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Your ref: TR010032



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By email only, no hard copy to follow

Dear Mr Smith

**Application by National Highways for an Order Granting Development Consent for the Lower Thames Crossing
Natural England's response to Deadline 1 and to Procedural Deadline D including our Written Representations
Natural England User Code: 20034784**

Natural England is pleased to provide responses to Procedural Deadline D and our written representations for Deadline 1 for the Lower Thames Crossing Examination within this letter. For ease, we have provided:

- Our response to Procedural Deadline D in Annex A;
- Our answers to procedural matters requested for Deadline 1 in Annex B;
- A summary of our Written Representations in Annex C;
- Our detailed Written Representations within Annex D to this letter;
- Our initial review and list of concerns regarding the wording of the securing mechanism and Control Documents within Annex E to this letter; and
- A confidential report within a separate Annex F providing our advice in relation to species sensitive to disturbance which we consider should not be made public nor published on the Examination pages.

Natural England has worked collaboratively with the Applicant throughout the pre-application stage of this development. Throughout our engagement with the project, we have advocated that National Highways take a visionary approach to delivering the scheme, should consent be granted. Through careful route selection, design and innovation the scheme had the potential to deliver an exemplar of sustainable development avoiding or fully mitigating its environmental impact and leaving a truly visionary legacy for people and nature. The nature and scale of the project, being one of the largest road schemes in England, continues to provide a significant opportunity to contribute to the Government's 25 Year Environment Plan and the more recently published Environment Improvement Plan targets.

Natural England welcomes the collaborative approach, working in partnership with the Applicant which has allowed us to fully resolve many matters as detailed in our joint Statement of Common Ground. Within our Written Representations we have detailed the areas where we have yet to reach agreement highlighting where we consider additional information is needed to understand the nature and scale of the impacts, the scope for additional mitigation and clarity on the securing mechanisms.

We will continue to work with the Applicant to try and reach resolution on our outstanding concerns and will of course support the Examining Authority, as best we are able, during the Examination itself.

Yours sincerely

James Seymour
Area Manager Sussex and Kent Team
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Annex A: Natural England's response to Procedural Deadline D requests

Requests by Statutory Parties to be considered as an Interested Parties (IPs) by the ExA

Natural England registered as an Interested Party for the Lower Thames Crossing Examination on the 16 February 2023 and confirm that we wish to remain an Interested Party. I can confirm that the contact details for Natural England in relation to the Examination remain the same as at registration namely:

- Main contact: Sean Hanna, Senior Adviser
- Telephone number: 0208 0266 064
- Email address (this is our preferred contact method for document sharing and project updates): lrc@naturalengland.org.uk
- Postal address: Natural England, 9th Floor, International House, Dover Place, Ashford, Kent TN23 1HU
- Natural England User Code: 20034784

Requests by IPs to be heard at any subsequent OFH

Whilst Natural England does not wish to be heard at any subsequent open floor hearings, we do however wish to be heard at Issue Specific Hearings relevant to our role and remit and look forward to details of the topics, agendas and timings being published in due course.

Requests by Affected Persons to be heard at a Compulsory Acquisition Hearing (CAH)

Natural England is not an affected person so I can confirm that we do not wish to be heard at any Compulsory Acquisition Hearing.

Requests to attend the ASI

I can confirm that Natural England may, based upon the currently available information, like to attend the accompanied site inspections north and south of the Thames and look forward to receiving further details in due course. Once the itineraries are confirmed, we will then be pleased to confirm whether we wish to attend the ASIs.

Annex B: Natural England's response to the Procedural Deadline 1 requests

Post-event submissions, including written submission of oral comments made at the hearings held between 20 June and 6 July 2023

Natural England did not attend the Preliminary Meeting or Issue Specific Hearings 1 (exploring the Project) and 2 (exploring the draft Development Consent Order) and we therefore have no submissions to make regarding these matters. We have however provided comments on these topics within our Written Representations in Annexes C and D to this letter.

Comments on Additional Submissions submitted since the Application was accepted.

Natural England has no comments to make in relation to the additional submissions made to date since the application was accepted for examination.

Comments on Relevant Representations

Natural England notes that, within the Port of Tilbury's (PoT) Relevant Representation¹, reference is made at paragraph 7.22 to an 'unpublished survey report' prepared for PoT dated January 2023. The Port's Relevant Representation also states at paragraph 7.23 that 'PoTLL understand that Ashfield C, and particularly the exposed PFA cliff face, may be regarded as a site of equal or greater importance for invertebrate conservation to Ashfield 1'.

Natural England would like to understand what evidence the Port is aware of to substantiate the statements regarding Ashfield C, as this (alongside the unpublished survey report) is relevant to the project being examined and we recommend this should be submitted to the Examination for consideration by the Examining Authority and Interested Parties.

Local Impact Reports (LIR) from Local Authorities

This request is not applicable to Natural England in our role as a statutory adviser.

Written Representations (WR)

We have included our detailed Written Representations at Annex D appended to this letter.

Summaries of any Written Representations over 1500 words

We have included a summary of our Written Representations within Annex C appended to this letter.

Applicant's amended proposed ASI itinerary

This request is not applicable to Natural England.

New Statements of Common Ground (SoCG) (and of updated SoCGs if required).

We are continuing to work collaboratively in updating the Statement of Common Ground previously submitted (document reference APP-099) with the Applicant. We expect to be able to agree an updated Statement for the Applicant to submit at Deadline 2.

New and updated Principal Areas of Disagreement Summaries (PADS) (if updated).

Natural England did not submit a Principal Areas of Disagreement as we considered that the Statement of Common Ground captured fully our areas of disagreement sufficiently. We consider this still to be the case with our emerging, updated Statement of Common Ground.

¹ <https://infrastructure.planninginspectorate.gov.uk/wp-content/uploads/projects/TR010032/TR010032-001983-Port%20of%20Tilbury%20-%20Relevant%20Representation.pdf>

Annex C: Summary of Natural England's Written Representations for the Lower Thames Crossing NSIP

Natural England has provided a summary of our comments based upon the topic headings in our main Written Representations (Annex D) appended to this letter.

Overarching comments

At the time of writing, and based upon the currently submitted/available information, Natural England has significant concerns regarding the scheme in its current form, particularly the lack of detail around the environmental mitigation and compensation measures and the securing mechanisms. We strongly advocate much clearer commitments to delivering mitigation measures through the removal of ambiguous wording within the various Control Documents and the provision of much clearer parameters within which the detailed design will be delivered.

We consider that further work and stronger commitments from the Applicant will ensure that the scheme helps to further address the many significant residual environmental impacts and secure the environmental legacy expected from a project of this scale. Our concerns are elaborated in more detail in the following sections.

The draft Development Consent Order

Natural England does not agree to National Highways' proposed disapplication of our Site of Special Scientific Interest (SSSI) responsibilities as set out in sections 28E and 28H of the Wildlife and Countryside Act 1981. National Highways should follow the guidance on the process for NSIP impacts on SSSIs set out in the Planning Inspectorate's 'Advice Note 11 Annex C Natural England and the Planning Inspectorate'.

In addition, we consider that the application documents do not provide sufficient certainty as to the works that are proposed which impact designated sites, within the suite of protective provisions. As such, it is not possible for us to provide detailed advice to the Examining Authority at this stage on the nature and scale of the impacts.

Securing Mechanisms

Natural England has significant concerns with the scale of detail that the Applicant intends to defer to the post consent stage. The various tiers of Control Documents, as currently presented, contain numerous ambiguous statements regarding what measures the Applicant will deliver. The discretion and scope for negotiation through the tiers of the Control Documents means it is unclear what avoidance, mitigation and compensation measures the Applicant will deliver should consent be granted. We therefore recommend that the Applicant provides, or is obligated to provide, much greater clarity on the measures that will be delivered.

Natural England recommends that the Applicant should revise the various Control Documents accompanying the application (including the dDCO, the Register of Environmental Actions and Commitments, the Design Principles, the Landscape and Ecology Management Plan, the Code of Construction Practice and the Outline Prescriptions for the Nitrogen Deposition Mitigation Areas) to remove the clauses within them which allow for significant deviation from the measures which are presented within the Environmental Statement.

We also consider that the Applicant should apply the mitigation hierarchy more stringently to avoid unnecessary damage and harm to the natural environment.

Natural England recommends that the dispute resolution procedure in the Terms of Reference for the Advisory Group is amended to ensure the Secretary of State or an agreed independent authority will arbitrate should there be disagreements which cannot be resolved.

Given the scale of the detail proposed to be deferred to the post-consent stage, Natural England recommends that confirmation is provided by the Applicant that they will and enable cost recovery agreements for non-statutory advice to continue during the post consent period.

Given the nature and scale of the ecological and landscape impacts and the mitigation and compensation package required, Natural England also recommends that certainty is provided on how these measures will be secured in perpetuity.

Internationally designated sites

Epping Forest and North Downs Woodland Special Areas of Conservation

The information provided by the Applicant indicates that impacts to the Epping Forest and North Downs Woodland Special Areas of Conservation (SAC) from transport generated air quality are likely to result from the Project.

Natural England does not agree with the conclusion of no adverse effect on the integrity of Epping Forest SAC and has concerns that the conclusion of no likely significant effect on North Downs Woodlands SAC is not robust. We have set out our concerns linked with the air quality modelling methodology employed. The effects of the project in-combination with other plans and projects are also insufficiently identified in our opinion.

Natural England is confident that there is a solution for the project to satisfy the requirements of the Habitats Regulations for both SAC sites, and we are committed to working with the Applicant on these matters as the examination progresses.

Mitigation for the effects arising at Epping Forest SAC has been identified, but not proposed, by the Applicant. Natural England supports the need for mitigation, which could take the form of an enforceable speed limit reduction on the M25 as identified by the Applicant, which we understand has been modelled to be effective by the Project. Without mitigation, the conclusion of the Appropriate Assessment for the Epping Forest SAC is not legally robust in our opinion, being inconsistent with case law.

In relation to the North Downs Woodlands SAC, we advise that this site should be taken forward for Appropriate Assessment following revisions to the air quality modelling methodology, and the need for any specific mitigation measures should be explored further as part of that process

Thames Estuary and Marshes Special Protection Area and Ramsar site

The application will result in the loss of land used by species associated with the Thames Estuary and Marshes Special Protection Area (SPA) and Ramsar site. The Applicant is proposing to mitigate the loss of Functionally linked Lane through the provision of habitat at Coalhouse Fort in Essex and adjacent to the Rifle Range in Kent.

Natural England advises that in order to secure confidence in a conclusion of no adverse effect on the integrity of the Thames Estuary and Marshes SPA and Ramsar site, an indicative detailed design is needed for each water supply scenario that the project allows for

the mitigation land at Coalhouse Fort. This design will need to describe a framework of site preparation (i.e. habitat creation), site management (i.e. preferred grazing stocking rates and/or a mowing regime), and site governance (detailing monitoring and adaptive management measures). In our opinion, this level of detail can be achieved prior to project consent and should be achievable in a reasonably short timeframe.

Natural England remains committed to working with the Applicant to achieve the necessary levels of confidence that the Project both can deliver (it is feasible) and will deliver (it is required and controlled within the DCO submission), ensuring appropriate mitigation that will meet the specific habitat needs of target species (it is sufficiently detailed).

In order to ensure that the management of the Coalhouse Point land and the Rifle Range land are secured, Natural England recommends that the proposed management frameworks for these sites are captured in individual documents (preferably Control Documents) that can then be appropriately referenced from the HRA for the proposals, and adherence to their identified management explicitly conditioned as part of the consenting process.

Nationally designated sites

Shorne and Ashenbank Woods Site of Special Scientific Interest

The scheme, as currently reported, will result in the loss of 5.85 hectares (including 0.95 hectares of irreplaceable ancient woodland habitat) habitat from within the Shorne and Ashenbank Site of Special Scientific Interest (SSSI). Natural England does not endorse the loss of habitat from within the SSSI but acknowledges that, should the scheme be consented by the Secretary of State, a compensation package is proposed by the Applicant.

Given the national importance of the site, Natural England considers that further detail is required to be provided to ensure that the requirements of Section 5.29 of the NPSNN, which details that 'The Secretary of State should ensure that the Applicant's proposals to mitigate the harmful aspects of the development and, where possible, to ensure the conservation and enhancement of the site's biodiversity or geological interest, are acceptable' can be met in full. In the absence of a comprehensive ecological impact assessment and confidence in the delivery of the mitigation/compensation measures we cannot at present advise the Examining Authority on whether the requirements of the NPSNN can be met.

Currently, we do not consider that there is sufficient information for Natural England to be able to fully advise the Examining Authority on the nature and scale of the potential impacts to the Shorne and Ashenbank Woods SSSI and the appropriateness of the mitigation and compensation measure. We recommend that the Applicant provides the following information:

- An assessment of the potential impacts resulting from the proposed additional car park at Thong Lane including consideration of recreational impacts to the SSSI;
- Clarity on the nature of the proposed surface upgrade and impacts resulting from the cycle route within Ashenbank Woods south of the A2;
- A detailed map showing which areas of habitat are specifically being created to compensate for the loss of habitats from within the Shorne and Ashenbank Woods SSSI;
- Greater clarity on the habitat creation and management prescriptions for the SSSI compensation areas;
- Further information detailing how the woodland habitat creation, particularly at Park Pale, will not result in additional impacts to the Kent Downs Area of Outstanding

- Natural Beauty (AONB); this should also include details of how the project will conserve and enhance the special qualities of the AONB;
- Clarity on whether the digital mapping error alters the assessment of impacts to the SSSI from the scheme.

South Thames Estuary and Marshes Site of Special Scientific Interest

Natural England remains concerned that the Applicant does not appear to have considered the potential impacts to the breeding bird interest associated with the South Thames Estuary and Marshes Site of Special Scientific Interest resulting from the Project. This includes the impacts that may result from timing constraints implemented in relation to mitigation works for species associated with the Thames Estuary and Marshes SPA and Ramsar site.

Natural England considers that the Applicant should provide greater clarity on the potential impacts to breeding bird species association with the South Thames Estuary and Marshes SSSI. Where impacts are likely to result, details of the mitigation measures should also be provided.

Nationally protected landscapes

The Project falls within the Kent Downs Area of Outstanding Natural Beauty (AONB) and will result in both direct and indirect impacts to the AONB and its setting. Such effects will result from both the road and associated infrastructure, the utility diversions and the environmental mitigation measures.

Whilst Natural England acknowledges that the Applicant has identified a number of significant impacts to the Kent Downs Area of Outstanding Natural Beauty during construction and operation, we consider that, in a number of instances, the scale of the impact has been underestimated. It is also unclear why the nature and scale of effects has been reduced since the original application was withdrawn in 2020. We recommend that additional information and visualisations are provided by the Applicant to better understand the nature and scale of the impacts.

Notwithstanding the concerns in relation to the landscape and visual impact assessment, Natural England considers that the Applicant should commit to delivering a greater package of mitigation measures. Whilst these are unlikely to remove the number of significant residual impacts, they will help to further mitigate them, and we recommend the Applicant commits or is obligated to provide a more comprehensive mitigation package should the Secretary of State be minded to grant consent.

Habitats of Principal Importance

Ancient woodland

Overall (including the ancient woodland loss from the Shorne and Ashenbank Woods SSSI), the scheme will result in the direct loss of 6.92 hectares of ancient woodland and six veteran trees.

Natural England does not endorse the loss of such irreplaceable habitat and recommends that the Applicant should continue, through detailed design, to further avoid and reduce the loss of irreplaceable ancient woodland and veteran trees.

If the Secretary of State is minded to grant consent, Natural England recommends that a much greater degree of clarity on how the replacement woodland will be created and functions.

Acid grassland

Natural England considers that the importance of acid grassland habitats generally, and the Thames Terrace Grasslands as a specific sub-habitat type, have not been adequately recognised within the submission, and therefore the compensation provision is inadequate. Whilst some steps are being taken by the project to increase the prospects of the successful compensation by re-creation of acid grassland (such as micro-siting towards more favourable geology), the following additional steps are required to be secured within the submission:

- An increase in the compensation ratio for acid grassland by 2 hectares (to better reflect the ecological risk factor in re-creating TTG grasslands);
- A commitment to topsoil stripping as necessary site preparation in the area identified for acid grassland re-creation to address presumed high nutrient loading; and
- Adjustments to the Environmental Masterplan to build in strategically located 'seams' of acid grassland habitat to improve the connectivity of this habitat type.

Protected species

Based upon the information submitted by the Applicant, the Project is likely to impact bats, badgers, dormice, great crested newts and water voles.

Natural England has agreed letters of no impediment regarding the proposed measures for great crested newts and badgers and are satisfied with the mitigation proposed by the Applicant for these species.

Natural England requires additional information to understand the impacts resulting from the scheme and the appropriateness of the mitigation measures for bats, dormice and water voles. We are not yet able to provide letters of no impediment for these species.

Biodiversity net gain

Natural England welcomes the commitment from the Applicant to ensure that the Project achieves Biodiversity Net Gain in advance of it becoming mandatory for Nationally Significant Infrastructure Projects.

Given the nature and scale of the scheme, Natural England considers that the Applicant should commit to achieving a greater percentage gain than is currently proposed. We would recommend that they strive for a minimum 10% gain.

King Charles III England Coast Path

Natural England notes that the Project will result in temporary impacts to the route of the England Coast Path in the Tilbury Area. We would expect the Applicant to confirm that an alternative diversion route is provided during the period of impacts to ensure that a continuous path is available for users.

Landscape scale connectivity

Given the linear nature of the project and its length, the Lower Thames Crossing will result in significant new and additional landscape scale severance along the route for wildlife and people

Natural England welcomes the consideration of landscape severance for people and wildlife by the Applicant; fully mitigating these impacts will be critical to avoid permanent impacts.

The provision of effective green bridges along the route has the potential to help mitigate the severance resulting from the scheme. In their current form, Natural England does not consider that they will meet the Scheme's objectives to maintain habitat and landscape connectivity. We therefore consider that that Applicant should, or be obligated to, maintain habitat connectivity and provide greater clarity on how the green bridges will achieve their stated aims.

Annex D: Natural England's Written Representations for the Lower Thames Crossing

1 Overarching comments

- 1.1.1 Natural England has worked collaboratively with the Applicant throughout the pre-application stage of this development. Following significant engagement during the route optioneering discussions, we welcomed the preferred route announcement by the Secretary of State in 2017 which largely avoided direct impacts to statutory designated sites and nationally protected landscapes. We are however concerned that the amendments to the scheme made since the route announcement now mean that significant direct and indirect impacts to nationally important assets will result from the scheme as acknowledged by the Applicant. From the Applicant's submissions, these effects cannot be fully avoided or mitigated and will result in long-term significant adverse effects.
- 1.1.2 Throughout our engagement with the project, we have advocated that National Highways take a visionary approach to delivering the scheme, should consent be granted. Through careful route selection, design and innovation the scheme had the potential to deliver an exemplar of sustainable development avoiding or fully mitigating its environmental impact and leaving a truly visionary legacy for people and nature. The nature and scale of the project, being one of the largest road schemes in England, continues to provide a significant opportunity to contribute to the Government's 25 Year Environment Plan and the more recently published Environment Improvement Plan targets. These Plans and their delivery are cross Governmental, with all Government Departments expected to deliver against them and achieve the shared environmental outcomes. Such an approach would also be in accordance with National Highways' Environmental Sustainability Strategy² and their own guidance within the publication 'The Road to Good Design'³.
- 1.1.3 In addition, Natural England has regularly, in our 'critical friend' role, championed to the Applicant that through innovative design, the Lower Thames Crossing could remove some of the existing severance impacts from the existing transport corridor for nature and people, fully mitigate the impacts from the scheme itself and leave a long-term lasting environmental legacy and be an exemplar of sustainable development.
- 1.1.4 Disappointingly, in its current form such an exemplar approach has not been fully realised. We consider that further work and stronger commitments from the Applicant at this stage will ensure that the scheme addresses the many significant residual environmental impacts whilst also securing a true environmental legacy.
- 1.1.5 Natural England remains concerned that the Applicant has, in effect, submitted an outline application with a significant amount of key design and mitigation matters to be deferred to the post consent stage. Such an approach makes it challenging for consultees, such as Natural England, to advise the Examining Authority on the acceptability or otherwise of the measures proposed to avoid, mitigate or as a last resort compensate for impacts to the natural environment. This is further compounded by the lack of certainty provided within the draft Development Consent Order (dDCO) and the various supporting Control Documents including the Environmental Management Plan, the Design Principles and the Code of

² https://nationalhighways.co.uk/media/g5yfcl3m/nh-environmental-sustainability-strategy_final_020523.pdf

³ <https://nationalhighways.co.uk/media/l4ihgawx/strategic-design-panel-the-road-to-good-design.pdf>

Construction Practice and embedded Register of Environmental Actions and Commitments.

Summary of advice

- 1.1.6 At the time of writing, and based upon the currently submitted/available information, Natural England has significant concerns regarding the scheme in its current form, particularly the lack of detail around the environmental mitigation and compensation measures and the securing mechanisms. We strongly advocate much clearer commitments to delivering mitigation measures through the removal of ambiguous wording within the various Control Documents and the provision of much clearer parameters within which the detailed design will be delivered.
- 1.1.7 We consider that further work and stronger commitments from the Applicant will ensure that the scheme addresses the many significant residual environmental impacts and secure the environmental legacy expected from a project of this scale. Our concerns are elaborated in more detail in the following sections.

2 The draft Development Consent Order and securing mechanisms

2.1 Disapplication of legislative provisions

- 2.1.1 We note that the Applicant wishes, through the Development Consent Order, to disapply Natural England's role in relation to Sites of Special Scientific Interest. Section 53(1)(c) of the draft Development Consent Order (dDCO) details that:

'Disapplication of legislative provisions, etc.

53.— (1) The following provisions do not apply in relation to the construction of any work or the carrying out of any operation required for the purpose of, or in connection with, the construction of the authorised development and within any maintenance period defined in article 36(13), any maintenance of the authorised development - ...

