the SSTPs and the implementation and monitoring of SSTP measures).

11 Monitoring and review

11.1 Introduction

- 11.1.1 Monitoring is an important part of achieving Travel Plan success, as noted in Government guidance. It provides an evidence base to inform the review and evaluation of Travel Plan measures on a continuous basis.
- 11.1.2 This FCTP and the SSTPs would be actively implemented throughout the construction of the Project. Highways England, contractors, subcontractors, and suppliers would all be obliged to commit to the monitoring and review process, as detailed below.

11.2 Travel surveys

- 11.2.1 Employee travel surveys would be conducted by the TPCs at each site within three months prior to construction commencement. These would then be repeated within the first six months of construction, and then every six months thereafter during the construction phase. A common survey structure would be set by the TPM to enable standardised information to be captured across the Project. This would be supplemented by discussions with the TPCs to ensure that relevant site-specific information is collected in each location. These surveys would be iTrace compliant and would allow progress towards targets within the FCTP and SSTPs to be reviewed.

11.3 Review programme and Travel Plan updates

- 11.3.1 The TPLG would be responsible for reviewing the operation of this FCTP and the SSTPs and would require continuous engagement for review and discussion as part of the monthly TPLG meetings. The review would be based on the targets and indicators identified and the regular reporting from the TPM.
- 11.3.2 Following the receipt of information from the TPCs, the progress on the effectiveness of this FCTP and the SSTP action plans would be reviewed, audited and reported to Highways England by the TPM every six months throughout the duration of construction.

11.4 Remedial measures

- 11.4.1 In the event of this FCTP and the SSTP targets not being met, the TPLG would meet and agree whether the shortfall is significant (ie it is possible that failure to achieve a mode share target may be offset by lower overall trip generation or better performance in another area of the plan).
- 11.4.2 If the degree of shortfall is considered to be significant, the TPM, along with Highways England and the relevant TPC, would agree a package of remedial measures designed to address the shortfall in relation to the initial targets set out in the SSTPs. These measures would be presented to the TPLG for agreement, including a timescale over which the success of these measures should be reviewed.

- 11.4.3 Proposals may include further use of measures set out in the Travel Plan or drawing on measures set out in national and/or local highway authority guidance or other sources and may be implemented directly by Highways England if appropriate. The emphasis of addressing any target shortfall would be to consider 'soft' measures first, including incentives or disincentives designed to address the shortfall.

11.5 Funding

- 11.5.1 Funding for the monitoring of each SSTP would be provided by Highways England (as set out in Section 10.3).
- 11.5.2 It would be expected that a sum of money for each construction area and compound be held by the contractors to cover proportionate remedial measures. The exact sum of money will be agreed between the contractors and Highways England as part of their appointment.
- 11.5.3 If remedial measures are required at a particular site these would be proposed as set out in Section 11.4. If the measures agreed require funding in excess of that available, or the funding set aside has been previously exhausted, Highways England and the contractors will enter discussions to agree the source for funding between them.

12 Summary

- 12.1.1 This document is the Framework Construction Travel Plan (FCTP) for the Lower Thames Crossing (the Project).
- 12.1.2 The document is designed to provide a framework for how the impacts of the Project's construction workforce on the highway network would be reduced and/or transferred to more sustainable modes.
- 12.1.3 The principles set out in this framework are intended to be implemented in a series of Site-Specific Travel Plans (SSTPs) which would be implemented for a construction area or compound, or collection of construction areas and compounds by the appointed contractors.
- 12.1.4 Details of the Project's proposed construction programme has been detailed, with particular regard to the workforce numbers and peak period trips.
- 12.1.5 Baseline conditions on the transport network in and around the Project's construction areas and compounds have been set out, providing context particularly in relation to existing sustainable transport provision.
- 12.1.6 Reference has been made to relevant national, regional and local policy and guidance with regard to Travel Plans.
- 12.1.7 This FCTP has set out the overall aims and objectives (established as commitments to be delivered by the Project) and intent of this framework so that it is clear, particularly to those implementing it, what the Project wishes to achieve and how.
- 12.1.8 This FCTP then sets out high-level targets and how more detailed targets will be developed for the SSTPs.
- 12.1.9 Measures have been set out, providing a minimum level for construction areas and compounds, and providing flexibility for further measures if locally appropriate.
- 12.1.10 The management and organisation of this FCTP and SSTPs are set out, providing clear roles and responsibilities.
- 12.1.11 These are then set out further in the implementation strategy and action plan which provide a simple checklist to ensure this FCTP is implemented as planned. Details of how funding for the implementation of this FCTP and SSTPs is also set out.
- 12.1.12 Finally, the monitoring and review programme has been set out, which includes details of remedial measures that would need to be implemented if targets are not being met.