(c) sections 28E (duties in relation to sites of special scientific interest) and 28H (statutory undertakers, etc.: duty in relation to carrying out operations) of the Wildlife and Countryside Act 1981(a);'

Natural England **does not agree** to this proposed disapplication of our responsibilities, and we consider that the application documents do not provide sufficient certainty as to the works that are proposed which impact designated sites, within the suite of protective provisions.

- 2.1.2 Given that National Highways is an organisation to which S.28G of the Wildlife and Countryside Act 1981 (WCA 1981) applies (a S.28G authority), this situation would not be governed by S.28E WCA 1981. It is for the Secretary of State (SOS) (as the decision-maker in relation to the DCO and also as a s.28G authority) to give notice to Natural England under S.28I WCA 1981 if the operations to be permitted by the DCO are likely to damage any of the flora, fauna or geological or physiographical features by reason of which the SSSI(s) are of special interest. Natural England then has 28 days (beginning with the date of the notice) to provide its advice, following which the SOS may decide whether to grant the DCO. The SOS must take Natural England's advice into account in deciding whether to grant the DCO and what (if any) protective provisions should be included in the DCO.
- 2.1.3 If the DCO is granted, National Highways can then carry out the operations permitted by it in reliance on the reasonable excuse defence in S.28P(4)(a) WCA 1981, which says that if the operations in question were permitted by a S.28G authority which has acted in accordance with section S.28I (i.e. followed the correct process for obtaining Natural England's advice, as outlined above), then this will be a reasonable excuse for any failure by a S.28G authority to obtain Natural England's assent (under S.28H WCA 1981) before carrying out any damaging operations.
- 2.1.4 The Planning Inspectorate's 'Advice Note 11 Annex C Natural England and the Planning Inspectorate'⁴, provides guidance on the process for NSIP proposals impacts SSSIs; it states that:

'Sites of Special Scientific Interest (SSSIs)

In relation to applications where there may be potential impacts on SSSIs both the Secretary of State and Natural England have duties under the WCA [The Wildlife and Countryside Act, 1981].

⁴ <https://infrastructure.planninginspectorate.gov.uk/legislation-and-advice/advice-notes/an11-annexc/>

Under s.28(l), the Secretary of State or minister must notify Natural England before authorising the carrying out of operations likely to damage the special interest features of a SSSI. Under these circumstances 28 days must elapse before deciding whether to grant consent and the Secretary of State must take into account any advice received from Natural England, including advice on attaching conditions to the consent.'

- 2.1.5 Following this guidance, the Secretary of State must give notice to Natural England before they authorise the carrying out of operations likely to damage the special features of the SSSI.
- 2.1.6 Natural England is aware, following pre-application discussions with the Applicant, that the disapplication of S28E, and/or S28H, would mean that, should a new SSSI(s) be notified within the Order area, National Highways could carry out works that may affect any new SSSI(s), by relying on the disapplication. This highlights a concern for Natural England that impacts on any such new SSSI(s) would not have been considered/mitigated for (and legally secured) at the DCO consenting stage. Natural England has a general statutory duty in relation to SSSIs and that general duty would be better served through the S28I route in this situation – as this would mean that any impacts on new SSSI(s) would need to be considered and appropriate mitigation secured through the S28E/S28H SSSI consenting/assenting route.
- 2.1.7 Given that there is an established process for dealing with SSSIs in relation to NSIPs, as set out above and detailed within the Planning Inspectorate's guidance, Natural England considers it would not be reasonable for the Secretary of State to disapply S28E and/or S28H of the Wildlife and Countryside Act. Our approach on this matter was supported by the Secretary of State in their recent 2022 decision for the A417 – Missing Link NSIP (application reference TR010056).
- 2.1.8 In addition, as detailed within this Written Representation, Natural England, on the basis of the information currently submitted, considers that the Applicant has not provided sufficient information in relation to existing notified Sites of Special Scientific Interest. In the absence of a comprehensive impact assessment and certainty regarding the avoidance, mitigation and where required compensation measures proposed we are unable to assess the implications for the designated sites. As we do not have the information to be able to fully assess the implications of the proposal, Natural England needs to have the ability to fully consider them under the normal SSSI consenting/assenting regime in the future should the Secretary of State be minded to grant consent.

Summary of advice

- 2.1.9 Natural England does not agree to National Highways' proposed disapplication of our SSSI responsibilities as set out in sections 28E and 28H of the Wildlife and Countryside Act 1981. National Highways should follow the guidance on the process for NSIP impacts on SSSIs set out in the Planning Inspectorate's 'Advice Note 11 Annex C Natural England and the Planning Inspectorate'.
- 2.1.10 In addition, we consider that the application documents do not provide sufficient certainty as to the works that are proposed which impact designated sites, within the suite of protective provisions. As such, it is not possible for us to provide detailed advice to the Examining Authority at this stage on the nature and scale of the impacts.

3 Securing mechanisms

- 3.1.1 Given the approach of the Applicant to defer significant detail to the post consent stage Natural England considers that, if consent were to be granted, all of the securing mechanisms should be detailed and unambiguous. This will ensure that all parties, including the Examining Authority and Secretary of State, have confidence in the avoidance, mitigation and compensation measures that will be delivered and how they will achieve their stated outcomes. At present, the Applicant in the various Control Documents accompanying the application (including, for example, the dDCO, the Register of Environmental Actions and Commitments, the Design Principles and the Landscape and Ecology Management Plan) is proposing clauses within them which allow the Applicant a degree of discretion and the potential for significant deviation from the measures which are presented within the Environmental Statement itself.
- 3.1.2 Section 4(2) of the dDCO details that (our emphasis) ‘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 authorities, highway authorities and bodies identified in Table 2.1 of the Code of Construction Practice to the extent that it relates to matters relevant to their respective functions’.
- 3.1.3 In addition, the Code of Construction Practice includes numerous references to key mitigation measures being delivered ‘where reasonably practicable’ and the linked Outline Landscape and Ecology Management Plan (Application document 490) also includes similar clauses. For example, Section 8.2.10 (e) details within the Outline Prescriptions for the Nitrogen Deposition Mitigation Areas that the project will ‘Undertake habitat creation actions as far as reasonably practicable’.
- 3.1.4 Given the need for these documents to deliver the essential mitigation for the significant biodiversity and landscape impacts associated with the scheme, Natural England considers that further detailed information on how the mitigation measures will be achieved and secured should be provided by the Applicant at this stage.
- 3.1.5 In addition, given the deferral of much of the detailed information regarding the design and full nature of the impacts resulting from the scheme to the post consent stage, such clauses do not provide a sufficiently high degree of reassurance or certainty to Natural England that the required avoidance, mitigation and compensation measures for biodiversity, landscape and access impacts will be delivered.
- 3.1.6 As required within the NPSNN, development proposals should follow the ‘avoid, mitigate, compensate’ hierarchy whereby the scheme should be designed in a way which preferentially avoids or fully mitigates impacts with compensation being proposed only as a last resort once all measures to avoid or mitigate have been fully exhausted. Given the deferral of the design to the post consent stage, the approach taken by the Applicant is one whereby they have assumed a ‘worst case scenario’ approach within the Order Limits rather than looking at how impacts to important environmental assets can be avoided or fully mitigated. Such an approach appears to conflict with the ‘avoid, mitigate, compensate’ hierarchy. With greater clarity on the design, environmental impacts could potentially be reduced significantly.
- 3.1.7 By way of an illustration of the potential for significant deviation from the outline

proposals given the ambiguity within the Control Documents, an example is provided below for the green bridges.

- 3.1.8 The dDCO details in Section 5 (2) (Landscape and Ecology) 'A LEMP [Landscape and Ecology Management Plan] prepared under sub-paragraph (1) must be substantially in accordance with the outline LEMP and must (a) reflect the design principles...'.
- 3.1.9 The outline LEMP in Section 5.6 Green Bridges (Brewers Road, Thong Lane over A2, Thong Lane over Lower Thames Crossing) details that the Management Requirements include (our emphasis) within 5.6.6 c 'to provide a visual connection between the woodlands north and south of the A2/M2/Lower Thames Crossing corridor through planting on, and adjacent to, the green bridge to retain and reinforce the wooded character of the landscape as far as *reasonably practicable*' and 5.6.6 'to provide a closed canopy of the highway crossing the green bridge at Brewers Road and Thong Lane South as *far as reasonably practicable*'.
- 3.1.10 Similarly, Clause S1.04 of the Design Principles details (our emphasis) that '...Landscape shall be designed to provide continuity of habitat between the bridges along the main highway's corridor as *far as reasonably practicable*'.
- 3.1.11 Using this relatively straightforward example above (and there are many other similar examples) illustrates how these three tiers of Control Documents all contain ambiguous statements regarding what may actually be delivered. Such discretion and scope for negotiation as you cascade through the Control Documents means it is unclear what will be delivered by the Applicant should consent be granted. We therefore recommend that a much clearer commitment for all of the required environmental avoidance, mitigation, compensation and enhancement works is provided by, or imposed upon, the Applicant.
- 3.1.12 Given the flexibility that is sought by the Applicant within the dDCO and accompanying Control Documents, it raises the question as to what mechanisms are in place should the mitigation measures for the impacts assessed within the Environmental Statement not be deliverable. If, at the post consent stage, the Applicant deems it not possible to deliver the indicative mitigation and compensation measures the nature and scale of the impacts assessed within the submitted Environmental Statement may no longer be valid. It therefore feels appropriate for the Applicant to provide clarity on how such a situation would be resolved.
- 3.1.13 Natural England has undertaken an initial, non-exhaustive, review of some of the Control Documents including the dDCO, the Code of Construction Practice and the Design Principles documents to try and better understand of the scale of detailed mitigation and compensation matters where the Applicant is providing a limited degree of certainty. This initial, limited review and suggested amendments is provided in Annex E to this Written Representation. Given this, we would recommend that the Applicant provides a much higher degree of certainty as to what the measures are that they will deliver to ensure that the scheme avoids, mitigates or fully compensates the impacts to the natural environment.
- 3.1.14 Whilst acknowledging the desire to defer most of the detail to the post consent stage, this comes with significant challenges when limited detail is provided as part of the DCO documentation. If sufficient detail on the measures to manage the environmental impacts cannot be provided by the Applicant at this stage, then we consider that stronger wording within the dDCO, the REAC commitments and all

other Control Documents should be provided to ensure that the Examining Authority has confidence in the measures proposed and their delivery, should the Secretary of State be minded to grant consent.

Proposed Lower Thames Crossing Advisory Group

- 3.1.15 Natural England welcomes the proposed Lower Thames Crossing Advisory Group to help ensure that the detailed design delivers the mitigation and enhancement measures required.
- 3.1.16 Having reviewed the draft Terms of Reference for the Advisory Group (document APP-491) Natural England considers it is more appropriate for the Applicant to provide the resource for the Secretariat and to Chair the subgroup meetings rather than Group members (Section 1.4.4 (f)).
- 3.1.17 Natural England also has significant concerns regarding the proposed dispute resolution process (Section 1.6). Given the deferral of significant detail to the post consent stage, we acknowledge that there are likely to be areas of disagreement and Natural England would work with the Applicant to try and reach resolution. We fully realise that this may not always be possible given the highly technical nature of some matters. The Applicant's approach to resolving disagreements within Section 1.6.2 details that 'should conflicts arise these will be resolved by escalating within the primary organisations'. We do not consider that this is an appropriate way of resolving matters where there are likely to be sound reasons for in-principle differences of opinion between organisations and recommend that a more agile, effective dispute resolution procedure is proposed by the Applicant. We would recommend that the Terms of Reference is amended to require that disputes are deferred to the Secretary of State or an independent expert agreed by all parties.
- 3.1.18 Given the scale and complex nature of the detailed information and design that the Applicant has proposed to defer to the post consent stage, the ask upon stakeholders such as Natural England will be considerable. We would therefore expect the Applicant to allow cost recovery agreements for non-statutory advice to continue during the post consent period.

Securing mitigation and compensation land

- 3.1.19 Notwithstanding our concerns in relation to the lack of confidence and certainty as to the ecological and landscape mitigation and compensation measures to be delivered, should the Secretary of State be minded to grant consent we would advise that clarity on their security is provided. At present it is not clear how the Applicant proposes to ensure that the mitigation and compensation measures will be secured in perpetuity. Natural England recommends that the Applicant provides a firm commitment, or is obligated, to ensure that all of the ecological and landscape mitigation and compensation measures required for the scheme are delivered and secured in perpetuity.

Summary of advice

- 3.1.20 Natural England has significant concerns with the scale of detail that the Applicant intends to defer to the post consent stage. The various tiers of Control Documents, as currently presented, contain numerous ambiguous statements regarding what measures the Applicant will deliver. The discretion and scope for negotiation through the tiers of the Control Documents means it is unclear what avoidance, mitigation

and compensation measures the Applicant will deliver should consent be granted. We therefore recommend that the Applicant provides, or is obligated to provide, much greater clarity on the measures that will be delivered.

- 3.1.21 Natural England recommends that the Applicant should revise the various Control Documents accompanying the application (including the dDCO, the Register of Environmental Actions and Commitments, the Design Principles, the Landscape and Ecology Management Plan, the Code of Construction Practice and the Outline Prescriptions for the Nitrogen Deposition Mitigation Areas) to remove the clauses within them which allow for significant deviation from the measures which are presented within the Environmental Statement.
- 3.1.22 We also consider that the Applicant should apply the mitigation hierarchy more stringently to avoid unnecessary damage and harm to the natural environment.
- 3.1.23 In addition, we recommend that Applicant should improve the dispute resolution procedure in the Terms of Reference for the Advisory Group and enable cost recovery agreements for non-statutory advice to continue during the post consent period.
- 3.1.24 Given the nature and scale of the ecological and landscape impacts and the mitigation and compensation package required, Natural England recommends that certainty is provided on how these measures will be secured in perpetuity.

4 Internationally Designated Sites

Air quality impacts

- 4.1.1 This section is structured using the key issues in our Relevant Representations (our reference 418789 dated 24 February 2023), and Statement of Common Ground (SOCG) (document reference APP-099) expanding on the points raised therein. Certain issues apply to several protected sites and relate to a disagreement in the methodology used for air quality assessment between Natural England and National Highways. At the time of writing of the SOCG it was hoped that further discussions could resolve these issues – however, they remain points of disagreement.
- 4.1.2 These written representations do not address areas where agreement on air quality impacts has been reached through earlier discussion with the Applicant - for example, on air quality issues relating to Thames Estuary and Marshes SPA and Ramsar site, and consideration of construction traffic and other construction-related impacts. These issues were not included within the SOCG/ Relevant Representations and Natural England considers that they have been appropriately addressed based upon the currently available information.
- 4.1.3 It is noted that critical loads for nitrogen deposition (Ndep) on APIS (Air Pollution Information System) were updated in May 2023 as a result of a Europe-Wide review of critical loads undertaken in 2022⁵. Critical loads for some habitats associated with protected sites relevant to this project have altered as a result. For example, until the recent change, the critical load range for the saltmarsh habitat associated with Thames Estuary and Marshes SPA and Ramsar site was 20-30 kgN/ha/yr, and it is now 10-20 kgN/ha/yr. Natural England's current position is not to require reassessment of protected sites where previous decisions were made based on the earlier critical loads, and where planning applications are at an advanced stage of determination (as in this case). For example, in the Applicant's HRA Report, construction traffic impacts were concluded to result in no LSE on Thames Estuary and Marshes SPA and Ramsar site (Table 6.9. section 6.2.119 of the HRA) on the basis that the Predicted Environmental Concentration (PEC) was less than the lower critical load for the qualifying habitat (the PEC was 18.5 kgN/ha/yr – so lower than the 20-30kgN/ha/yr critical load). That PEC is now higher than the new lower critical load. However, as Natural England was content that the estuarine habitat was not especially sensitive to temporary construction traffic impacts based on the earlier data, we will not require further assessment to be undertaken. However, where impacts on protected sites are considered not agreed within these Written Representations, reference will be made to the new critical loads where relevant.

Area of concern: Epping Forest SAC – operational air quality impacts

- 4.1.4 Natural England does not agree with the conclusion of no adverse effect on the integrity of Epping Forest SAC, as outlined by the Applicant in section 7.2.63 of the HRA Report. The Applicant argues that:
- the overall high exceedance in the area is affected by a variety of factors. (*'the site-relevant critical loads are currently exceeded by over 150% and the contribution of the Project to the N deposition on the site, alone and in combination, would be <5%... ' - 10.8% in-combination*). Vehicle emissions are

⁵ [Review and revision of empirical critical loads of nitrogen for Europe 2022 \(FINAL\) | Umweltbundesamt](#) (Bobbink *et al.*, 2022).

- only part of the source of the site-relevant pollutants. There would be very high decreases in N deposition required to bring the site to below its critical load.
- vehicle emissions will decrease as a result of policy changes leading to a changing fleet with reduced NOx emissions and increasing electrification. The increase in emissions caused by the project is not material compared to these reductions.
- the qualifying habitat within the area affected by the changes in N deposition would not change in extent and distribution, or structure and function as a result of the Project. There are currently no N-sensitive species which could be affected by further additions of N and any air quality effect would not degrade the habitat to the extent that it would no longer be classified as that qualifying habitat.
- the project will 'delay' the projected decline in NOx at the site by 4 years i.e. return to the 'do minimum' level (tonnes of NOx per year) at the opening year.

Natural England disagrees with these conclusions and assertions for the reasons which will be set out in the following sections of this Written Representation.

- 4.1.5 The Conservation Objective at Epping Forest SAC, as outlined in Table 5.2 of the HRA Report identifies an Air Pollution vulnerability (H04) and indicates that the Conservation Objective is to:

'Ensure that the integrity of the site is maintained or restored as appropriate, and ensure that the site contributes to achieving the Favourable Conservation Status of its Qualifying Features, by maintaining or restoring:

- the extent and distribution of qualifying natural habitats and habitats of qualifying species
- the structure and function (including typical species) of qualifying natural habitats
- the structure and function of the habitats of qualifying species
- the supporting processes on which qualifying natural habitats and the habitats of qualifying species rely
- the populations of qualifying species
- the distribution of qualifying species within the site.'

- 4.1.6 As the SAC exceeds its critical load for Ndep (and critical level for ammonia) the Conservation Objective is to restore the SAC to the required extent and distribution, and structure and function of the qualifying natural habitats. The restore Objective also relates to restoring the SAC below its critical load (and critical level) which will be exceeded with and without the project. The 'Dutch Nitrogen' judgement explains it is difficult to justify further emissions to a site in such unfavourable condition. 'Unfavourable conditions' are such conditions which do not satisfy the definition of Article 1(e) of the Habitats Directive, where 'Favourable condition is when, inter alia, it's natural range and the areas it covers within that range are stable or increasing and the specific structure and functions which are necessary'. Any 'autonomous' measures (in this case, the assumption that nitrogen deposition levels will decline as a result of vehicle NOx emissions declining – and the proposal will delay this reduction by 4 years) must be sufficiently robust to be relied on. In this case, there is not a clear trend in reduction in Ndep (or ammonia) in the area – as indicated on APIS (see Figure 4.1) although NOx is declining. In addition, it is not clear if the 4-year assumption would be backed up by monitoring – or how the actual emissions or their decline would be ensured or established.
- 4.1.7 As well as the Air Quality restore Conservation Objective, there is a Conservation Objective to restore the structure and function (including typical species) of qualifying

natural habitats. The Applicant's NVC survey has identified the habitat type affected by the increase in Ndep as being mostly NVC W15 (*Fagus sylvatica* – *Deschampsia flexuosa*) with some in mosaic with W10 (*Quercus robur* – *Pteridium aquilinum* – *Rubus fruticosus* woodland). Natural England advises that NVC type W15 is regarded as H9120 Atlantic acidophilous beech forest which is a qualifying feature of the SAC. W10 is not core H9120, but often occurs in mosaic with W15 due to the complexities of the ancient forest soils, and hence is included in the Supplementary Advice on conserving and restoring site features for Epping Forest SAC⁶. It is therefore considered that all the plots identified by the Applicant as being subject to increased nitrogen as a result of the project comprise qualifying feature of the SAC.

- 4.1.8 The most recent survey of the relevant SSSI Unit of the SAC (105 – Epping Thicks) was undertaken by Natural England in November 2022. The relevant SSSI unit was recorded as being in 'unfavourable recovering' condition. It noted that the woodland was dominated by oak and beech, with some hornbeam, birch and holly in a mosaic of W10, 14, 15, 16 woodland types with streams and ponds. There were characteristic veteran features with microhabitats for fungi, bryophytes and saproxylic invertebrates, along with sufficient dead wood. There was a diverse understorey but the bryophyte and lichen cover and diversity was sub-optimal near boundary roads, notably the northern area, but was more diverse within the varied topography of the southern areas. The survey noted that some veteran and old trees showed signs of stress (i.e. thin canopy and stunted leading shoots), which was recorded as being possibly attributable to air quality.
- 4.1.9 It is therefore considered likely that the site is already affected by air pollution, and this is affecting the vegetation present – especially the bryophyte and lichen community which is integral to the H9120 Feature. The Applicant's surveys undertaken in 2020 indicated that some moss species such as *Ullota phyllantha*, *Mnium hornum* and *Isothecium myosuroides* were present. Despite existing high N levels, these species are understood to be Nitrogen sensitive and vulnerable to decline with excess nitrogen – though *I. myosuroides* is the least sensitive and can be an indicator of N-exceeding sites⁷. In addition, nitrogen-sensitive ground flora species wood sorrel *Oxalis acetosella* and primrose *Primula vulgaris* have previously been recorded from this SSSI unit, though were not recorded as present in 2020. Other factors such as increased coverage/extent of Nitrogen-liking species (such as nettles, nitrophile mosses and lichens, sycamore) can be signs of adverse impact. Natural England's general fieldwork experience of the Epping Forest SAC is that there are N-liking species (nettles, *Xanthoria* lichen) in higher abundance nearer to the M25 end of the site and adjacent to the B1393 – ie, areas subject to higher aerial N pollution from traffic.
- 4.1.10 The Supplementary Advice on conserving and restoring site features for Epping Forest SAC⁸ outlines a target relating to key structural, influential and/or distinctive species, which refers to maintaining the abundance of such species to enable each of them to be a viable component of the H9120 feature. Epiphytic bryophytes (including the endangered Schedule 8 Knothole moss *Zygodon forsteri*) and epiphytic lichens (including Pinheads) are specifically noted among these key species to be maintained, alongside many other species in the Explanatory notes in Table 3 of the Supplementary Advice. Plans or projects which undermine the potential for such

⁶ <https://publications.naturalengland.org.uk/publication/5908284745711616>

⁷ Wilkins K. & Aherne, J (2016) Vegetation community change in Atlantic oak woodlands along a nitrogen deposition gradient - Environmental Pollution, Volume 216, Pages 115-124, <https://doi.org/10.1016/j.envpol.2016.05.024> .

⁸ <https://publications.naturalengland.org.uk/publication/5908284745711616>

key species to be maintained/ restored would therefore undermine this Conservation Objective.

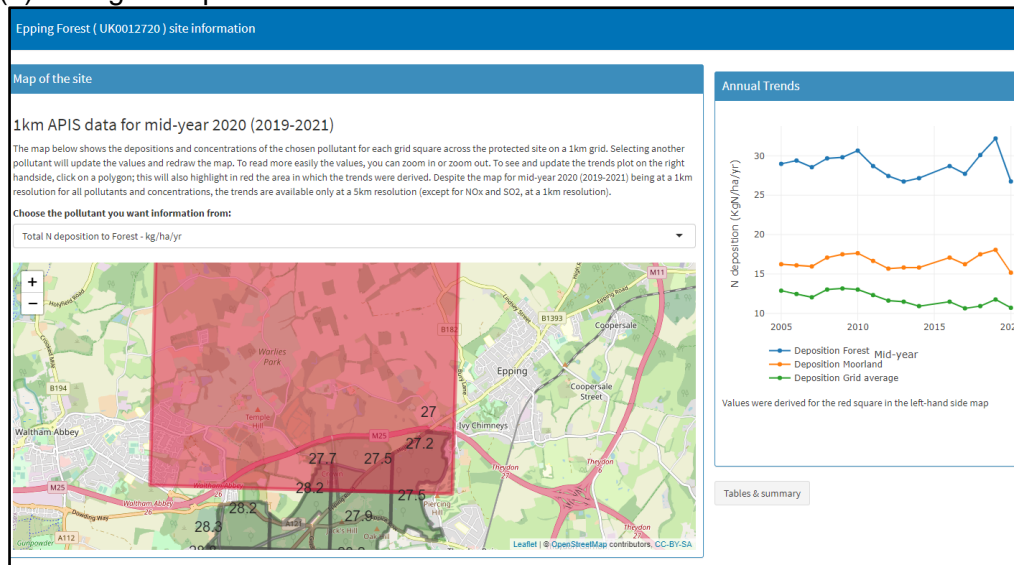
- 4.1.11 Further addition of nitrogen could affect the extent/ abundance of the species currently at the site, as well as preventing colonisation of further species as outlined in the Supplementary Advice. The lack of N-sensitive species now does not mean they could never be present in the future or were never there in the past. Also, even a degraded habitat can degrade further with further N additions – further encroachment of N-tolerant species or loss of species richness/diversity can still occur above any critical load. This can affect the structure and function of a site and undermine any Conservation Objectives. This is considered within the Natural England report 'Assessing the effects of small increments of atmospheric nitrogen deposition (above the critical load) on semi-natural habitats of conservation importance' (NECR210)⁹, which reports on damage above critical loads.
- 4.1.12 As the Site Improvement Plan for Epping Forest SAC¹⁰ identifies Air Pollution as an issue, and some parts of the site are assessed as in unfavourable condition for reasons linked to air pollution impacts, actions to address this include measures to 'control, reduce and ameliorate atmospheric nitrogen impacts'. Given the antiquity of the forest soils, and contiguity of habitat mosaic, Natural England considers there to be potential for beneficial restoration through active and targeted conservation management of the qualifying H9120 feature, so long as the background environmental conditions (i.e. Air Quality critical levels and critical load) are suitable.
- 4.1.13 Natural England therefore does not agree with the Applicant that an adverse effect on the integrity of Epping Forest SAC can be excluded, for both these reasons.
- 4.1.14 However, to address the impact of the predicted increase in Ndep, mitigation was identified by the Applicant - namely a temporary speed limit reduction on the relevant section of the M25. This would be in place until emissions from the proposed development decline to the baseline level – in the region of 4 years. However, although modelling by National Highways indicates this mitigation would be effective (this is detailed within a Technical Note appended to the Statement of Common Ground, document APP-099), it is not formally proposed as part of the development by National Highways. Without this mitigation, the proposed development is not consistent with the Conservation Objectives to 'restore' the site to below its critical levels or loads and as such, adverse effects cannot be discounted. Speed limit reduction is a recognised mitigation measure. It serves to reduce emissions (and therefore ecological effects), and is enforceable, meaning it would meet the certainty requirements of the Habitats Regulations.
- 4.1.15 If this mitigation was implemented and its effectiveness monitored in an enforceable manner, until emissions from the proposed development decline consistently to the baseline level – whatever the actual period for such to occur, Natural England would agree to the conclusion of no adverse effect on site integrity for Epping Forest SAC.
- 4.1.16 It is understood that there will be a delay in construction of the project compared to the assessment, and a revised model in line with the new timetable could result in impacts reducing, with a reduced requirement for mitigation. However, without sight of new modelling results and an updated HRA, Natural England's position remains as stated above.

⁹ <https://publications.naturalengland.org.uk/publication/5354697970941952>

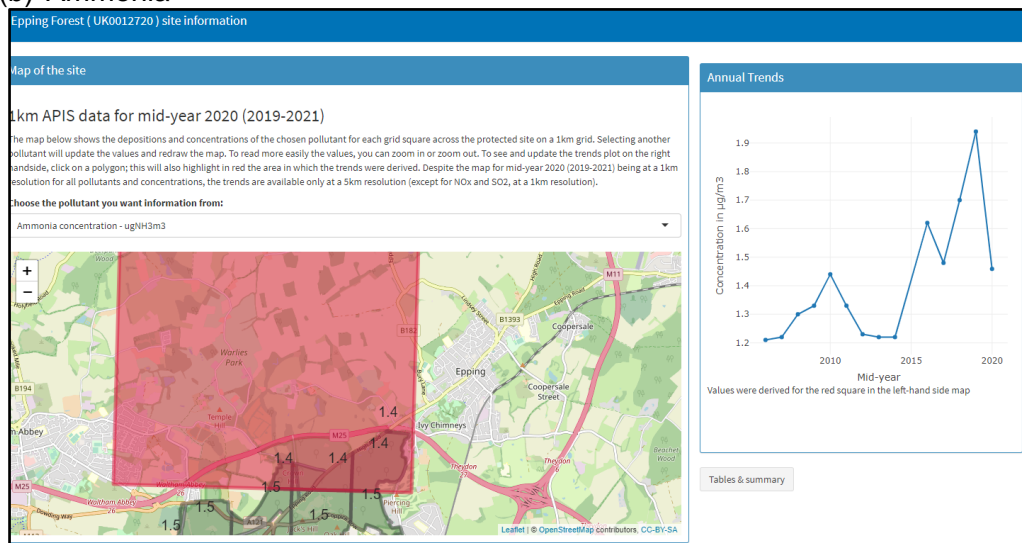
¹⁰ <https://publications.naturalengland.org.uk/publication/6663446854631424>

Figure 4.1: Screen captures from APIS (taken 8 June 2023) showing air pollutant trends at Epping Forest SAC

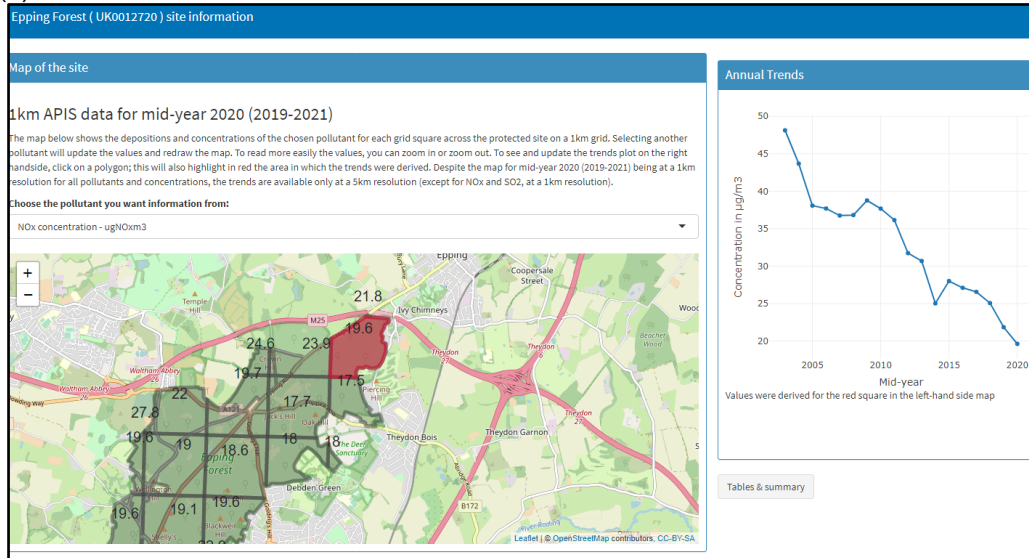
(a) Nitrogen Deposition



(b) Ammonia



(c) NOx



Area of concern: Epping Forest SAC – operational air quality impacts

4.1.17 As well as disagreement with the conclusion of the effect of operational vehicle emissions on the integrity of Epping Forest SAC, Natural England retains two key concerns, both relating to the assessment of the impact of increased traffic along the M25 affected road network. These are considered in turn, as they relate specifically to Epping Forest SAC, below:

Nitrogen Oxide Assessment and Methodology (allegedly inconsequential NOx)

4.1.18 The methodology National Highways uses for calculating other pollutants – in this case ammonia (NH₃) concentrations and nitrogen deposition (Ndep) – are dependent on NOx (nitrogen oxide) concentrations. National Highways considers that changes below 1% of an air quality threshold can be regarded as imperceptible or inconsequential. Changes above 1% of an air quality threshold are considered further. Therefore calculation of ammonia and Ndep is only undertaken where the concentration of NOx arising from the projects is 1% or more of the NOx critical level (i.e., $\geq 0.3\mu\text{g}/\text{m}^3$ - the concentration of NOx in the atmosphere, above which direct adverse effects on plants or habitats may occur, according to present knowledge¹¹) (e.g. Paragraph 5.3.105 in the AQ chapter 5 of the ES and paragraph 4.1.6 in the HRA). However, as indicated under paragraph 4.1.28, impacts arising from NOx alone above this threshold are not addressed. Without this information, Natural England cannot accurately analyse the level of impact caused by nitrogen gases.

Biological implications

4.1.19 This approach can lead to a situation where the 1% threshold of the critical level for ammonia concentrations or the critical load for Ndep can be exceeded, but concentrations of these pollutants have not been calculated, as NOx concentration is $< 0.3\mu\text{g}/\text{m}^3$.

4.1.20 As an example, Table 4.1 shows that converting 1% of the critical load for NOx ($0.3\mu\text{g}/\text{m}^3$) to ammonia and Ndep, results in concentrations for those pollutants that

¹¹ [Critical Loads and Critical Levels - a guide to the data provided in APIS | Air Pollution Information System](#)

reach or exceed 1% of their respective critical level (for ammonia) or critical load for Ndep.

- 4.1.21 For example, the critical load for the *Fagus* woodland at Epping forest¹² is 10-15 kgN/ha/yr. The critical load range for the qualifying habitats of dry heaths and wet heaths in the SAC is 5-15 kgN/ha/yr. As shown in Table 4.1, when the 0.3µg/m³ threshold of NOx is reached, the associated Ndep would be at 3% or over of the critical load for the woodland and heathland habitat types, and the ammonia concentration would be at up to 3% of its relevant critical level. On this basis, the application of factors to convert concentrations to deposition will arguably make an imperceptible effect become a perceptible, and therefore potentially harmful one. The modelled emissions for North Downs Woodlands SAC (see further details below) reach 0.27ug/m³, which is very close to the 0.3ug/m³ threshold (1% of the critical level).
- 4.1.22 Table 4.1 illustrates the derivation of three key pollutants (ammonia (NH₃), nitrogen oxides (NOx) and nitrogen) as a proportion (1%) of the critical level or load. The first and second columns represent the information we begin with, simply the threshold and then 1% of that threshold, giving the concentration at which harm may occur. The subsequent columns for NO₂ (nitrogen dioxide) and NH₃ are both derived from the original NOx value – the road NO₂ is converted to N Dep using a 1µg/m³ = 0.14 or 0.29 kg/N/ha/Yr conversion factor, and the ammonia (NH₃) component is generated using one of two possible models. Hence the final column presents what has been calculated as a result of the process – the ammonia is now known following conversion from NOx and the nitrogen deposition is now known by conversion from NOx to nitrogen dioxide and ammonia, then adding these two values together. Hence, the table is read from left to right and the final column gives you the calculated values. The intention of the table is to demonstrate that even where the NOx concentration is at (or below) 1% of its critical level, the subsequent ammonia concentrations and nitrogen deposition will still be in exceedance of the 1% threshold, therefore there is still risk of harm occurring even where the NOx concentration is below 0.3ug/m³ (1% of the 30ug/m³ critical level).

¹² As listed on APIS – [Indicative values within nutrient nitrogen critical load ranges for use in air pollution impact assessments | Air Pollution Information System \(apis.ac.uk\)](https://apis.ac.uk)

Table 4.1 – Nitrogen Deposition for Moorland/ Grassland and Woodland Based a NOx change of 1% of the Critical Level

	Critical level/lower critical load	1% of critical level/lower critical load	Resultant NO ₂ Concentration	Resultant NH ₃ Concentration	Resultant % of the critical level/load
NOx	30µg/m ³	0.30 µg/m ³	0.15 µg/m ³ ¹³	0.03 µg/m ³ ¹⁴	Ammonia: 3% of the lower critical load
Nitrogen Deposition 0.3 µg/m ³ (1%) NOx	5 Kg N/ha/yr (Moorland)	0.05 Kg/N/ha/yr	0.02 Kg N/ha/yr ¹⁵ ↓	0.17 Kg N/ha/yr ↓	Moorland: 0.19 Kg N/ha/yr Total N deposition = 3.84% of critical load
	10 Kg/N/ha/yr (Woodland)	0.10 Kg/N/ha/yr	0.04 Kg N/ha/yr	0.26 Kg N/ha/yr	Woodland: 0.3 Kg N/ha/yr N Deposition = 3% of the critical load

¹³ Based on Defra’s published NOx to NO₂ calculator. Defra’s tool takes as inputs the year, road NOx, background NO₂ concentrations (taken from Defra’s background concentrations maps) and the road type. The latter element defines the primary NO₂ value for the calculation to determine the total NO₂ from the road. The values provided in Table 1 are indicative for a general road type, as provided in National Highways position paper on the modelling approach for protected sites.

¹⁴ National Highways has developed a tool to calculate an equivalent NH₃ concentration based on the modelled road NOx. The research that underpins this NH₃ tool identified different ratios of NOx:NH₃ emissions for light duty vehicles (LDVs) [cars and vans] and heavy duty vehicles (HDVs) [lorries and buses / coaches]. To enable the calculation of NH₃, the total road NOx is split into the contribution from LDVs and HDVs and entered into National Highways’ NH₃ tool. The tool then calculates an equivalent NH₃ concentration for LDVs and HDVs and sums the NH₃ values to calculate a total road NH₃ concentration for each receptor location.

¹⁵ Deposition velocities and dry deposition flux conversion factors for grasslands or woodland, which differ for NO₂ and NH₃, are applied to the modelled concentrations to calculate an equivalent N deposition load separately for NO₂ and NH₃. The N deposition loads from the NO₂ and NH₃ concentrations are summed together to calculate the total N dep load from the road at each receptor. Deposition velocities and deposition fluxes (and the relevant calculations) are taken from AQTAG 06.

Legal implications

- 4.1.23 National Highways considers that changes < 1% of an air quality threshold can be regarded as imperceptible or inconsequential and can therefore be ignored in air quality modelling.
- 4.1.24 The argument that small, modelled contributions can be ignored was rejected by the UK Courts in the Wealden decision¹⁶. In that case it was whether further consideration of other plans and projects in combination was required if a project alone generated <1000AADT – in this case it is whether the concentration of ammonia and Ndep requires to be considered when NOx concentration are below 0.3 µg/m³ at a protected site. However, the same point applies in that several imperceptible effects added can, in principle, become perceptible and therefore potentially harmful. 1% is the level at which perceptible air quality changes need to be examined more closely to test for harmful effects (i.e. the trigger for likely significant effects).
- 4.1.25 The Wyatt ruling (2021)¹⁷ considered whether the uncertainty in modelling could be used to cast doubt over the requirements of the Habitats Regulations. The argument was that uncertainty precluded a decision-maker from being able to conclude ‘no adverse effect to site integrity’, as reasonable scientific doubt would remain. The conclusion was that the use of precautionary variables must be used in modelling to ensure that any doubt erred on the precautionary side. This is contrary to the position of National Highways, that doubt in the modelling should be used to discount the findings of that modelling (in this case, that NOx under 0.3µg/m³ is imperceptible so cannot be used to generate ‘perceptible’ concentrations of other pollutants). However Natural England’s position is that NOx under 0.3ug/m³ could result in perceptible (and therefore potentially harmful) levels of Nitrogen deposition and also ammonia (according to National Highway’s calculation methodology for ammonia concentration).
- 4.1.26 The exclusion of proposals on the basis of their contribution being ‘small’ is therefore contrary to established caselaw. As effects must be considered in combination with other plans and projects, there is a requirement to consider such ‘small’ impacts. Accepting this approach (i.e. that very small effects may be dismissed without further consideration, either due to their scale or uncertainties in their derivation) would be vulnerable to legal challenge and would also be inconsistent with the advice provided by Natural England to other public bodies.

Implications to assessment and mitigation proposals at Epping Forest SAC

- 4.1.27 Were Ndep to be calculated regardless of the NOx concentration, we anticipate that the area of Epping Forest SAC where Ndep would exceed 1% of its critical load would increase. Therefore, the area where adverse effect on integrity cannot be excluded may increase. If the revised calculations were undertaken, this would not increase the requirement of the identified mitigation (this is because although the area of exceedance would increase, the maximum concentrations of Ndep are not further exceeded). The mitigation identified already addresses exceedances for the area of Epping Forest SAC closest to the M25, and so an enlarged area further away would also by definition benefit from this measure. It would therefore not alter the

¹⁶ Wealden DC v SoS and Lewes DC and South Downs National Park Authority

<https://www.bailii.org/ew/cases/EWHC/Admin/2017/351.html>

¹⁷ <https://www.bailii.org/ew/cases/EWHC/Admin/2021/1434.html>

requirement of the proposed mitigation as outlined in section 4.1.15 of this Written Representation.

- 4.1.28 Natural England outlined our position on Inconsequential NOx to National Highways (nationally) and to the Lower Thames Crossing Project Team in April 2023 but has not had a response at the time of writing this Representation. This position is appended in Annex G to these Relevant Representations.

Failure to assess the impact of ammonia and NOx concentrations (critical levels)

- 4.1.29 The assessment process (for example Section 4.3.13 in the HRA Report) assessed Ndep (which includes an assessment of the contribution of ammonia – as outlined in section 2.5.14 of the HRA Report¹⁸). However, it does not assess against the critical levels for either ammonia or NOx. Critical levels have been set for both NOx and ammonia which reflect the concentration of both pollutants in the atmosphere, above which direct adverse effects on plants or habitats may occur, according to present knowledge¹⁹. Natural England's guidance document NEA001 (for example see section 2.2) makes it clear that both critical levels and loads should be included in an assessment due to the direct effects of NOx and ammonia in the air (critical levels) and the indirect effects of deposited nitrogen (critical loads) on sensitive habitats and species.
- 4.1.30 The Applicant concludes that increased traffic at Epping Forest SAC will increase NOx by >1% of the critical level -for example Table 6.12 of the HRA Report. NOx emissions are predicted to be between 0.3µg/m³ (the minimum concentration acknowledged for calculation of Ndep) and 1.74µg/m³ - therefore between 1% and 5.8% of the 30µg/m³ critical level. However, consideration of the impact of NOx (separate to the impact of Ndep) is not addressed in the appropriate assessment (Section 7.2.53 onwards in the HRA Report). Although the background concentration of NOx in the most affected area of Epping Forest SAC is not exceeding the current critical level, local increases, and their potential impact on vegetation should still be considered.
- 4.1.31 Although ammonia is included in the assessment of Ndep where this is calculated, it is not considered as a pollutant in its own right. The critical level of ammonia for the qualifying habitat at Epping Forest SAC (*Fagus* woodland) depends on the presence of bryophytes and lichens, which APIS indicates are both integral to the habitat. The critical level is therefore 1µg/m³, and concentrations arising from the proposed development should be assessed against this critical level. The background ammonia concentration in the area is approximately 1.4µg/m³, so it already exceeds the critical level where direct adverse effects on the habitat (including ecosystem change) may occur.

Biological implications

- 4.1.32 Although both NOx and ammonia are components of nitrogen deposition, which is one means by which nitrogen (as a nutrient) impacts upon ecological sites, they are also pollutants in their own right. Therefore, the impacts of nitrogen emissions and elevated NOx cannot solely be addressed by focussing on Ndep.

¹⁸ The calculation of N deposition from road-increment NH₃ applied the Draft National Highways (2021) ammonia N deposition tool as described in Chapter 5 - Air Quality (Application document 6.1).