Appendices

DRAFT

Appendix A SSTP example template

A.1 Contact details

- A.1.1 Site information (site name and full address of the site).
- A.1.2 Travel Plan Coordinator information (name, organisation, address, telephone and email contact details).
- A.1.3 Travel Plan Manager information (name, organisation, address, telephone and email contact details).

A.2 Introduction

- A.2.1 Each SSTP should be developed in accordance with the requirements and guidance set out in the FCTP.
- A.2.2 Provide a brief introductory paragraph which explains the purpose of this SSTP and how it fits within the FCTP.
- A.2.3 For example: *'to actively manage and control workers' travel to and from the construction site to limit traffic movement and reduce disruption in the vicinity of the site'*.

A.3 Site details

- A.3.1 Provide a summary of the site location and size of the site.
- A.3.2 Provide information on the relevant construction details such as the phases of development, anticipated outline programme and site access arrangements.
- A.3.3 Provide a breakdown of the anticipated number of construction workers and Highways England client staff, working hours and details of shift patterns.
- A.3.4 Where appropriate, provide this information for different phases of the construction work.

A.4 Local policies

- A.4.1 Provide a brief summary of relevant local transport, development, and environment policies, to ensure compliance with local travel planning policies, guidance and schemes in relation to travel planning measures.

A.5 Contractor policy

- A.5.1 Provide a brief summary of relevant contractor company policy in relation to transport, the environment and sustainability.

A.6 Existing transport conditions

- A.6.1 Describe the local transport network (walking and cycling facilities, public transport services and their location and the nature of the highway network).
- A.6.2 Provide information on the baseline mode split for site workers (this will initially be based on the latest available Census Journey to Work data for the site location but will be updated after initial travel surveys are conducted at each development site).

A.7 Objectives

- A.7.1 Set site-specific objectives. These need to align with the aims and objectives of the FCTP, as set out in the CoCP.
- A.7.2 The objectives must also have regard to:
- a. Mayoral policy and strategic guidance
 - b. Local authority policy and guidance
 - c. Contractor company policy
 - d. The challenges and opportunities specific to the site

A.8 Site-specific targets

- A.8.1 Set interim site-specific targets which link directly to each objective. These will be in addition to targets included within the FCTP.
- A.8.2 The site-specific targets should be based on the baseline mode share data and should be developed in line with the programme of construction at each individual site.
- A.8.3 Develop indicators by which the targets will be monitored. These should align with indicators included within the FCTP but also be relevant to this site.

A.9 Site-specific measures

- A.9.1 Develop site-specific measures which support the objectives and therefore enable the targets to be met. These will be in addition to the measures included within the FCTP. Relevant measures should be detailed according to each specific site.

A.10 Action plan

- A.10.1 Tabulate the measures and implementation programme in an action plan which is split according to short, medium, and long-term activities.
- A.10.2 Explain how each of the measures in the SSTP will be secured in terms of funding and implementation responsibilities.

A.11 Management and monitoring

- A.11.1 Summarise the management and monitoring requirements described in the FCTP, but in the context of the site. This should include the relationships between the TPC, the TPM, subcontractors, TPRs and all site workers.
- A.11.2 Make clear who is responsible for monitoring at this site (this is expected to be the nominated Travel Plan Coordinator for the site).
- A.11.3 Confirm the scope of the monitoring programme for this site.
- A.11.4 Provide information on the schedule of surveys and reviews (to match the requirements of the FCTP).
- A.11.5 Set out the mechanism for reviewing measures and targets regularly and revising them where necessary, particularly after the first employee travel survey for the site which will provide information on workers' travel patterns.

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