¹⁹ [Critical Loads and Critical Levels - a guide to the data provided in APIS | Air Pollution Information System](#)

4.1.33 As an example to demonstrate the different impacts, paragraphs 9, 16 and 64 of the CIEEM Air Quality guidance document²⁰ state:

'9) Both ammonia and NO_x can be toxic to vegetation (for example causing leaf yellowing and dieback) and 'critical levels' ...have been set for vegetation for both pollutants.

16) ...where critical levels are exceeded, consideration should also be given to the potential for direct effects from NO_x, especially where concentrations of sulphur dioxide and/or low-level ozone are also elevated. ...

64) ... the predominant role of NO_x regarding vegetation is as a source of nitrogen (which can in turn result in growth stimulation, growth inhibition and changes to chlorophyll), although it is possible that at high concentrations it may also affect lipid biosynthesis and cell acidity.

4.1.34 These paragraphs reflect that the impact of NO_x and ammonia can be distinct from their role in Ndep. Both can result in cellular and physiological impacts within the plant causing growth changes, as well as having eutrophic or acidifying impacts on the soil where deposited, resulting in growth changes and changes in community composition.

4.1.35 There are acknowledged complications in separating direct effects on the vegetation from NO_x, from indirect effects via N deposition processes (i.e. soil eutrophication and acidification). Indeed, NO_x can stimulate growth of some species – resulting in a 'change in ecosystem functioning' which could result in an 'adverse effect' on the individual plants. However, NO_x, ammonia and Ndep can have distinct impacts on plants, and act through different mechanisms.

4.1.36 A review of NO_x critical levels being undertaken by ICP Vegetation²¹ which has indicated that as the pollution climate is very different from 1992 when the 30µg/m³ critical level was set, there is substantial evidence that the current critical level is set too high to protect all plant species. There is therefore the potential for the NO_x critical level to be revised – either as a universal concentration as a present or, like the current ammonia critical level, being set at different concentrations depending on other factors (in the case of ammonia, whether lichens or bryophytes are integral components of the qualifying habitat) which could include species type or other environmental factors. This is mentioned to indicate that, like critical loads, science surrounding critical levels is evolving, and new impacts, and impacts at lower concentrations can become evident. It is therefore not possible to exclude assessment against critical levels from environmental and ecological assessment – focussing only on Ndep/ critical loads as a means to 'protect' ecosystems.

Implications to assessment and mitigation proposals at Epping Forest SAC

4.1.37 Where a habitat is exceeding its critical level (for NO_x or ammonia) the Conservation Objective for that site will be to reduce the site to below the critical level, as is the case for Epping Forest SAC. Therefore a proposal that will undermine that objective will have an adverse effect on the integrity of the site. A proposal where the process contribution will exceed 1% of the relevant critical level(s) must therefore be assessed within an appropriate assessment, to address whether an adverse effect

²⁰ CIEEM (2021) Advice on Ecological Assessment of Air Quality Impacts. Chartered Institute of Ecology and Environmental Management. Winchester, UK.

²¹ [Review of NO_x critical levels - online workshops | ICP Vegetation \(ceh.ac.uk\)](https://www.ceh.ac.uk/resources/working-with-us/our-workshops/online-workshops)

on integrity remains, potentially once mitigation is applied. On a national basis, the trend in NO_x concentrations is generally decreasing, partly as a result of reduced combustion of fossil fuels, including in the vehicle fleet. However, local concentrations by the roadside should also be considered where these are part of the SAC. Therefore, although at Epping Forest SAC the background NO_x concentration is not above the critical level (see Figure 1c), consideration should be made of local exceedances and whether qualifying features could be affected.

- 4.1.38 In the case of ammonia, the site exceeds its 1µg/m³ critical level (see Figure 1b) and nationally the trend is not on a downward trajectory and so there are no future improvements which can be relied upon for discounting any potential impacts. The assessment therefore has to consider the impact that the road scheme will have on the Epping Forest SAC and whether the proposal will hinder the ability to achieve the site's Conservation Objectives.

Area of concern: North Downs Woodlands SAC – operational air quality impacts

- 4.1.39 The Applicant screened out consideration of North Downs Woodlands SAC within the appropriate assessment on the grounds that Likely Significant Effects (LSE) could be excluded. This was due to the transport model indicating that NO_x concentrations at the boundary of the SAC would be less than 0.3 µg/m³ (Table 6.14 in the HRA Report – and paragraph 6.2.134). Therefore, Ndep was not calculated for the relevant habitats. Natural England does not agree that LSE can be excluded at this site for the following two reasons: A) alleged inconsequential NO_x and B) lack of an in combination assessment.

A) Nitrogen Oxide Assessment and Methodology (alleged inconsequential NO_x)

- 4.1.40 As indicated in Section 4.1.18 of this written representation, Natural England does not agree with this exclusion of assessment of Ndep or any other impacts purely on the basis of the NO_x concentration being 'inconsequential/ imperceptible'.

- 4.1.41 The modelled increase in NO_x concentration from the project alone at North Downs Woodlands SAC would be approx. 0.22-0.28 µg/m³ (Table 6.14 in the HRA Report). Using the methodology outlined in Table 4.1 of this Written Representation, if 0.22 µg/m³ NO_x is simply converted to Ndep (using AQTAG06 – assuming all NO_x is NO₂) the deposition would be approx. 0.06 kgN/ha/yr – which is 2% of the lower critical load at North Downs SAC (3kgN/ha/yr – coniferous woodland). This does not include the impact of ammonia, which is also a component of Ndep, and which will only be accounted for by the conversion the Applicant uses, in the conversion of NO_x to Ndep. As outlined in Section 4.1.41, the impact of ammonia itself should also be considered before excluding LSE.

B) Lack of an in-combination assessment

- 4.1.42 In screening out LSE at North Downs Woodlands, no in-combination assessment was undertaken, on the grounds that an 'inconsequential' impact would not combine with others to become consequential – as per Section 2.5.13 of the HRA:

'Where a theoretical pathway exists but the impact would not be of sufficient scale to result in or significantly contribute to any LSE together with other plans or projects, the conclusion of an inconsequential effect has been made.... An inconsequential scale of effect cannot be reasonably considered to be an LSE alone; and equally cannot be reasonably considered likely to contribute to in-combination effects in any

consequential or material way.'

- 4.1.43 Natural England considers that this approach does not comply with the Wealden judgement requiring in-combination effects to be addressed prior to excluding LSE, as many 'inconsequential' effects could add up to something significant. This applies even where the project alone does not exceed the screening threshold. If it does exceed the threshold alone (bearing in mind Section (A) above) it would be taken to appropriate assessment and the in-combination assessment would form part of the appropriate assessment.
- 4.1.44 Where a project alone does not exceed the 1% screening threshold, in-combination emissions should be considered before LSE can be screened out. This approach is stated in our air quality guidance NEA001, and a suggested methodology/sources to consider when undertaking an in-combination assessment is provided. Therefore in-combination NO_x concentrations at North Downs Woodlands SAC should be considered against 1% of the critical level before LSE can be excluded. In addition, if ammonia and Ndep do not exceed 1% of their critical level/load as a result of the project alone, in-combination issues from other plans and projects should be considered.
- 4.1.45 Further consideration of the in-combination assessment methodology of the Applicant is provided below in Sections 4.1.47-56.

Implications

- 4.1.46 The Applicant should consider whether the 'screening threshold' of 1% of the critical level for ammonia and/or 1% of the critical load of Ndep is exceeded by the project alone at North Downs Woodlands SAC. If it is, impacts of these pollutants (alone and in-combination) on the Conservation Objectives of the SAC should be considered. If it is not, in-combination impacts should be considered to assess if the 1% is met. Only if in-combination projects do not result in an increase of 1% can LSE be excluded. In addition, in-combination NO_x emissions should be considered before LSE arising from NO_x directly can be excluded.
- 4.1.47 Assuming North Downs Woodlands SAC will be screened into the appropriate assessment for one or more of the three pollutants, the Applicant will therefore need to identify the relevant habitat types and Conservation Objectives, appropriate critical loads/ levels, presence of qualifying features within the pollutant footprint, background concentrations and impacts of the predicted concentration/deposition on the qualifying habitats. If adverse effect on integrity on the site cannot be excluded, further mitigation may be required to avoid air pollution impacts undermining the Conservation Objectives.

Area of concern: In-combination assessment

- 4.1.48 This concern applies to general traffic and air quality modelling work, and therefore applies to a range of ecological receptors sensitive to air quality impacts, rather than one specific receptor.
- 4.1.49 The methodology used for in-combination assessment within the air quality assessment, and projects scoped into the assessment are outlined across several documents.

- 4.1.50 Paragraph 4.3.9 of the HRA Report indicates that non-traffic plans and projects that potentially contribute to N deposition (and could be identified via the planning or permitting system) would be broadly limited to industrial processes and intensive agricultural units. The assumption was that such projects would be limited to Environment Agency permitted sites. Figure 23 shows the location of these identified sites – primarily energy sites – based on a 15km radius around the point of exceedance at Epping Forest SAC (though not North Downs Woodland SAC which, as indicated in point 4B above, was not, but should be, subject to in-combination assessment). However, it is not clear that other potential sources of in-combination impact were included -for example, any agricultural sites, or the in-combination sites (and similar) shown in Figure 27 of the HRA Report (including industrial sites, a waste site and a freepoint site).
- 4.1.51 Developments included in the Transport Model are outlined in section 16.3.66 onwards of the Cumulative Effects Assessment chapter. The transport model includes highway schemes and junction improvements within the Department for Transport's Road Investment Strategy 2015/16 –2019/20 (DfT, 2015), the Road Investment Strategy 2: 2020–2025 (DfT, 2020), local authority schemes, and Transport for London (TfL) schemes. Local plan site allocations were included where information was available when the searches were undertaken up to 31 May 2022. A review was undertaken of relevant Local Plan documents available on local authority websites to identify proposed site allocations for future development. The local authorities were also contacted with a request for further information on proposed site allocations for inclusion in the long list. The 'long list' developments were refined into a short list based on consultation with local authorities, to remove fully implemented developments.
- 4.1.52 As part of ongoing discussions with the Applicant, Natural England has sought confirmation that the same transport data has been used that the Local Authorities use for their Local Plan allocations and that it includes consented and unconsented allocations. National Highways provided a briefing note (September 2022) on the modelling approach. Further discussion has also been undertaken with National Highways air quality modellers to understand their approach to in-combination assessment and assessment of nitrogen deposition and ammonia (February 2023).
- 4.1.53 However, Natural England has yet to receive adequate assurances that all allocated developments (including those with and without planning permission) within Local Plans which will generate a volume of traffic, have been appropriately accounted for in the calculations informing the Environmental Impact/HRA assessments. The methodology outlined in Chapter 16 of the ES (for example 16.3.69) does not provide confirmation that the same allocations were used. Progress on this issue appears to be hindered by the methodology being unable to expressly confirm the traffic figures in a translatable manner which can be used with confidence for HRA in-combination purposes (i.e. comparing growth factors with traffic numbers). Thus Natural England is not yet confident that the Project can demonstrate that it has fully taken account of Local Plans within the in-combination test.
- 4.1.54 The transport model forecasts traffic growth based on assumptions for changes to the road network and general planned development included in the DfT forecasts published in 2018 for HGVs and 2017 for cars and light goods vehicles, as well as local adjustments. The assessment for air quality therefore used traffic forecasts including this predicted growth.
- 4.1.55 The in-combination assessment approach is based on the difference between the 'do

something' traffic model (i.e. with the scheme) compared to the 'do minimum' forecast traffic (without the scheme) in the opening year of the scheme (in this case, 2030). The '1000AADT' criteria is applied, and only then is the 1% threshold (of the relevant ecological end point – in this case the critical level for annual NO_x) applied. Therefore, if the 1000AADT criteria is not met (in the opening year) – no further ecological consideration is made.

4.1.56 Natural England has concerns with the in-combination methodology applied. Although the predicted opening year traffic flows takes account of some anticipated future growth, it appears that predicted increases in traffic flows which might arise from some other plans and projects are excluded where these occur after the opening year. For example:

- Traffic-generating proposals which are in the pipeline but not 'operational' on the opening year – for example, a large traffic-generating project predicted to be operational in 2031 would not be included in the Applicant's assessment for an opening year of 2030. This would mean emissions from this project would not be addressed in the assessment which would underestimate 'committed' in-combination emissions to a protected site;
- Development allocated in local plans, other than a general 'national growth' figure which is not apparently locally relevant. It is accepted that the methodology used for traffic modelling for Local Plans uses a different approach, and may result in different model flows. Although such modelling may include sites that do not end up being developed, inclusion of such sites is the more precautionary approach, and excluding them in favour of general 'national growth' risks missing out potential impacts at protected sites; and
- Contributions from non-road-based emissions from other plans and projects – such as emissions arising from industrial, agricultural or energy development that could also impact the same protected sites. Although some of these sites appear to have been included in the assessment, it is not clear why only Environment Agency permitted sites are included and not others – in particular agricultural sites which would be held on the local authority planning portal. It can therefore not be identified with any certainty that such schemes have been included in the assessment.

4.1.57 Natural England considers that this approach does not properly consider other projects in-combination. Natural England outlined our position on in-combination assessment to National Highways (nationally) and to the Lower Thames Crossing Project Team in April 2023 but have not yet had a response.

Area of concern: Nitrogen Deposition Methodology

4.1.58 This concern applies to general traffic and air quality modelling work, and therefore applies to a range of ecological receptors sensitive to air quality impacts, rather than one specific receptor.

4.1.59 It should be noted that Natural England's agreement within the SOCG to National Highways' EIA Nitrogen deposition methodology (subject to reviewing the final assessment) – Ref 2.1.96 – related only to the information provided in Chapter 5 of the ES (and Appendix 5.1 - air quality methodology and 5.2 - AQ Baseline conditions) relating to establishment of the baseline concentrations, modelling, and conversion of monitored and modelled concentrations into deposition values. This agreement is still relevant. However, as outlined at Sections 4.1.18, 4.1.41 and 4.1.39, Natural England does not agree with the methodology relating to 'inconsequential NO_x' or

the assessment of only Ndep and not NOx or NH₃. The request to review the final assessment was to confirm that ammonia was incorporated into the calculations of Ndep. The Applicant has undertaken this – however, it was not clear at the time, that the ammonia concentrations calculated in this way would not be used to assess ammonia in its own right, against its critical levels, or that Ndep would not be calculated unless NOx was >0.3µg/m³.

Summary of advice

- 4.1.60 In summary, Natural England does not agree with the conclusion of no adverse effect on the integrity of Epping Forest SAC and has concerns that the conclusion of no likely significant effect on North Downs Woodlands SAC is not robust. We have set out our concerns linked with the air quality modelling methodology employed. The effects of the project in-combination with other plans and projects are also insufficiently identified in our opinion.
- 4.1.61 Natural England is confident that there is a solution for the project to satisfy the requirements of the Habitats Regulations for both SAC sites, and we are committed to working with the Applicant on these matters as the examination progresses.
- 4.1.62 Mitigation for the effects arising at Epping Forest SAC has been identified, but not proposed, by the Applicant. Natural England supports the need for mitigation, which could take the form of an enforceable speed limit reduction on the M25 as identified by the Applicant, which we understand has been modelled to be effective by the Project. Without mitigation, the conclusion of the Appropriate Assessment for the Epping Forest SAC is not legally robust in our opinion, being inconsistent with case law.
- 4.1.63 For the North Downs Woodlands SAC, we advise that this site should be taken forward for Appropriate Assessment following revisions to the air quality modelling methodology, and the need for any specific mitigation measures should be explored further as part of that process.

4.2 Impacts to land functionally linked to the Thames Estuary and Marshes Special Protection Area and Ramsar site

- 4.2.1 Unless indicated otherwise, the section and paragraph references below refer to the Habitats Regulations Assessment Screening Report and Statement to Inform An Appropriate Assessment (i.e. the shadow Habitats Regulations Assessment (HRA) document), document reference APP-487.
- 4.2.2 The Applicant has identified that the project presents a risk to the integrity of the Thames Estuary and Marshes Special Protection Area (SPA) and Ramsar site through the pathway of impacts on SPA and Ramsar site species in areas that are functionally linked to the SPA. These pathways are summarised in the shadow HRA at paragraphs 6.2.1 and 6.2.2, and in the Executive Summary at 1.4.1.
- 4.2.3 A number of species that are integral to the function of the SPA and Ramsar site either as individual features (including avocet, black-tailed godwit, grey plover, ringed plover, dunlin, knot and redshank), or as contributors to the assemblage feature (all of the above with a number of additional species with the numbers of curlew; lapwing, shelduck and little gull recorded being of particular note), are identified in Section 5.3.8: Table 5.6 (and subsequent Tables 5.7 and 5.8) as being potentially exposed to the pathways identified by virtue of their distribution.

- 4.2.4 The Applicant has identified that the area of land referred to as Coalhouse Point in Essex (field west of Coalhouse Fort) will be secured permanently as mitigation for long-term impacts (Sections 7.1.21-23; 7.1.25-27), and land adjacent to the Rifle Range in Kent as temporary mitigation (Section 7.1.24) such that there will be no net impact on the SPA (Sections 7.2.14; 7.2.19; 7.2.31; 7.2.36; 7.2.44). Neither of these sites fall within the SPA, Ramsar site or underpinning SSSI. This enables the conclusions of no adverse effect on the integrity of the SPA and Ramsar site by the shadow HRA at Sections 7.2.47, 7.2.51 and 7.2.52.
- 4.2.5 Baseline surveys identify the land at Coalhouse Point (field west of Coalhouse Fort) as being of limited value in supporting SPA and Ramsar site interest at the time of the survey, with an expected consequent increase in the value of this land for SPA and Ramsar site species arising from future management proposed by the Applicant (Section 7.2.13). However, this assessment does not set out how the increase in value was calculated, and more importantly does not set out how it takes into consideration the specific needs of those species most at risk.
- 4.2.6 With reference to our submitted Statement of Common Ground (document reference APP-099), item numbers 2.1.4 and 2.1.93, it is a matter of Common Ground with Natural England that these two areas have the potential to secure appropriate mitigation of impacts in the Functionally Linked Land (i.e. their delivery is feasible) allowing a conclusion of No Adverse Effect on Integrity to be reached. However, it remains the case that if the potential to secure appropriate levels of mitigation is not realised in practice, then an Adverse Effect on Integrity would result.
- 4.2.7 The shadow HRA, outline Landscape Ecology and Management Plan (oLEMP) (Section 6.3), Design Principles (Section 9.13) and Coalhouse Fort Technical Notes supplied to Natural England (appended to our Statement of Common Ground, document APP-099) documents all assert that that the Coalhouse Point land west of Coalhouse Fort in Essex and the Rifle Ranges site in Kent would be managed to ensure they appropriately mitigate SPA and Ramsar site impacts, but do not provide a detailed design within the submission to provide necessary confidence that the required outcomes will be realised.
- 4.2.8 In the document 'Lower Thames Crossing Technical Note Coalhouse Point Mitigation Progress Update' issued to Natural England by the Applicant on the 30 June 2023 (included in Annex H of this Representation) on pages 16 and 17 it is stated that:

'The management prescriptions will be developed as part of detailed design and in consultation with Natural England. Those prescriptions can target specific areas and specific times of the year for specific water depths and/or salinities. The design assumptions and water demand calculations have demonstrated that any water management prescriptions likely to emerge from the detailed design, including Natural England's advice, could be accommodated with the flexibility of water supply and management structures.'

And furthermore that:

'...The final design will need to balance the needs of the range of target features as well as views of stakeholders on priorities. For consenting purposes however, the DCO application provides certainty that the necessary conditions and management capabilities to achieve whatever specific targets are agreed in the detailed design stage can be achieved.'

4.2.9 From this the Applicant considers that it is certainly possible to deliver the required outcomes (which Natural England does not dispute), but also that the details required to ensure that the outcomes will be delivered have not been worked up and secured. Until these details are developed and secured, a conclusion of 'No Adverse Effect on Integrity' cannot be concluded, because it lacks certainty of delivery.

4.2.10 In order to assist the Applicant and the Examination, Natural England has set out below the substantive issues to resolve, which include:

- The proposed water inlet from the Thames is stated as being either a Regulated Tidal Exchange (RTE) structure, as referred to in both the Shadow HRA (at 7.1.26) and the Coalhouse Fort Technical Note, or a Controlled tidal water inlet structure with no return and an invert bed level of 2m AOD as also described in the Coalhouse Fort Technical Note. Both approaches can potentially deliver the required outcome (i.e. they are feasible), but they are different in their operational requirements and habitat designs to achieve the required outcome. The submission needs to allow for each scenario to play out (currently it proposes a single indicative design);
- Details of mitigation land habitat design cross-referenced to target species suitability to ensure the requirements for an appropriate species suite will be met– for example areas of short sward and bare mud for lapwing; provision of bare gravelled islands for ringed plover; areas of seed-rich shallow water for waterfowl. We cannot locate this type of detail in the submission;
- Details of how the site management will be delivered to ensure optimal habitat availability – for example to include details such as grazing or mowing, what stock type and seasonality etc. This needs to propose an optimal scenario(s), recognising some of these details will not be known (for example stock availability) until closer to the delivery of the works.
- How site salinity will be managed. This is important because key invertebrate prey for many waterbirds requires a stable salinity regime;
- Suitable boundary fencing and other access management controls to limit (or ideally prevent) the area of habitat becoming effectively lost to disturbance from people and dogs, for example from marginal footpaths;
- Monitoring and corrective management triggers / mechanisms are needed to determine if the site is meeting its objectives as a mitigation site, and if it is failing to achieve those objectives what will be the management response, to ensure functionality is achieved; and
- Suitable governance structures to ensure that monitoring of the site enables adaptive management change to be successfully implemented.

4.2.11 It is possible that other nature conservation and recovery objectives (such as for terrestrial and aquatic invertebrates and certain breeding birds) are also to be accommodated on the Coalhouse Point site west of Coalhouse Fort. If so, the submission needs to be clear that these will not compromise achievement of the primary SPA and Ramsar site mitigation requirements. Currently there is insufficient detail on this aspect captured within the submission.

4.2.12 Until these details are resolved, the adequacy of the mitigation site at Coalhouse Point to deliver the required management cannot be considered assured. Without these assurances, and especially the need for monitoring to dictate appropriate management, then the proposals will not satisfy the tests of the Habitats Regulations.

4.2.13 Similarly, the detail of the required appropriate management of the land adjacent of the Rifle Range site in Kent needs to be provided. This detail is necessary to ensure the proposals meet the needs of the individual species, and species assemblage, which the mitigation area will need to support.

Summary of advice

4.2.14 In summary, Natural England advises that in order to secure confidence in a conclusion of 'no adverse effect on site integrity', an indicative detailed design is needed for each water supply scenario that the project allows for. This design will need to describe a framework of site preparation (i.e. habitat creation), site management (i.e. preferred grazing stocking rates and/or a mowing regime), and site governance (detailing monitoring and adaptive management measures). In our opinion, this level of detail can be achieved prior to project consent and should be achievable in a reasonably short timeframe. Natural England remains committed to working with the Applicant to achieve the necessary levels of confidence that the Project both can deliver (it is feasible), and will deliver (it is required and controlled within the DCO submission), ensuring appropriate mitigation that will meet the specific habitat needs of target species (it is sufficiently detailed).

4.2.15 In order to ensure that the management of the Coalhouse Point land and the Rifle Range land are secured, Natural England recommends that the proposed management frameworks for these sites are captured in individual documents (preferably Control Documents) that can then be appropriately referenced from the HRA for the proposals, and adherence to their identified management explicitly conditioned as part of the consenting process.

5. Nationally Designated Sites

5.1 Shorne and Ashenbank Woods SSSI

5.1.1 Since the preferred route announcement, the order limits have increased, largely to manage the utilities infrastructure impacts, and the scheme will now result in the direct loss of some 5.85 hectares (including 0.95 hectares of irreplaceable ancient woodland) from the Shorne and Ashenbank Woods Site of Special Scientific Interest (SSSI). The SSSI is nationally important for its ancient and long-established semi-natural woodland habitat and the invertebrate species it supports.

5.1.2 Natural England has recently noticed that there are some boundary mapping errors within the publicly available digital datasets for the Shorne and Ashenbank Woods SSSI in the vicinity of Darnley Lodge Lane. Figure 4.1 provided by the Applicant (based upon the public digital datasets) does not show the boundary of the SSSI running to the southern side of Darnley Lodge Lane whereas the SSSI notification map (Figure 4.2) shows the SSSI boundary abutting the southern edge of the Lane.

It is acknowledged that this area of the SSSI has been subject to significant works and resulting impacts from both the Channel Tunnel Rail Link/High Speed 1 Rail Line and also the A2/M2 widening works. Given that the SSSI overlaps with a greater area than shown, for completeness, it would appear appropriate for the Environmental Statement to reflect the full boundary of the SSSI and any additional impacts that may result.

Figure 4.1 Extract of the Applicant's Figure 8.1 – Designated Site showing the SSSI boundary (green cross hatching)

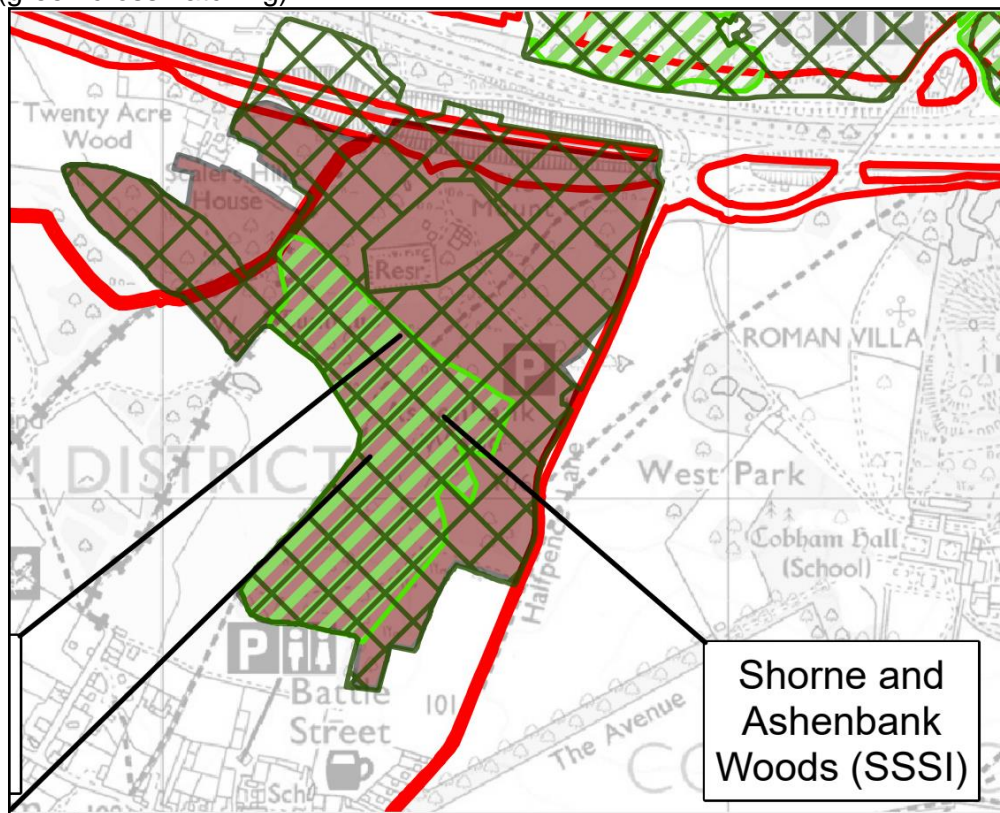
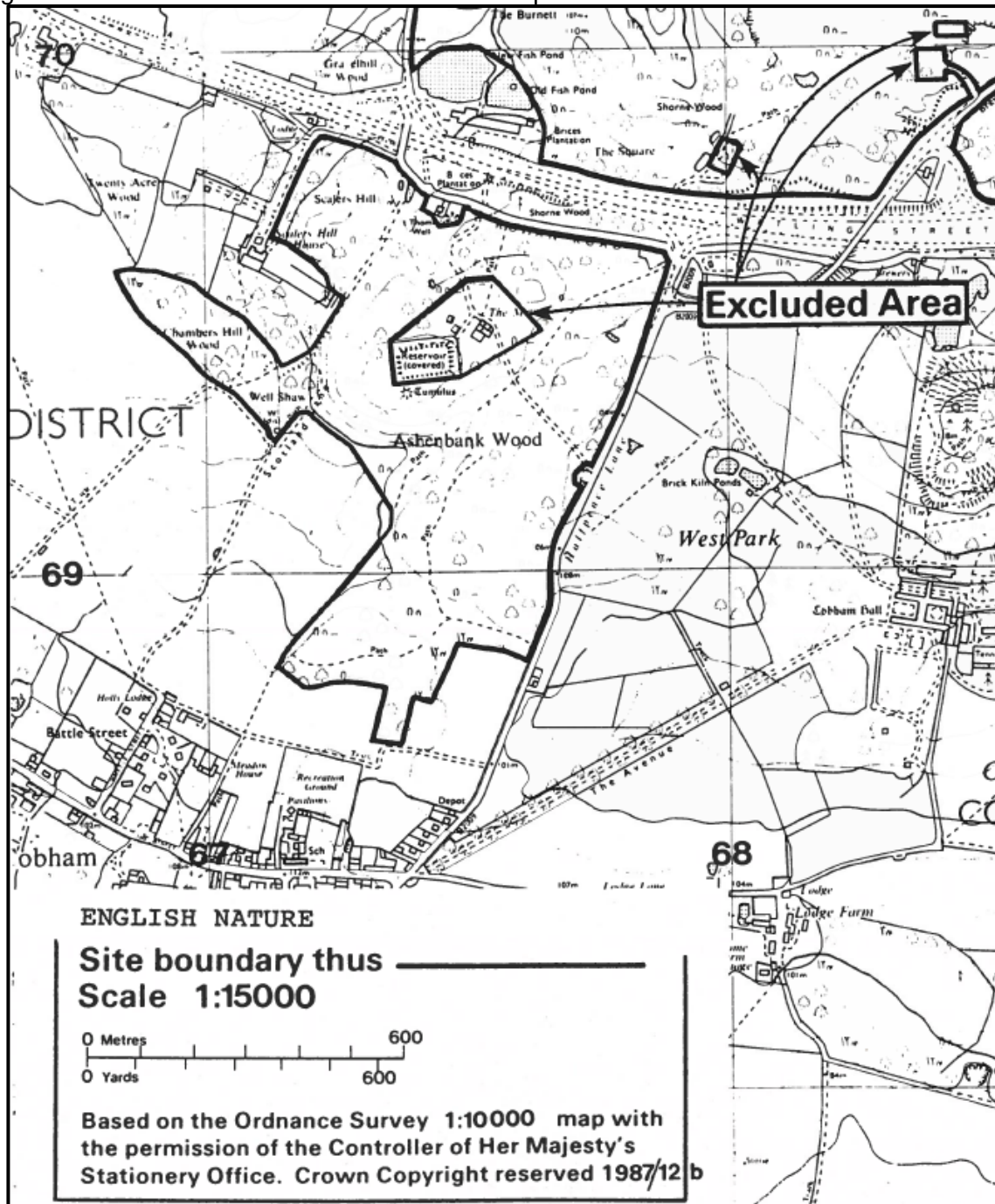


Figure 4.2 Extract from the formal notification map for Shorne and Ashenbank Woods SSSI



5.1.3 Section 5.29 of the National Policy Statement for National Networks(NPSNN)²², against which this application should be judged, provides clear guidance that:

‘Where a proposed development on land within or outside a SSSI is likely to have an adverse effect on an SSSI (either individually or in combination with other developments), development consent should not normally be granted. Where an adverse effect on the site’s notified special interest features is likely, an exception should be made only where the benefits of the development at this site clearly outweigh both the impacts that it is likely to have on the features of

²²https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/387222/npsnn-print.pdf

the site that make it of special scientific interest, and any broader impacts on the national network of SSSIs. The Secretary of State should ensure that the Applicant's proposals to mitigate the harmful aspects of the development and, where possible, to ensure the conservation and enhancement of the site's biodiversity or geological interest, are acceptable. Where necessary, requirements and/or planning obligations should be used to ensure these proposals are delivered.'

- 5.1.4 In addition, Section 5.32 of the NPSNN, in relation to irreplaceable ancient woodland details that:

'Ancient woodland is a valuable biodiversity resource both for its diversity of species and for its longevity as woodland. Once lost it cannot be recreated. The Secretary of State should not grant development consent for any development that would result in the loss or deterioration of irreplaceable habitats including ancient woodland and the loss of aged or veteran trees found outside ancient woodland, unless the national need for and benefits of the development, in that location, clearly outweigh the loss. Aged or veteran trees found outside ancient woodland are also particularly valuable for biodiversity and their loss should be avoided. Where such trees would be affected by development proposals, the Applicant should set out proposals for their conservation or, where their loss is unavoidable, the reasons for this.'

- 5.1.5 As detailed in Natural England's Relevant Representations, we consider that the nature and scale of the impact to the SSSI has not been fully assessed within the submitted documents. A car park with a retail kiosk, cycle hub, changing and associated facilities is proposed off Thong Lane adjacent to the SSSI.
- 5.1.6 During the pre-application stage, Natural England requested a detailed assessment of the potential impact to the SSSI from increased recreational activities to the western area of the site resulting from the proposed car park and associated development. This would need to consider the likely increase in usage of the public rights of way and permissive paths within the SSSI by walkers, cyclists and horse riders and the potential impacts to habitats and species. At the time of writing these Written Representations, no such assessment has been provided, nor details of any mitigation measures to be implemented to ensure that impacts do not result.
- 5.1.7 In addition, a temporary surfaced cycle path is proposed within Ashenbank Wood which falls within the SSSI to the south of the A2. Unfortunately, no details of the nature and scale of any potential direct and indirect impacts has been included within the submitted documents. It is also unclear from the information provided whether the permanent diversion of the National Cycle Route will result in impacts to the SSSI. We therefore recommended that further information on the potential direct and indirect impacts that could result from these facilities to the SSSI is provided by the Applicant.
- 5.1.8 Natural England has advised the Applicant that the provision of low-level parking facility (that is a small car park only without a cycle hub, kiosk, horsebox parking and associated development/facilities) may be acceptable in this area, as part of an integrated access management strategy for recreation using the existing public rights of way network. Such a low-key parking offer has the potential for people to access the valued existing recreational facilities within Shorne Woods Country Park, Jeskyns Farm, Ashenbank Wood and the wider Kent Downs Area of Outstanding Natural Beauty as part of a holistic access strategy with exemplar green bridges across the

A2 corridor to provide users with a high-quality experience. In their current form, Natural England has significant concerns with the proposal.

- 5.1.9 In the absence of detailed information relating to the impacts and mitigation for both the car park and the surfaced cycle route, Natural England is not able to advise the Examining Authority on the nature and scale of the impacts to the SSSI and whether these can be avoided or fully mitigated. We understand that such an assessment of the impacts is being prepared by the Applicant which should provide clarity on the nature and scale of any direct and indirect impacts resulting from their access proposals and any additional mitigation measures required. When this information is forthcoming, we will of course be pleased to provide further, detailed advice.
- 5.1.10 In relation to the direct loss of habitat from the SSSI, Natural England does not endorse such impacts. We recognise that the Secretary of State needs to consider the project in relation to the tests set out in the NPSNN whether the adverse impacts upon the Shorne and Ashenbank Woods SSSI and the national designated site series and whether these are outweighed by the benefits of the scheme. In reaching the decision, they will need to consider whether all alternatives have been exhausted to avoid or fully mitigate impacts.
- 5.1.11 Given that ancient woodland is an irreplaceable habitat, it is not possible to compensate for the impacts resulting from the scheme should the Secretary of State be minded to grant consent. Notwithstanding our in-principle position regarding the loss of habitat from the SSSI, Natural England acknowledges that a package of woodland habitat planting is proposed as part of the package for impacts and whilst the approach of buffering and linking existing woodland blocks is supported from an ecological resilience perspective, we advise that further detail is required regarding the proposals.
- 5.1.12 Natural England recommends that greater clarity is provided on the areas of habitat that are specifically being created for impacts to the SSSI; we have sought a detailed plan showing which area(s) of habitat are being created for each parcel of habitat impacted.
- 5.1.13 In addition, greater clarity on the management of the replacement habitats should be provided to ensure that the target ecological condition is met, not just in terms of the habitat but the species assemblages that they support (see Section 13 for further comments on the management and monitoring of habitats). We would also recommend that much greater clarity is provided on the mitigation measures and how biodiverse rich habitat will be created given the lack of certainty within the dDCO and the Code of Construction Practice and associated securing mechanisms.
- 5.1.14 Experience from other schemes, such as the A2/M2 widening, has shown that the translocation of woodland soils can help to establish a more biodiverse rich woodland habitat in a shorter period of time. The monitoring undertaken at Cossington Fields²³ showed that comparison between two compensation areas (one where woodland soil was translocated and one where soils were not) after ten years concluded that the fields where soils were translocated had developed a range of woodland species, including ancient woodland indicator species, whereas the site where the topsoil was

²³ Literature review and analysis of the effectiveness of mitigation measures to address environmental impacts of linear transport infrastructure on protected species and habitats (Natural England Commissioned Report NECR132)

not translocated had not developed these species.

- 5.1.15 These works suggest that the translocation of soil can be beneficial in accelerating the rate at which certain woodland indicator species are established. Whilst this suggests that soil translocation may help accelerate the creation of a more diverse habitat it should not be interpreted as meaning that ancient woodland loss can be successfully compensated but assists in creating a functioning woodland ecosystem.
- 5.1.16 The Applicant has indicated that they may undertake soil translocation for some of the woodland creation areas, but it is not clear which of the woodland planting sites will be subject to soil translocation. Natural England therefore recommends that greater clarity is provided by the applicant on their proposed woodland compensation proposals.
- 5.1.17 Natural England also recommends that greater clarity is provided by the Applicant on the replacement woodland planting to ensure that impacts to the Kent Downs Area of Outstanding Natural Beauty (AONB) do not result. As detailed in Section 6 of this letter, we have concerns that the proposed woodland planting at Park Pale, linking Brewers and Great Crabbles Woods will result in significant additional landscape impacts given the views from this area and the parkland nature of this part of the AONB. We therefore recommend that the Applicant provides greater clarity on how the mitigation conserves and enhances the special qualities of the AONB.

Summary of advice

- 5.1.18 The scheme, as currently reported, will result in the loss of 5.85 hectares (including 0.95 hectares of irreplaceable ancient woodland habitat) habitat from within the Shorne and Ashenbank SSSI. Natural England does not endorse the loss of habitat from within the SSSI but acknowledge that, should the scheme be consented by the Secretary of State a compensation package is proposed by the Applicant.
- 5.1.19 Given the national importance of the site, Natural England considers that further detail is required to be provided to ensure that the requirements of Section 5.29 of the NPSNN, which details that 'The Secretary of State should ensure that the Applicant's proposals to mitigate the harmful aspects of the development and, where possible, to ensure the conservation and enhancement of the site's biodiversity or geological interest, are acceptable' can be met in full. In the absence of a comprehensive ecological impact assessment and confidence in the delivery of the mitigation/compensation measures we cannot at present advise the Examining Authority on whether the requirements of the NPSNN can be met.
- 5.1.20 At present, we do not consider that there is sufficient information for Natural England to be able to fully advise the Examining Authority on the nature and scale of the potential impacts to the Shorne and Ashenbank Woods SSSI and the appropriateness of the mitigation and compensation measures. We recommend that the Applicant provides the following information:
- An assessment of the potential impacts resulting from the proposed additional car park at Thong Lane including consideration of recreational impacts to the SSSI;
 - Clarity on the nature of the proposed surface upgrade and impacts resulting from the cycle route within Ashenbank Woods south of the A2;
 - A detailed map showing which areas of habitat are specifically being created to compensate for the loss of habitats from within the Shorne and Ashenbank

Woods SSSI;

- Greater clarity on the habitat creation and management prescriptions for the SSSI compensation areas;
- Further information detailing how the woodland habitat creation, particularly at Park Pale, will not result in additional impacts to the Kent Downs AONB; this should also include details of how the project will conserve and enhance the special qualities of the AONB;
- Clarity on whether the digital mapping error alters the assessment of impacts to the SSSI from the scheme.

5.2 South Thames Estuary and Marshes Site of Special Scientific Interest

- 5.2.1 Given the overlap of the Order Limits with the Thames Estuary and Marshes Special Protection Area (SPA) and Ramsar site, Natural England welcomes the measures outlined within the Register of Environmental Actions and Commitments (REAC) and Chapter 8 of the Environmental Statement, as well as the further details contained within Section 8.5 demonstrating how impacts to the features of the SPA and Ramsar site will be avoided and mitigated. Nonetheless, as set out within our Relevant Representations, we remain concerned regarding the lack of a robust assessment on the potential impacts to the breeding bird features associated with the South Thames Estuary and Marshes Site of Special Scientific Interest (SSSI).
- 5.2.2 Despite many of the designated features of the SPA and Ramsar site also being a feature of the underpinning South Thames Estuary and Marshes SSSI, the breeding bird interest is exclusive to the SSSI and do not feature within the SPA and/or Ramsar site interest features. As such, there is a risk that the SSSI breeding bird features may be adversely impacted by the implementation of measures intended to avoid and mitigate potential impacts to the SPA and Ramsar site due to the timing of their delivery to avoid the passage and wintering bird season.
- 5.2.3 Furthermore, we remain concerned about the lack of a robust assessment that considers the impacts to the SSSI, and the impacts associated with the implementation of mitigation measures (for the SPA and Ramsar) during the breeding bird season.
- 5.2.4 Within the REAC, it is detailed that the ‘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’ (REAC reference number HR006). However, two of the compounds identified within HR004 are directly adjacent to the boundary of the SSSI, and therefore, present a potential impact pathway for the SSSI. As recognised within Chapter 8 – Terrestrial Biodiversity of the submitted Environmental Statement, visual disturbance can alter the behaviour of birds by causing them to avoid areas that they would naturally use otherwise.
- 5.2.5 Whilst it is recognised that seasonal timings present an additional challenge in wholly avoiding impacts to the designated sites, we would nonetheless reiterate that the applicant should robustly consider all potential pathways of disturbance to breeding birds associated with the SSSI (including the impact of delivering SPA and Ramsar mitigation during the breeding bird season). If following a robust assessment of these potential impacts, it is considered that there will be an impact, we would advise that appropriate mitigation should be delivered.
- 5.2.6 Natural England would advise that in order for mitigation to be effective, it should be

implemented and functioning, prior to the impact occurring. We would therefore advise that the impacts associated with delivering mitigation for retained habitats (that are found to support breeding birds) should also be scoped into an assessment of the potential impacts of the construction phase taking place during the breeding bird season.

- 5.2.7 We would also highlight that whilst there may be breeding birds present within the affected areas (that are not designated features of the SSSI), that any impacts to breeding birds associated with the SSSI should instead be considered as being of National importance given their SSSI status. We are concerned that defining all breeding birds as being of a County importance – and not differentiating between those that are designated as part of the SSSI and those that are not – has the potential to downgrade the assessed scale and significance of impact within the Environmental Statement.

Summary of advice

- 5.2.8 Natural England remains concerned that the Applicant does not appear to have considered the potential impacts to the breeding bird interest associated with the South Thames Estuary and Marshes SSSI resulting from the Project. This includes the impacts that may result from timing constraints implemented in relation to mitigation works for species associated with the Thames Estuary and Marshes SPA and Ramsar site.
- 5.2.9 Natural England considers that the Applicant should provide greater clarity on the potential impacts to breeding bird species association with the South Thames Estuary and Marshes SSSI. Where impacts are likely to result, details of the mitigation measures should also be provided.

6 Nationally protected landscapes

- 6.1.1 The Lower Thames Crossing falls within the Kent Downs Area of Outstanding Natural Beauty (AONB) and will result in both direct and indirect impacts to the AONB and its setting. Such effects will result from both the road and associated infrastructure, the utility diversions and the environmental mitigation measures. Natural England considers that the nature and scale of the impacts to landscape and visual receptors has been underestimated by the project and that the Applicant should commit to a greater mitigation package to help reduce the significant residual impacts predicted.
- 6.1.2 The National Policy Statement for National Networks provides strong policy protection for nationally important protected landscapes such as the Kent Downs AONB. Of particular note are Sections 5.150-53 which detail that (our emphasis):

'5.150 Great weight should be given to conserving landscape and scenic beauty in nationally designated areas. National Parks, the Broads and Areas of Outstanding Natural Beauty have the highest status of protection in relation to landscape and scenic beauty. Each of these designated areas has specific statutory purposes which help ensure their continued protection and which the Secretary of State has a statutory duty to have regard to in decisions.

5.151 The Secretary of State *should refuse development consent in these areas except in exceptional circumstances* and where it can be demonstrated that it is in the public interest. Consideration of such applications should include an assessment of:

- the need for the development, including in terms of any national considerations, and the impact of consenting, or not consenting it, upon the local economy;
- the cost of, and scope for, developing elsewhere, outside the designated area, or meeting the need for it in some other way; and
- *any detrimental effect on the environment, the landscape and recreational opportunities, and the extent to which that could be moderated.*

5.152 There is a *strong presumption against any significant road widening or the building of new roads* and strategic rail freight interchanges in a National Park, the Broads and *Areas of Outstanding Natural Beauty*, unless it can be shown there are compelling reasons for the new or enhanced capacity and with any benefits outweighing the costs very significantly. Planning of the Strategic Road Network should encourage routes that avoid National Parks, the Broads and Areas of Outstanding Natural Beauty.

5.153 *Where consent is given in these areas, the Secretary of State should be satisfied that the Applicant has ensured that the project will be carried out to high environmental standards and where possible includes measures to enhance other aspects of the environment.* Where necessary, the Secretary of State should consider the imposition of appropriate requirements to ensure these standards are delivered.'

- 6.1.3 As a matter of procedure, we note that the boundaries of some of the Local Landscape Character Areas within the Kent Downs AONB appear to be incorrectly transposed within the Environmental Statement. The Environmental Statement appears to show incorrect boundaries for the contiguous West Kent Downs (sub area Cobham) and West Kent Downs (sub area Shorne) Local Character Areas. The

Cobham sub area boundary largely follows the northern boundary of the existing A2/High Speed 1 Rail Line alignment whereas the Environmental Statement shows the same Character Area boundary running to the south of the A2/High Speed 1 Rail Line. The incorrect transposition of the boundaries for these two Character Areas is likely to mean that the assessment of landscape and visual effects within the Environmental Statement are incorrect and we would recommend that the Examining Authority liaises with the Applicant to understand the nature of any amendments and updates to the Environmental Statement required.

- 6.1.4 Notwithstanding this apparent error in the Character Area boundary mapping, Natural England has reviewed the Environmental Statement and provide our detailed comments on the information presented below. This of course may need to be updated to reflect any amendments that the Applicant provides during the Examination.
- 6.1.5 Natural England has worked collaboratively with the Applicant and partners including the Kent Downs AONB Unit and Gravesham Borough Council where our landscape roles are complementary. We welcomed the joint working to agree the viewpoint locations but acknowledge that this did not extend to the locations where all visualisations would be prepared.
- 6.1.6 Natural England provided detailed advice to National Highways on the Landscape and Visual Impact Assessment chapter of the Environmental Statement for the Lower Thames Crossing application which was withdrawn by the Applicant in late 2020. We are concerned that, despite apparently minor changes being made to the scheme, significant parts of the assessment appear to have been downgraded without a narrative to explain the reasoning. Given the nature and scale of the development within the AONB, we would expect a greater degree of clarity to be provided.

Landscape character baseline

- 6.1.7 Notwithstanding the comments above regarding the apparent boundary mapping errors, we note that within the schedule of landscape effects detailed within Appendix 7.9 that the susceptibility of the Local Landscape Character Areas within the Kent Downs AONB are judged to be either 'Medium' or 'High'. However, the Applicant's methodology detailed within Appendix 7.2 of the Environmental Statement defines a Medium Susceptibility as the 'Ability to accommodate some change (relating to landscapes of local or regional recognition of importance)'. As the Kent Downs AONB is a landscape of 'National Importance', we consider that the susceptibility should be 'High' or 'Very High' to comply with the Applicant's own methodology. This will affect the subsequent assessment of the scale of impacts during construction and operation of the project.
- 6.1.8 Having compared the current assessment with the 2020 withdrawn Environmental Statement, we note that the susceptibility in the current application has been downgraded. In the 2020 withdrawn assessment, all Local Landscape Character Areas within the Kent Downs AONB were assessed as being of 'Very High' susceptibility.
- 6.1.9 Given these concerns, Natural England recommend the Applicant provides further clarity on the assessment of susceptibility based upon their own submitted methodology and the difference in values assigned between the two assessments. Where required, an updated impact assessment should also be provided if, using the Applicant's methodology all Local Landscape Character Areas are reassigned to

'High' or 'Very High' susceptibility.

- 6.1.10 Notwithstanding the concerns regarding susceptibility above, Natural England considers that the sensitivity provided in Appendix 7.9 of the Environmental Statement, with them all being judged 'High' or 'Very High' appears appropriate and to be in accordance with the Applicant's methodology.
- 6.1.11 Similarly, visual receptors within the Kent Downs AONB are identified as being of 'High' or 'Very High' sensitivity which we consider appropriate. We however note that Paragraph 1.1.2 of Appendix 7.7 details that sensitivity judgements have been made 'taking into consideration the value attached to the view and the susceptibility of viewers to change'. Whilst susceptibility and values have not been separated, which is in accordance with the Design Manual for Roads and Bridges, LA107, this deviates from the good practice recommended within the Guidelines for Landscape and Visual Impact Assessment (3rd edition) and appears contrary to the approach taken by the Applicant for landscape receptors. It would be helpful for the Applicant to provide clarity on this matter.

Assessment of effects

- 6.1.12 Natural England considers that, when assessing the impacts, the methodology appears to have been applied consistently and, in general, offers a clear justification for each assessment. The exception to this is the assessment of effects on visual receptors in Tables 2.2 and 3.3 of Appendix 7.10 which we will expand further below.
- 6.1.13 Natural England notes that the vast majority of the landscape and visual effects within the Kent Downs AONB and its setting are identified as being 'adverse'. Similarly, all effects during the construction are identified as being adverse except the Local Landscape Areas where only compensatory planting is proposed.

Beneficial effects identified by the Applicant

- 6.1.14 The Applicant advises that a 'moderate beneficial effect' is identified at design year for the Mid Kent Downs (sub area Bredhurst) Local Landscape Character Area within the AONB and also for the Shorne Wooded Slopes Local Landscape Character Area within the setting of the Kent Downs. These assessments are made on the basis of the woodland planting proposed as part of the nitrogen deposition compensation.
- 6.1.15 Natural England notes that the Applicant has recently completed a Minor Refinements Statutory Consultation which proposes to reduce the area of compensatory planting in the Burham and Blue Bell Hill areas. It is unclear whether the Applicant propose to amend their impact assessment as a result of this reduction in habitat provision as this may alter the assessment of beneficial effects. We therefore recommend that clarity is provided by the Applicant on the status of the Minor Refinements consultation and any implications this has for the submitted documents.
- 6.1.16 Notwithstanding the Minor Refinements Consultation, Natural England has concerns regarding the lack of detail regarding the habitat creation proposed. We have worked with the Applicant to seek clarity on these matters and continue to recommend that further detail is sought to ensure that the proposals fully reflect the landscape characteristics and management principles for the Local Landscape Character Areas in which they sit. For example, it may be appropriate to retain some areas which have a more open, parkland character, and to build upon the existing

habitat/vegetation (eg the existing scrub habitat to the east of Bowesden Lane, Shorne/Park Pale).

- 6.1.17 Beneficial effects have also been identified during the design year for visual receptors: S-03 (moderate beneficial), S-12 (slight beneficial), S-13 (slight beneficial) and S-14 (slight beneficial) and we have provided commentary on these below.

Viewpoint S-03

- 6.1.18 Viewpoint S-03 is located on a public right of way which has slightly elevated views across a parkland landscape towards the A2/M2 and High Speed 1 to the south which is partially screened by vegetation and back clothed with a wooded ridgeline. There are industrial buildings in the view (at Park Pale) but the outlook remains rural as detailed in Figure 7.17. The Applicant is proposing to provide ancient woodland compensation planting in the foreground of the view (as detailed on Figure 2.4, Section 1, Sheet 4) and we have expressed concerns previously that this could alter the views and landscape character of this area to the detriment of the AONB.

- 6.1.19 The Applicant has not provided a visualisation from this viewpoint to verify their beneficial assessment of effects. Natural England advise that the loss of rural views towards a wooded ridge could be considered 'adverse' rather than beneficial. We advise that retention of the open views to the east and south of this viewpoint would be desirable to allow users to continue to appreciate the parkland and woodland landscape in the area. Woodland planting could be limited to the north side of the A2 corridor to supplement the existing filters and screening of the A2, particularly during the winter months.

- 6.1.20 Natural England would welcome further assessment (including a visualisation) to better understand the nature and likely scale of the impacts from viewpoint S-03.

Viewpoint S-12

- 6.1.21 Viewpoint S-12 is located on Brewers Road, Shorne providing close views to the south-west across and existing road bridge over the A2. Mature trees along Brewers Road filter and screen the more distant views. The Applicant is proposing a 'light-weight' green bridge in this location (as detailed on Figure 2.4, Section 1, Sheet 3). This will screen part of the widened A2 corridor which provides some limited justification for the slight beneficial effect identified by the Applicant at design year.

- 6.1.22 Natural England however considers that this would be more than offset by the loss of mature woodland along the existing A2 corridor including the woodland within the central reservation which is highly effective in screening the current transport corridor. Given this, Natural England considers that the beneficial effects for Viewpoint S-12 appear to be overstated.

Viewpoint S-13

- 6.1.23 Viewpoint S-13 is located on the existing road bridge over the A2 at Brewers Road. Views are provided in both directions along the A2 with a substantial belt of mature woodland between the east and westbound carriageways. As mentioned above, the Applicant is proposing a 'light-weight' green bridge in this location (as detailed on Figure 2.4, Section 1, Sheet 3) which will screen part of the widened A2 carriageway. As for Viewpoint S-12 this provides some limited justification for the slight beneficial effect identified by the Applicant at the design year.

6.1.24 Natural England however considers that this would be more than offset by the loss of mature woodland along the existing A2 corridor including the woodland within the central reservation which is highly effective in screening the current transport corridor. Given this, Natural England considers that the beneficial effects for Viewpoint S-13 appear to be overstated.

Viewpoint S-14

6.1.25 Viewpoint S-14 is also located on the existing road bridge over the A2 at Brewers Road with views both east and west along the A2 and the adjacent High Speed 1 Rail Line. The mature woodland between the east and westbound carriageways of the A2 is visible. The photomontage for Viewpoint S-14 illustrates that there would be proposed tree planting to the east of the viewpoint which would screen both the widened A2 and the High Speed 1 Rail Line by design year. This provides some justification for the slight beneficial effect identified by the Applicant.

6.1.26 However, as with Viewpoints S-12 and 13, Natural England considers that this would be offset by the loss of mature woodland along the widened A2 corridor, including the substantial belt of woodland within the central reservation. As such, Natural England considers that the beneficial effects for Viewpoint S-14 have also been overstated.

6.1.27 For all of these viewpoints, the Applicant may have overstated the beneficial nature of effects by placing an over reliance on the screening potential of the proposed planting at design year (15 years post planting). Natural England continues to seek further improvements to the design of the green bridge at Brewers Road (and Thong Lane bridges) from the Applicant to further improve the mitigation measures. A broader crossing with wider swathes of vegetation along each side of the road and either side of the pedestrian/cycle route would enhance the experience of the AONB at Brewers Road.

Direct and indirect effects on the Kent Downs AONB

Landscape effects

6.1.28 Having reviewed the submitted information, and notwithstanding our comments regarding the apparent mapping error for the Local Landscape Character Areas, Natural England considers that the effects during construction are realistic. Most of the Local Landscape Character Areas within the AONB along with several forming part of its setting have been identified as experiencing 'Large Adverse' or 'Very Large Adverse' and significant effects. The one exception is at Gravesend Southern Fringe Local Landscape Character Area where effects have been assessed as 'Slight Adverse (not significant)' during construction despite being directly impacted by the new junction at the eastern end of the Character Area. Natural England therefore considers that the effect is likely to be significant given the Character Area would be directly affected.

6.1.29 A 'Large Adverse' and significant effect is identified within the West Kent Downs (sub area Shorne) Local Landscape Character Area at opening year. This reduces to 'Moderate' and significant at design year. We consider that this appears to overestimate the role of the proposed mitigation in reducing the effects to the AONB in the longer term. The trees will not be fully mature at year 15 and would not replace the mature woodland and trees lost as part of the Project, including that within the central reservation.

6.1.30 A 'Slight Adverse' and not significant effect is identified for the West Kent Downs (sub area Cobham) Local Landscape Character Area at both opening and design year. Again, Natural England considers that this appears to overestimate the role of the proposed vegetation in screening the Lower Thames Crossing project. Some of the mature vegetation which filters and screens views of the existing A2 corridor will be removed (for example, that between the Project and the High Speed 1 Rail Line) and is to be replaced with 'shrubs with intermittent trees'. By design year, the trees would not be fully mature and would not replace the mature woodland and trees to be lost as a result of the scheme.

Visual effects

6.1.31 The Environmental Statement considers visual effects on specific groups of visual receptors including residential properties, recreational routes and publicly accessible areas, transport routes and other receptors. We note there does not appear to be a commentary for the assessment of these additional visual receptors and it is therefore unclear how the Applicant has reached each judgement with regard to the magnitude and significance of the effect. As such, Natural England recommends that a separate assessment providing clear and transparent commentaries and descriptions for each of these additional receptors within the AONB is provided.

6.1.32 Natural England considers that the visual effects during construction are appropriate with the majority of receptors experiencing a 'Large' or 'Very Large' adverse effect with justifications provided.

6.1.33 Effects during operation range from 'Very Large Adverse' and significant to 'Neutral' and not significant. As mentioned above, it is noted that a number of effects have been downgraded since the withdrawn application from 2020 despite limited changes to the design of the Project. Where effects have been downgraded from significant to not significant, we have provided our observations below:

Viewpoint S-08

6.1.34 S-08 is now assessed as 'Slight Adverse' (Not Significant) at design year. We consider that the existing vegetation is likely to help filter and screen views towards the Project (particularly in summer), providing some justification for the effect not being significant.

Viewpoint S-09

6.1.35 S-09 is now assessed as 'Slight Adverse' (Not Significant) at design year. We consider that the existing vegetation is likely to help filter and screen views towards the Project (particularly in summer), providing some justification for the effect not being significant.

Viewpoint S-12

6.1.36 S-12 is now assessed as 'Slight Beneficial' (Not Significant) at the design year. As noted above, a new green bridge is proposed at this location which screens part of the A2 carriageway, providing some justification for the slight beneficial effect identified at design year. However, this would be offset by the loss of mature woodland along the A2 including along the central reservation. It is considered that improvements to the design of the green bridge in this area would help with the

assessment.

Viewpoint S-13

6.1.37 S-13 is now assessed as 'Slight Beneficial' (Not Significant) at design year. As noted above, a new green bridge is proposed at this location which screens part of the A2 carriageway, providing some justification for the slight beneficial effect identified at design year. However, this would be offset by the loss of mature woodland along the A2 including along the central reservation. It is considered that improvements to the design of the green bridge would help with the assessment.

Viewpoint S-14

6.1.38 S-14 is assessed as Slight Beneficial (Not Significant) at design year. As noted above, a new green bridge is proposed at this location which screens part of the A2 carriageway, providing some justification for the slight beneficial effect identified at design year. However, this would be offset by the loss of mature woodland along the A2 including along the central reservation. It is considered that improvements to the design of the green bridge in this area would help with the assessment.

Indirect effects to the Kent Downs AONB

6.1.39 As noted in our Relevant Representation, Natural England 'remains concerned that there would be a reduction in tranquillity and people's enjoyment of the AONB during construction and after completion of the Project, from noise and increased lighting and broader urbanising effects'. Tranquillity and remoteness is one of the special components, characteristics and qualities of the AONB. Natural England is also concerned that there would be very limited, if any, noise attenuation for users of the green bridges.

6.1.40 We note that the Applicant has provided an assessment of night-time effects in Appendices 7.9 and 7.10 as part of the overall assessment of effects on the Local Landscape Character Areas and visual receptors. This includes effects during construction and operation. It is noted that there would be a 'perceived change' to the West Kent Downs Local Landscape Character Areas due to changes in street lighting. In many cases the Applicant finds a positive impact in relation to lighting for visual receptors, noting that the change in street lighting (light-emitting diode (LED) luminaires) and reduced height of columns would reduce light spill and skyglow apparent in the night-time view. There are some locations where existing lighting along the A2 is visible above surrounding vegetation, so a reduction in column height is welcomed.

6.1.41 Effects on tranquillity are considered as part of wider effects on landscape character, with the Applicant noting that this takes both noise (with reference to noise contour mapping) and visual intrusion into account (paragraph 7.3.16). The Applicant indicates that the Project will see reductions in tranquillity in Local Landscape Character Areas due to construction activity and also along the widened A2/M2 corridor during the operational phases.

6.1.42 Appendix 7.11 considers the effects of noise and visual disturbance on tranquillity within the wider AONB, specifically in relation to changes in traffic flows. Some adverse effects are recorded on existing areas of relative tranquillity within the AONB, including at design year (Boxley Road, The Street, Pilgrim's Way and Lidsing Road between the M20 and M2 motorways due to visual disturbance and Shorne

Ridgeway, Sole Street, Trottscliffe and Boxley, due to visual disturbance).

- 6.1.43 In Chapter 2, it is noted that a 'Thin Surface Course System (TSCS) has been assumed for all new and altered highways associated with the Project, which is a low noise surface that generates lower road traffic noise levels than a standard hot rolled asphalt pavement surface' (paragraph 2.4.14). In Chapter 7, the Applicant notes that 'the proposed [acoustic] barrier alongside Park Pale has now been omitted because proposed noise reducing surfacing has made it unnecessary for noise mitigation and design refinements have made it possible to retain more of the existing tree screening between Park Pale and the A2 corridor' (Table 7.2) which is welcomed. Acoustic barriers shown elsewhere on the Environmental Masterplan in Figure 2.4 are noted to be 'typically incorporating highway boundary fence'.
- 6.1.44 Whilst many views towards the existing A2 corridor are filtered and screened by existing vegetation (particularly in summer), traffic noise is noted to be a key factor in reducing baseline tranquillity within the study area. Any reduction in traffic noise, as compared to baseline levels, would be of benefit in enhancing this special component, characteristic and quality of the AONB.
- 6.1.45 In addition to the design of the green elements of the green bridges (discussed elsewhere in this response), Natural England considers that the Applicant should give consideration to the location and design of acoustic barriers to reduce the effects on tranquillity. This could include exploring options for vertical green wall visual and acoustic barriers on the bridges themselves. Similarly, greater consideration of potential options to mitigate the noise from the widened A2 corridor to recreational users crossing the Thong Lane South green bridge to access Ashenbank Woods and the wider Kent Downs AONB should be provided. The footpath runs parallel to the A2 to reach the proposed crossing over the High Speed 1 Rail Line and users are likely to experience significant traffic noise.
- 6.1.46 Whilst measures to use a low noise road surface are welcomed, Natural England has sought reassurances from the Applicant that such a surface which meets or exceeds the noise reduction capabilities at opening year is maintained throughout the lifespan of the project. Such a commitment (secured via the DCO) is required to give confidence that the reduction in noise (and therefore a reduction in effects on tranquillity) are guaranteed for the lifetime of the Project. We therefore recommend that that the DCO is amended to secure this, if consent is granted.

Cumulative effects

- 6.1.47 Given the significant switch in traffic flow from the Dartford Crossing and the M25/M20 for traffic heading to the Channel ports, the roads linking the A2/M2 and the M20 are likely to experience higher volumes of traffic. We have previously expressed concerns that the proposed junction upgrade of the M2 Junction 3 at Blue Bell Hill, which falls within the Kent Downs AONB, should form part of the cumulative assessment. We would support the Applicant providing greater clarity on the need to consider upgrades to other parts of the road network resulting from the Lower Thames Crossing as part of their cumulative landscape assessment in relation to the Kent Downs AONB.

Mitigation measures

Embedded Mitigation

6.1.48 A suite of embedded mitigation measures is proposed by the Applicant which we have summarised below:

- S1.03 The Project details the commitment to 'To reduce the impact on the Kent Downs AONB, the preliminary design has been developed to reduce 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...'
- S1.04 - New multifunctional green bridges at Brewers Road and Thong Lane south to support landscape integration and act as local landmarks.
- S1.08 – 'New woodland east of Shorne Woods Country Park shall be provided to link Shorne Woods with Great Crabbles Wood...The design of woodland shall retain key views from the upper slopes of the new woodland across to the Darnley Mausoleum...'
- S1.16 - '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...'
- 'Woodland planting (Landscape Element (LE)2.1, 2.2, 2.3, 2.4) typically of native species (with some climate-change-adapting species), planted as multipurpose features for visual screening, to aid landscape integration and support nature conservation and biodiversity within the A2 corridor adjacent to retained features outside the utility easements, and as part of the ancient woodland compensation planting.'
- 'Species-rich/wildflower/acid grassland (LE1.3, 1.5, 1.6) typically planted adjacent to the Project road.'
- 'Shrub/scrub planting (LE2.5, 2.6, 2.8) typically of native species (with some climate-change-adapting species), including those on the green bridge structures.'
- 'Native hedgerows (LE4.2, 4.3, 4.4) typically planted on the green bridge structures.'
- 'Specimen/individual trees and scattered trees' (LE2.7, 5.1)
- 'Wetland planting associated with waterways and water bodies (LE6.1, 6.2, 6.3, 6.4).'

6.1.49 With regard to lighting, proposed Project-wide mitigation is as follows: 'To preserve the rural and historic nocturnal character of the landscape along the Project route... lighting will be minimised wherever it is reasonably practicable and safe to do so...'. Chapter 2 provides further detail of mitigation in relation to lighting including the use of luminaires which would emit no light above the horizontal to reduce skyglow and ensure light is only projected to where it is needed (paragraph 2.4.26).

6.1.50 Many of these embedded mitigation measures are welcome. Natural England however has significant concerns regarding the proposed woodland planting at Park Pale (linking Shorne and Brewers Woods to Great Crabbles Wood) and the impacts this will have for receptors using the public right of way at Viewpoint S-03. In addition, Natural England has, and continues to express concerns, regarding the use of non-native species as part of the planting palette given the biodiverse rich landscape within the AONB.

6.1.51 Natural England also considers that there is the potential for additional mitigation as summarised below:

- The use of woodland planting to south of the High Speed 1 railway line (instead of 'shrubs with intermittent trees' as currently proposed) to help integrate it with its landscape setting, and provide long-term filtering and screening of views towards the Project, for example from the public footpath which runs along the north side of Rochester and Cobham Park Golf Club;
- The inclusion of an additional low-traffic green bridge at the Park Pale overbridge, to provide habitat connectivity and enhance the experience of recreational users crossing the A2 at this location. It would be desirable to screen views of the Project but retain long views to the north and east which are available at this location;
- The use of vernacular materials to construct or clad retaining walls and the use of trees and shrubs characteristic of the local area to help to blend the proposals into the surrounding landscape;
- It is recommended that further discussions are held with Natural England and the Kent Downs AONB Unit regarding the new woodland proposed at Park Pale to ensure that it is in keeping with the local landscape character on the fringes of the AONB.

Essential Mitigation

6.1.52 In addition to the embedded mitigation, the Applicant is proposing Essential Mitigation which is defined in Chapter 7 as 'any additional Project-specific measures needed to avoid, reduce, or offset potential impacts that could otherwise result in effects considered to be significant in the context of the EIA Regulations' (paragraph 7.5.2c).

6.1.53 Construction phase essential mitigation of relevance to the landscape and visual chapter is set out in Table 7.14. Operational phase essential mitigation of relevance to this landscape and visual chapter is set out within Table 7.15. It is stated that key mitigation measures will be delivered 'where reasonably practicable' which Natural England has expressed concerns with earlier in this letter.

6.1.54 One element of the essential mitigation is 'Retaining structures and bridge abutments within the Kent Downs AONB and its setting, shall be either green walls, earth banks, or clad with hard materials in accordance with the Kent Downs AONB Landscape Design Handbook, to be reflective of the local vernacular.' This is welcomed. National Highways has some examples of good practice in this respect, for example the finish to the viaduct for the M2 Junction 5 improvement works and we look forward to working with the Applicant to ensure a similar, flexible outcome focussed approach.

6.1.55 As with other environmental mitigation measures highlighted throughout this Written Representation, Natural England consider that much greater clarity on mitigation measures is provided at this stage in order to mitigate the landscape and visual effects within the AONB and its setting. Disappointingly, many of the details have been deferred to the post-consent phase. This includes further detail about what is proposed at 'nitrogen deposition compensation sites' and if this is in keeping with landscape character within the AONB and its setting.

6.1.56 Natural England considers that a robust approach to monitoring the success of all ecological and landscape mitigation measures also needs to be provided.

Visualisations

- 6.1.57 Natural England welcomed the collaborative approach to the selection of viewpoints and sharing information with us during the pre-application period and are broadly content that the visualisations have followed good practice.
- 6.1.58 We have however noted an apparent discrepancy with viewpoint S-05a. The existing vegetation which is shown as removed in the winter year 1 photomontage (and replaced with saplings) reappears in the summer year 15 photomontage. It is unlikely that this vegetation would have reached the heights indicated by year 15, which could be seen to be misleading.
- 6.1.59 Natural England advises that further photomontages should be provided in order to understand both the nature and scale of the impacts along with the effectiveness of the mitigation measures proposed within the AONB. It is recommended that opening and design year photomontages (summer and winter) are provided from the following viewpoints:
- S-03 - to better understand the Applicant's stated moderate beneficial effect identified at design year;
 - S-08 - to better understand the slight adverse effect identified at design year, including the effects of removing vegetation between the existing A2 and HS1; and
 - S-11 - to better understand the moderate adverse effect identified at design year.

Summary of effects

- 6.1.60 The Applicant has identified a number of significant effects on the landscape of the AONB and its setting during construction and operation. Both direct and indirect effects on the AONB have been identified including:
- Significant effects on the landscape of the AONB (West Kent Downs Local Landscape Character Area) during operation – a direct and significant residual effect has been identified which will be permanent;
 - Significant effects on the setting of the AONB during operation - In addition, a direct and significant residual effect has been identified for the Higham Arable Farmland (sub area Thong) and West Tilbury Urban Fringe Local Landscape Character Area which is permanent;
 - Permanent loss of ancient woodland (although it is noted that woodland planting is proposed). The loss of ancient woodland at Ashenbank Wood and Shorne Woods means the special characteristics and qualities of this type of woodland cannot be replaced;
 - Significant effects on visual receptors in the AONB during construction and operation. This includes effects on recreational receptors at Shorne Woods Country Park (noting that the Applicant considers some of these to be beneficial) and on the public rights of way network and long distance paths;
 - Loss of tranquillity as the Applicant details that the perceived tranquillity will be reduced along the existing A2 within the West Kent Downs (sub area Shorne) Local Landscape Character Area and the Landscape and Visual Impact Assessment predicts it will be further reduced during both construction and operation; and
 - Night-time effects on landscape receptors - with regards to night-time lighting it is noted that there would be a 'perceived change' to the West Kent Downs

Local Landscape Character Areas due to changes in street lighting.

Summary of further information required

6.1.61 As detailed above, Natural England recommends that additional information should be provided by the Applicant to allow a robust consideration of the landscape impacts and the potential for these to be fully mitigated, namely:

- Visualisations - it is considered that further photomontages are required in order to understand the nature and scale of the impacts and effectiveness of the mitigation measures proposed within the AONB;
- Mitigation – nitrogen deposition compensation sites - the detail of this habitat creation is unclear and it is recommended that further detail is sought to ensure that proposals reflect landscape characteristics and management guidelines within the Local Landscape Character Areas;
- Mitigation – green bridges – it is recommended that the Applicant give much greater consideration to the design of green bridges, to provide landscape and habitat connectivity, improve the experience for recreational users and help reduce the visual impacts of the Project;
- Mitigation – acoustic barriers – it is recommended that the Applicant give further consideration to the location and design of acoustic barriers, in order to reduce effects on tranquillity which is one of the special components, characteristics and qualities of the AONB; and
- Mitigation – road surfacing – it is recommended that the Applicant provide a mechanism for the replacement of low noise surfacing on a like for like (or betterment) basis, for example when road repairs are made.

Consideration of further mitigation measures to reduce effects

6.1.62 Natural England considers that the Applicant has the opportunity to provide additional mitigation measures to reduce the nature and scale of the impacts to the Kent Downs AONB. If the Secretary of State is minded to grant consent for the Project, we would recommend that the following measures are also more fully explored and secured:

- Use of natural stone or other finishes appropriate to the location, for example in the construction of retaining structures, to face bridge headwalls;
- Greater consideration of the colour of materials used, with regard to the Kent Downs AONB Guidance on the selection and use of colour in development (2019);
- Greater consideration of the finishes to the built structures / street furniture;
- Potential for an additional green bridge at the Park Pale overbridge, to provide habitat connectivity and enhance the experience of recreational users crossing the A2 at this location;
- Woodland planting to south of the High Speed 1 Rail Line (instead of 'shrubs with intermittent trees') to provide long-term filtering and screening of views towards the Project and help integrate it with its landscape setting;
- Use of sensitively designed, sympathetic visual and noise barriers comprising close boarded fence with associated screening with hedge and/or woodland planting, or vertical 'green wall' visual/acoustic barriers, to reduce effects on recreational receptors using proposed paths in proximity to the carriageway, in replacement of standard 'highway estate boundary fencing' illustrated in Figure 2.4;
- Only use indigenous species grown from seeds of local provenance to tie in with local vegetation;

- Creation of a more naturalistic edge to proposed attenuation ponds/wetland areas, to avoid an overly engineered appearance, and greater diversity of planting than the 'Marsh and Wet Grassland' and 'Species Rich Grassland' currently proposed around the pond; and
- Relaxation of normal highway design standards on side roads.
- In relation to wider offsite and 'compensatory' planting, the Project should ensure that this respects local landscape character as described in the Kent AONB Landscape Character Assessment Update (2020) for the West Kent Downs Local Landscape Character Area.

Summary of advice

6.1.63 Whilst Natural England acknowledges that the Applicant has identified a number of significant impacts to the Kent Downs AONB during construction and operation, we consider that, in a number of instances, the scale of the impact has been underestimated. It is unclear why the nature and scale of effects has been reduced since the original application was withdrawn in 2020. We recommend that additional information and visualisations are provided by the Applicant to better understand the nature and scale of the impacts.

6.1.64 Notwithstanding the concerns in relation to the landscape and visual impact assessment, Natural England considers that the Applicant should commit to delivering a greater package of mitigation measures. Whilst these are unlikely to remove the number of significant residual impacts, they will help to further mitigate them and we recommend the Applicant commits or is obligated to provide a more comprehensive mitigation package should the Secretary of State be minded to grant consent.

7 Natural England's work considering a potential SSSI notification in the Tilbury area

7.1 Overview

- 7.1.1 Natural England is continuing to progress our work considering whether land within the Tilbury area meets the criteria for notification as a Site of Special Scientific Interest (SSSI). We have worked closely with the Applicant and shared our thinking as it has evolved and continue to work with them as both projects progress.
- 7.1.2 Our work to date has identified five potential reasons for the land to be considered for notification, namely:
- terrestrial invertebrate assemblages associated principally with bare and sparsely vegetated habitats;
 - aquatic invertebrates, in particular saline lagoon fauna;
 - non-breeding birds associated primarily with inter-tidal habitats;
 - breeding bird assemblages associated with scrub and open water habitats; and
 - vascular plant species and assemblages.
- 7.1.3 Further to our Relevant Representation (NE Key Issue reference NE10), and Statement of Common Ground (relevant references 2.1.55, 2.1.56, 2.1.50, 2.1.65, 2.1.68), Natural England can provide an update within these Written Representations regarding our work on the case for SSSI notification in the Tilbury area.
- 7.1.4 Some additional but limited further survey work has been carried out within the 2023 field season, to supplement the majority of the work undertaken within 2022 (and to a limited extent in 2021). This work has targeted the saltmarsh habitat and also some limited supplementary work on vascular plants (required in part due to the heatwave of 2022 and the effect on plant communities resulting in sub-optimal survey conditions).
- 7.1.5 This fieldwork has therefore continued since our Relevant Representations and alongside this, we have continued to liaise closely with key stakeholders including the Applicant in order to advise on areas of potential special interest and measures they can take to manage the risk of impacts to these. We cannot provide the Examining Authority with a definitive timetable for SSSI notification at this stage, however we advise that it may be within the Secretary of State determination period (six months from 20 December 2023) or, less likely, the Examination (i.e. 6 months from 20 June).
- 7.1.6 It remains our view that the Tilbury area generally, and certain areas within the Lower Thames Crossing NSIP DCO boundary specifically, are very important for nationally significant wildlife across multiple species groups (spanning terrestrial and aquatic invertebrates, breeding and non-breeding birds, vascular plants, and saltmarsh habitat). The evidence informing SSSI notification is from multiple sources, including Lower Thames Crossing's own data and Natural England's surveys described above. Some other third-party data has also been referenced within the framework of the Examination and is relevant for more detailed consideration (see below).
- 7.1.7 We have made efforts to work with the Applicant to both ensure they are fully sighted on our SSSI notification proposals, and to explore where and how the project design can better reflect the requirements of nationally important wildlife. Whilst some of

these needs can be progressed through the post consent detailed design process, Natural England wishes to highlight and summarise to the Examining Authority four specific concerns which in our view require changes to the project at this stage and are outlined in detail in the relevant section of these Written Representations.

The footpath to bridleway upgrade at Bowaters scrublands.

- 7.1.8 The project proposes to enhance the access provision along Footpath 200 by upgrading the existing footpath to a bridleway. This footpath passes through an area of tall and very dense scrub, forming the most important area of scrub habitats within our SSSI notification area of interest. This habitat makes a substantial contribution to the scrub breeding bird assemblage, including a species for which we have provided further comments in a confidential annex (Annex F) to this letter, to be provided separately to the Examining Authority.

Construction compound 5 at the North Portal.

- 7.1.9 A substantial area of land is proposed for temporary construction uses surrounding the north portal, although much of this land is only generally allocated with few specific purposes identified at indicative locations (these being matters for the contractors). Within this broad zone are specific habitats of very high quality for terrestrial and aquatic invertebrates, in particular those associated with post-industrial habitats and often founded upon pulverised fuel ash (PFA) substrates. Whilst the Applicant's survey (invertebrate 'survey area 3') covered some of these areas, the resolution of this dataset is poor meaning little spatial qualitative analysis could be undertaken (by either the Applicant or Natural England). This has led to a precautionary approach to the assessment by the Applicant, effectively by-passing the first, and paramount, avoidance step of the mitigation hierarchy. More recently however, all parties have been made aware of (and latterly been provided with copies of) additional data collected by the Port of Tilbury which describes these areas in much more detail allowing a greater understanding of the importance of certain zones within the Project boundary. We consider this report, referred to as Telfer 2022 (comprising a main report and separate supplement), should be made available formally to both the Applicant and the Examining Authority to inform how the project can take appropriate account of the most up to date information and demonstrate due regard for the avoidance principle. This matter is set out in more detail in section 7.2 (Open Mosaic Habitats) of these Written Representations.

Open Mosaic Habitat design prescription

- 7.1.10 The project intends to create approximately 200 hectares of open mosaic habitats to the north of the Thames as part of its compensation for losses of this habitat. Open Mosaic Habitat (OMH) is a broad habitat type, expressing a diverse range of specific component parts, and is closely associated with terrestrial invertebrate assemblages. Natural England is especially concerned that the proposed compensation of one type of OMH by another of a different kind (but within the umbrella of OMH) is likely to lead to a qualitative change in the habitat provided. Specifically, the role of PFA as a habitat substrate is important, but as submitted the project commits to only a low level of PFA provision within the OMH design prescription (5%). This matter is set out in more detail in section 7.2 (Open Mosaic Habitats) of these Written Representations.

Impacts of the Project on Saline Lagoon Fauna

7.1.11 The project proposes a surface water drainage discharge from the northern portal tunnel into the river Thames via a ditch system exhibiting characteristics of a saline lagoon habitat, where indicator species of such habitat have been detected by Natural England's 2022 survey. Whilst the presence of some species tolerant of brackish water is noted within the Freshwater Ecology Appendix 8.4, the extent of this interest and its importance appears to have been overlooked. Natural England's aquatic invertebrate survey work usefully supplements the Applicant's survey and provides evidence of a stenohaline saline lagoon fauna (i.e. species tolerant of a narrow range of salinity). The works indicated on Drainage Plan Sheet 16 (Work No. 5A) raise cause for concern that input of a volume of freshwater into this system would be damaging to the maintenance of this brackish-water system. This matter is set out in more detail in section 7.4 of these Written Representations.

7.2 Open mosaic habitat

7.2.1 Overall, Natural England considers that the provision of Open Mosaic Habitats as part of ecological mitigation and compensation requirements, whilst broadly adequate in terms of scale, lacks sufficient detail and commitment to give adequate confidence in its effectiveness to deliver the requirements of the project. Our concerns relate in part to the assessment (inadequate survey of pulverised fuel ash (PFA) and poor spatial resolution of invertebrate survey), and in part to the component 'ingredients' making up the 'recipe' of the open mosaic habitat prescription (habitat proportions, and the specific contribution of PFA).

7.2.2 Natural England is also dissatisfied with the lack of appropriate levels of avoidance of high-quality habitats for terrestrial invertebrates, which should be given greater priority. This is especially the case where evidence clearly identifies pockets of high-quality habitat where greater efforts should be made to retain these intact (or near intact) throughout the construction period.

7.2.3 We have identified steps that could be taken by the Applicant / Examining Authority as appropriate to overcome these concerns, and we detail these below. In outline they comprise:

- increasing the proportion of PFA in habitat creation of open mosaic habitat in the OLEMP and Design Principles;
- commitment to retention of specific high-value habitats within the REAC;
- identifying and mapping other important habitats for avoidance at the detailed design stage; and
- adjustments to the OMH habitat prescriptions and proportions as detailed within the OLEMP and Design Principles.

7.2.4 The terrestrial biodiversity chapter of the Environmental Statement (ES, chapter 8), describes in table 8.35 that to the north of the River Thames, 66.91ha of 'open mosaic habitats on previously developed land' (OMH) will be lost to the project, with 199.75 hectares of permanent habitat gain, resulting in a net permanent gain of 132.84 hectares (approximately a 3:1 compensation replacement ratio²⁴). Natural England is broadly satisfied with the proportionality of the habitat compensation

²⁴ It is unclear however whether this habitat replacement ratio accounts solely for compensation uplift, or is intended to include Biodiversity Net Gain aspirations. Natural England advises that a 3:1 compensation ratio for PFA-based habitats is expected, exclusive of BNG.

provision ratio, which accounts for a variety of risk factors including:

- ecological (the difficulty in recreating often complex habitat structures),
- geographical (the spatial displacement of the habitat), and
- temporal (the time-lag between loss and habitat maturation).

7.2.5 The project will have a disproportionately disruptive effect on local ecology in the vicinity of the northern portal (as a focal point for the project and the large construction compound), which is part of an area long recognised as a nationally important node for nature conservation, including for terrestrial invertebrates specifically. It is appropriate therefore that the provision of compensatory open mosaic habitats is given prominence in the riverside corridor between the River Thames and the Railway Line (although the 'stepping stone' approach to OMH provision further north also serves an important function). The two focal points are at Tilbury Fields (46 hectares) and land north of Coalhouse Fort (44 hectares)²⁵, and Natural England is satisfied that these two locations proposed by the Applicant are appropriately placed both close to the point of impact (in the case of Tilbury Fields), and within the same broad ecological landscape (in the case of Coalhouse Fort) so as to maintain the importance of the area for invertebrate conservation in particular.

7.2.6 The terrestrial invertebrate 'survey area 3' (Figure 8.7 – Invertebrate Survey Locations page 2 of 5) in close proximity to the northern portal and associated construction compound is of particular importance and high value because of the presence of the pulverised fuel ash (PFA) fields linked with the former Tilbury Power Station (since decommissioned). The Terrestrial Invertebrate report at Appendix 8.3 concludes that survey area 3 is a site of national importance both for the presence of assemblages of national significance and specific notable species, but also the 'ecological position of the site in relation to other important invertebrate sites' (a reference to the wider general qualities of this area for invertebrate conservation). The contribution of PFA is noted as an important factor at several points in the Appendix (Table 3.1, Table 4.1, paragraph 5.4.17 and Table C.1).

7.2.7 PFA is an especially valuable ecological resource because it provides the underpinning structural foundation for free-draining, low-nutrient habitats, with vegetation-suppressing properties. These physical properties are similar to the semi-natural 'Thames Terrace Grassland' (TTG) habitats which have formed upon sand and gravel deposits associated with historic routes of the River Thames, and thus PFA-based habitats effectively form an extension of that now scarce natural resource. The chemical profile of PFA also stunts vegetation growth, slowing (or in some cases halting for a prolonged period) habitat succession and thereby maintaining open grassland conditions conducive to both species-rarity and species-richness amongst invertebrate and botanical communities.

7.2.8 The emphasis placed on PFA as a habitat substrate cannot therefore be understated, not only because of its close association with TTG grasslands (which themselves are very limited in extent, <20ha²⁶), but also because it is both finite (no longer produced) and diminishing (being extracted for secondary uses). Natural England regards the creation of significant PFA-based habitats at Tilbury Fields and / or in the vicinity of the Coalhouse Fort as an important outcome for the project which

²⁵ There is some disparity within the submission around the size of these land parcels, and Natural England has requested clarification from the Applicant.

²⁶ An Essex BAP grassland study in 2011 estimated <20ha of Thames Terrace Grasslands remain <https://www.legacygrazing.org.uk/media/1091/essex-bap-grassland-study.pdf>

not only compensates for impacts, but also provides a lasting legacy reflecting the post-industrial character of the area and its contribution to nature recovery. There is also an important opportunity to ‘tell the story’ of PFA as a nature conservation resource at Tilbury Fields as part of the interpretive design of this public open space. Natural England would welcome being a part of those discussions.

7.2.9 With this in mind, it is unfortunate therefore that the baseline survey information does not specifically map the extent of PFA-based habitats, but instead encompasses it within the over-arching habitat type of ‘open mosaic habitats’. Whilst this may be technically correct from a habitat assessment point of view (OMH is a recognised habitat type), it misses the arguably unique contribution that PFA makes towards ecological outcomes, in what is by definition an extremely broad habitat classification covering a multitude of post-industrial brownfield habitats (the full title of the s41 priority habitat is ‘open mosaic habitats on previously-developed land’ OMHPDL). There is much variation to be found both within and between brownfield OMH sites, both in terms of their habitat structure and composition, and the species which thrive in such conditions (notably terrestrial invertebrate assemblages). For this reason, there is a high degree of ecological risk if OMH habitats are compensated for without due regard to provision of equivalent underlying conditions.

7.2.10 It should be noted that a significant volume of survey data is available for the Tilbury ashfields, parts of which have been monitored in detail for the last 10 years (for example at Ashfield A1), or otherwise covered by older studies for various iterations of power station redevelopment. More recently, the Port of Tilbury Relevant Representation references two reports which overlap with the DCO boundary and provide helpful supplementary coverage to the Applicant’s dataset. These are a 2022 survey for PoTLL, and a report(s) produced for Ingrebourne Valley Limited (IVL), and both of these sources would usefully provide supplementary data to inform the project. Natural England respectfully requests that these reports referred to within the PoTLL Relevant Representation be submitted into the Examination to inform ongoing dialogue about achieving appropriate and optimal outcomes for ongoing work to achieve nature recovery objectives in the Tilbury area. Natural England is now sighted on the PoTLL 2022 survey and its supplement (referenced as Telfer, 2022), and where relevant we refer to this report to highlight specific locations of concern.

7.2.11 These reports are expected to be very helpful to the project, because the Applicant’s own invertebrate survey report contains a low level of data resolution, meaning that it is only possible to determine the presence of invertebrate species at the broad ‘Survey Area’ level. Survey Area 3 is large and covers multiple discrete land parcels. Following changes to the DCO red line as the project has evolved, Survey Area 3 contains habitats that now fall outside of the DCO boundary (notably Ashfield A1, and the Goshem’s Farm ‘conservation area’). It is therefore not possible to understand the precise locations of sub-areas of especially high quality, and this has led to the project being unable to have due regard for the avoidance principle as part of the Environmental Impact Assessment process. With the benefit of the PoTLL and IVL survey reports, the Project would be able to spatially identify these high-quality zones within Survey Area 3, and where possible, implement avoidance or other specific measures consistent with the mitigation hierarchy.

7.2.12 With reference to the Telfer 2022 Ashfields main report²⁷, Natural England proposes that the following specific sub-sections of the Lower Thames Crossing Invertebrate Survey Area 3 should be mapped for targeted interventions by the Applicant. These include:

- **Remnant original PFA at the northern point of Ashfield A3** (centred on grid reference TQ6651176396). We understand from the Applicant that the sole purpose for this triangular-shaped area is as part of a construction works corridor intended for the conveyor option linking into the CMAT aggregates facility to the west. The draft REAC proposes avoidance measures of other sensitive wildlife habitat (such as the Tilbury2 NSIP water vole receptor site at REAC Commitment reference TB023), and Natural England seeks equivalent provisions within the REAC to avoid the PFA at Ashfield A3 via the micro-siting of conveyor footings.
- **Ashfields A2/A3/B Ditch corridor bordering Shed Marsh** (with grid refs TQ6653176638 / TQ6668875950 / TQ6695776354 as approximate extremities²⁸). We understand from the Applicant that a stand-off zone of 8m from ditches is required to safeguard water vole habitat within water courses as part of their draft licence application, and although this is helpful in this location, a wider avoidance distance is likely to be needed (at least on the ashfield side of the ditch) to encompass the full extent of the linear habitats within this area. Natural England is especially concerned regarding the indicative routing of the main works access route (see Temporary Works Plans sheet 20), which traverses the ditch network in two locations. The Applicant has indicated to Natural England (meeting on 14th June 2023) that the alignment of this works corridor is indicative only, and that there are no engineering reasons why it needs to take this route. Natural England proposes that the main works corridor makes better use of the existing haul road alignment so as to avoid crossing the sensitive ditch network. We seek assurances from the Project that sensitive habitats can be avoided (see below).
- **Ashfield B Haul Road 'West'** (with pockets of habitat at TQ6672575897 / TQ6688476221 / but also expected at TQ6696076472 / TQ6697576663 / TQ6702376971 and possibly beyond). Telfer 2022 describes the habitats west of the haul road within Ashfield B (compared to the eastern side of the road) as 'more varied with a mosaic of areas of different substrates and of different stages of succession from bare ground to closed sward' (page 15). As above, Natural England understands that the layout indicated within the Temporary Works Plans (sheet 20) is purely indicative, and that it may be possible through Detailed Design to locate certain facilities (such as workshops etc.) in less damaging locations. We seek assurances from the Applicant that sensitive habitats can be avoided (see below).

²⁷ Natural England understands from PoTLL that a more detailed spatial analysis of the survey area referred to as 'The Rest' has been undertaken and this would form a very helpful further reference to guide the Lower Thames Crossing detailed design. Our highlighting of four specific sub-zones of particular interest is therefore a preliminary steer, and not intended to be exhaustive of final. We also are unsighted on relevant reports from Ingrebourne Valley Ltd. and will be pleased to review these when available to feed into the project design.

²⁸ This ditch network extends along Ashfield 'C' and is likely to continue in quality although the Telfer 2022 report only surveyed as far as Ashfield B. A likely further approximate extremity within Ashfield C is suggested as TQ6697876729 or possibly as far as TQ6725377139. The IVL survey reports is expected to cover this area.

- **Ditch corridor at JN1** (in particular the south-western and north-eastern sections). The specific qualities of ditch JN1 are described within the terrestrial invertebrate survey (Appendix 8.3) Annex D, finding it to be of national significance from just one visit. Whilst we appreciate that the central portal of this ditch is to be permanently lost to road infrastructure, the sections at the south-western and north-eastern extremities are earmarked for open mosaic habitat creation in any event (ref. Environmental Masterplan section 9 sheets 1 and 2), and so it is much preferred to retain these important habitats in situ.
- **Ashfield C1-C3.** Similarly, Natural England anticipates that the IVL survey report(s) will describe invertebrate habitats within ashfields C1-C3 which may remain intact since the surveys were undertaken (to be confirmed in discussion with the landowner and tenant) which are intended to become open mosaic habitats as part of the Lower Thames Crossing Environmental Masterplan. The retention of existing habitat within such areas makes sense if it is to be reinstated with the same habitat type.

7.2.13 Natural England notes at paragraph 8.4.100 of the Terrestrial Biodiversity Chapter that the baseline conditions of the project have taken into account existing permissions which are expected to result in reduced suitability for terrestrial invertebrates (in particular Thurrock Council application 17/00412/FUL). We would point out however, that to the best of our knowledge, the ecological provision of those permissions secured through undischarged planning conditions has yet to be properly described and so there is uncertainty regarding what the final conditions would be in the 'do nothing' scenario. We have discussed this complexity at length with the Applicant and note their use of an 'aspirational masterplan' prepared by the operator Ingreborne Valley Limited (IVL), which whilst helpful to a point, is not a substitute for properly discharged planning conditions. Natural England has sought clarification on these baseline permissions from both IVL, the landowner (via their agent) and Thurrock Council, but uncertainty remains whilst replies are awaited.

7.2.14 We also appreciate that application 17/00412/FUL permits the extraction and re-use of PFA, and this means that there is uncertainty over the extent and volume of PFA (and any PFA-type habitats) that may exist on the ground at the point at which the Applicant takes on control of overlapping land within the DCO order limits (should permission be granted), and to what extent such habitats may by extension be returned to the landowner. It therefore becomes difficult to track a 'moving target' of PFA-based habitats for baselining purposes. We are not aware of any work by the Applicant to examine likely extraction trajectories under various scenarios to better understand the conditions that the project will inherit which might have been helpful. Natural England requests that a clearer description of the land use conditions the project is expecting to need to work with is provided.

7.2.15 In view of these uncertainties, Natural England is seeking to secure an outcome which broadly reflects the importance of PFA as a habitat substrate by:

- increasing the proportion of PFA as part of OMH habitat creation (especially in the area of the northern portal); and by
- ring-fencing within the Control Documents the PFA supply required for habitat creation (either as a buried resource, or available commercially from existing stockpiles).
- evidencing the presence of a sufficient depth / volume of PFA if a buried resource is to be relied upon (such as core sampling etc.)

7.2.16 Natural England has discussed these matters with the Applicant as part of our ongoing engagement, and they have advised us that the Project have committed to internally to doubling the provision of PFA, with a focus on delivery of this at Tilbury Fields. We understand this is likely to be secured through updated Design Principles and the oLEMP. As submitted, the Design Principles require 10% of the overall areas of the 'low nutrient free draining grassland' component of OMH habitat (comprising 50% of the total OMH area) to be PFA, which, of which approximately 200 hectares is to be created north of the river, amounts to approximately 10 hectares. We understand therefore that the increased offer from the Applicant to be submitted into the Examination (via changes to the Design Principles and oLEMP) would double to approximately 20 hectares (an increase to 20% of the area of 'low nutrient free draining grassland' component habitat type). In principle Natural England would welcome and support this change should it be secured in appropriate terms within Control Documents. We will be happy to work with the Applicant on the most appropriate deployment and design of PFA as a key outcome for the project.

7.2.17 We appreciate that the Applicant is seeking to keep design options open for its contractor to work up in detail at the post-consent stage, however in our opinion, as described above, this has not reflected the avoidance principle adequately, and that steps should be taken as informed by emerging survey data already referenced within the Examination library (PoTLL Relevant Representation).

7.2.18 The specific steps that Natural England is seeking to resolve these matters are:

- a general REAC commitment to safeguard areas of important habitat equivalent to REAC commitments TB002 and TB003. This would preferably identify such areas on the Environmental Masterplan, and could take the form of an edit of the Commitment wording of TB002 and TB003, or a new Commitment as appropriate. Natural England would be pleased to work with the Applicant to inform the mapping of such habitats ;
- a specific REAC commitment to safeguard the triangular area of original PFA at the tip of Ashfield A3. This could take the form of an edit to existing Commitment TB023 to cover the wider conveyor installation or a new Commitment to secure avoidance of PFA habitats at Ashfield A3 specifically; and
- the submission of an additional 'heatmap' plan to identify specific areas of important habitat for invertebrates which can influence both the general and specific commitments described above.

7.2.19 In seeking to align the range of Project documents towards these outcomes, Natural England proposes further specific changes as follows:

- Changes to the Design Principle LSP.22 'Approach to Open Mosaic Habitat (OMH);
- The prescription for OMH habitat is covered in various documents, and to avoid duplication our comments on this are set out below, under the 'Changes to the OLEMP' section. This includes the aforementioned increase in the PFA provision; and
- Changes to the OLEMP habitat prescription 'LE8.1' for Open Mosaic Habitat (OMH)

7.2.20 The habitat build mix for OMH proposed within paragraph 8.22.7 of the outline Landscape and Ecology Management Plan is considered unlikely to support much of the core invertebrate fauna affected by the project. Natural England has suggested

an improved build mix of habitats in the Table 7.1.

Table 7.1 Natural England's suggested habitat split for Open Mosaic Habitat

	Submitted OLEMP	Proposed by Natural England
Scrub	10%	Maintain though not through planting
Bare ground	10%	50% PFA and admixes
Rough grassland	30%	10% - an indication of failure if higher
Short sward grassland	50%	40%
Other	Present	Present

7.2.21 The 'PFA and admixes' need to be essentially of low to no plant over at the outset, although slow succession will increase this (which can be captured by the success metrics). The short sward grassland can be founded on substrates which can include PFA but can also be other substrates. For example, the grassland present within the existing Mucking Flats and Marshes SSSI Until 1 near Coalhouse Fort is thought to be founded on dredged sands/silts, and elsewhere success has been achieved using tipped chalk. Having a range of grassland substrate increases sward variability and consequent species richness of the communities arising.

7.2.22 At paragraph 8.22.13 (bullet 'g') of the oLEMP the measure of success is too broad and does not reflect the specific invertebrate assemblages present. Natural England proposes a more prescriptive approach here which seeks to measure the establishment of F111 bare sand and chalk, and F112 open short sward invertebrate assemblages in favourable condition thresholds (as judged by the number of assemblage species present in standardised survey).

Changes to the OLEMP prescriptions for Tilbury Fields.

7.2.23 At paragraph 6.2.16 'Management Requirements' bullet a), whilst open mosaic habitat is sound as a target, the description should be amended to seek 'short sward and often stressed grassland as a sub-dominant of open and free draining substrates, principally pulverised fuel ash and admixes of PFA and other low nutrient substrates.' This change is proposed to ensure the openness of the resulting habitats; the prescription currently proposed will not achieve this and will fail to adequately support the core invertebrate assemblage which makes this area nationally significant.

7.2.24 At bullet d), Whilst the proposal 'to utilise the varying substrates from excavated material from the tunnels' may be sound in principle, it depends on the nature of the substrates, the intended biodiversity target, and with what / how / where it is deployed. To guide this principle further therefore, a matrix document which sets out the biodiversity end uses by substrate and substrate mixes would be helpful.

7.2.25 At bullets i), j), and k), whilst there are generally sound structural elements, they should avoid falling into the prescriptive build 'trap' as this results in sets of standardised landforms which work for the species they work for and little else. It is better to enshrine some genuinely random placement and admixing across the site to ensure niche variety and persistence.

7.2.26 At bullet n) we advise that scrub planting can be to the detriment of open habitats and so it needs to be carefully considered and placed. The limiting habitat which

should guide the overall character of Tilbury Fields should be sparse and open habitats, with scrub constrained to either naturally developed or earthwork strengthening. Maintaining structural integrity through the use of stonework is regarded as a more preferable approach to scrub planting as it would provide niches and shelter whilst maintaining visual integrity to earthworks.

7.2.27 A critical omission requiring priority inclusion is the absence of the fundamental parameter of substrate depth, which is key to the maintenance of open mosaic habitat. Without this, rank closed grassland will ensue and prove difficult to reverse. A foundation of at least 75cm depth (or 1m for ease of reference on the ground) is required to help ensure that coarse grass roots cannot reach underlying richer soils (depending on what the substrates are deposited upon). The placement of PFA onto agricultural land should certainly be of this sort of depth as the base level. A range of aspects is also desirable bearing in mind climate warming. The admixes should not ignore clay elements as some solitary wasps select nesting sites by the substrate granularity. Having a range of options increases the richness of the fauna.

7.3 Breeding bird assemblages

7.3.1 Recent surveys undertaken by both Natural England²⁹ and the Lower Thames Crossing NSIP project have identified the presence of nationally important assemblages of breeding birds within a study area known as the North Thames Estuary and Marshes (NTEM). These assemblages are:

- open waters and their margins; and
- lowland scrub.

There is significant overlap between the NTEM study area and the Lower Thames Crossing order limits, and Natural England has been working with the Applicant to seek to align the Project with conservation and nature recovery aspirations for the area. In seeking to ensure that favourable condition for these assemblages is secured as part of the project, the NTEM study area's habitat extent and quality should be maintained to support a range of species characteristic of these habitats.

Habitat Requirements

Open waters and their margins

7.3.2 Habitat heterogeneity is important. For areas of open waters and their margins, maintenance of the extent and range of sizes of open freshwater lakes and pools from smaller areas (1ha) which can support species such as grebes to up to 5-6ha to support species such as pochard, tufted duck and mute swan are desirable. A range of depths, from shallow to medium with a range of pools and ditches with shallow gradients and shallow water for species such as avocet, ringed plover, and little ringed plover to feed. A mix of patches of tall emergent vegetation close to the water, vegetated edges of lakes, with areas of wet grassland, wet swampy areas with reed bed and areas of low scrub are all important. Open areas with sparse vegetation and bare patches around scrapes and shallow pools are ideal for little ringed plover.

Scrub assemblage

²⁹ The Natural England breeding bird survey in 2022 will be published in due course at <https://nepubprod.appspot.com/publication/5602597666029568>

7.3.3 For the scrub assemblage, again, heterogeneity is essential. A mix of some mature trees, and a well-developed field and scrub understorey is key. A mosaic of habitats within a wider landscape including a mix of low scrub within open areas of grassland with a range of vegetation heights is required. Long term management of the scrub habitats would benefit from light grazing to ensure there is a good balance between open areas and more woody ones and to promote heterogeneity of the vegetation across the landscape. For nightingale, an iconic species of scrub habitats, scrub management is necessary to ensure that continuity of suitable thicket structures is maintained. Scrub is a dynamic habitat, changing into woodland if the natural processes of succession are left unchecked. Nightingales will only use scrub for the few years when it is most vigorous and dense. To maintain suitable scrub structure, regular maintenance and rotational cutting is needed (BTO 2015)³⁰.

Impact of the Lower Thames Crossing on extent and availability of habitats

7.3.4 Key areas supporting breeding species of the open water and its margins assemblage are either unaffected or positively enhanced by the Lower Thames Crossing. The proposed habitat creation proposals (required for HRA mitigation) in the area around Coalhouse Point in particular are expected to be beneficial for this assemblage (subject to detailed design). For the scrub habitats, however, mitigation plans require further consideration to avoid adverse impacts on this assemblage. In the long-term, additional areas of supporting habitat for the scrub assemblage are expected to be available across the Lower Thames Crossing site through mitigation proposals but there are, however, some species-specific requirements and localities where the Lower Thames Crossing proposals in their current form is likely to have an adverse impact, for which current mitigation is regarded to be inadequate. The details of Natural England's concerns for sensitive species are set out within a confidential appendix which has been made available to the Examining Authority, and which could be made available to Interested Parties upon request.

Assessment of Loss of Scrub Habitat within the Environmental Statement

7.3.5 Within the Terrestrial Biodiversity chapter of the Environmental Statement, losses of scrub habitats are amalgamated into single habitat type figures (for example Tables 8.21 and 8.35) with no qualitative breakdown. Thus the particular significance and high value of the mature dense scrub at Bowaters is lost within these generalisations. Furthermore, the species detailed within our confidential Annex F is not mentioned at all within the Terrestrial Biodiversity chapter, and within the Ornithology (Environmental Statement Appendix 8.7) is noted as a desk study record (Paragraphs 4.3.52 / 73) and described as a 'notable record' and was picked up on survey Transect 3 but as far as we can tell is nowhere given bespoke treatment within the Environmental Statement.

7.3.6 The Ornithology section of the Environmental Statement Terrestrial Biodiversity chapter describes 'a significant assemblage of red and amber listed (Eaton et al., 2015) breeding birds (notable species including nightingale, cuckoo, corn bunting *Emberiza calandra* and grasshopper warbler' but values this receptor as 'regionally important'. As noted above, Natural England advises that the breeding bird scrub assemblage within our study area meets selection thresholds for SSSI notification, and therefore should be assigned a 'national' valuation and assessed accordingly.

³⁰ BTO. Managing Scrub for Nightingales: A BTO Guide for Land Managers and Conservation Practitioners. 2015. BTO

7.3.7 There is no cross-referencing of the Environmental Statement Terrestrial Biodiversity (incorporating Ornithology) chapter with the Population and Human Health chapter, where the footpath upgrade to bridleway is described in more detail (for example Table 13.66 of Chapter 13 of the Environmental Statement).

Proposed Changes sought

7.3.8 For the reasons outlined above, Natural England is seeking the removal of the Footpath 200 upgrade to bridleway from the Project as a preferred outcome. Alternatively, if a bridleway is regarded by the Examining Authority as essential, re-routing should be sought to a less damaging alignment. The Examination Documents that would need to be amended include:

- Right of Way and Access Plans (sheet 19-20); and
- Design Principles and Code of Construction Practise (we cannot locate any specific reference to this upgrade within these Control Documents).

7.4 Saline Lagoon Fauna

7.4.1 Natural England notes that the Drainage Plan (Sheet 16) indicates an operational phase discharge from the Tunnel into the River Thames, referred to as 'Work No. 5A'. This is achieved via a pumping station marked on the same plan (solid blue square), in association with a structure marked as 'containment for contaminated water from tunnel low point sump' (solid orange rectangle). This proposed discharge follows a route eastwards where it would presumably enter the existing ditch and flow south towards, and passing through the sluice gate.

7.4.2 The Applicant has surveyed the ditch near the sluice gate for aquatic ecology, including at sampling point 'JN8' at grid ref. TQ 67845 75825. This sampling has identified the presence of saline conditions, which is to be expected given the positioning of the sluice gate, and the flow of Thames river water through a local hydrological system connecting with Coalhouse Fort (itself topped up by Thames River water).

7.4.3 Natural England has also surveyed aquatic habitats within this area as part of our project to consider SSSI notification, and the findings are complementary to the Lower Thames Crossing sample in this location. Our survey, Abrehart 2022, collected a sample from TQ67577653, ~1km north via a dog-leg, but essentially forming part of the same hydrological unit.

7.4.4 It is notable that the Applicant's survey detected the presence of *Palaemonetes varians* (a prawn) suited to brackish water conditions at JN8 in 2022, which is a Bamber³¹ Suite III species, whereas the Natural England sample recorded at TQ67577653 detected three Bamber Suite IV species (lagoon cockle *Cerastoderma glaucum*, the amphipod *Idotea chelipes*, and the mud shrimp *Monocorophium insidiosum*) were found indicating a stenohaline faunal community and an unusually constrained salinity gradient. These three species are listed within the Saline Lagoon

³¹ Bamber proposed a system of categorising saline and brackish aquatic fauna according to their tolerance of variably saline conditions. Suite III species are 'euryhaline', tolerating a wide range of salinity, whereas Suite IV are 'stenohaline', unable to withstand wide variation in salinity. Further information can be found in <https://onlinelibrary.wiley.com/doi/10.1002/aqc.3270020105> Bamber, Batten, Sheader and Bridgewater (1992) On the ecology of brackish water lagoons in Great Britain, Aquatic Ecology.

SSSI selection guidelines³².

- 7.4.5 This gradient is probably supported by the tidal water ingress into the ditch by the river from the sluice gate, as it is known that the sample from JN8 reflected more of a strictly estuarine fauna. It is likely that saline penetration occurs up through this ditch for some way, although the full extent is unknown. This makes this ditch the third most significant lagoon community present in the Tilbury proposed SSSI notification area of interest (after the Tilbury and Coalhouse Fort water systems).
- 7.4.6 The brackish / saline character of the water in this location, evidenced by the presence of saline lagoon indicator species tolerant of only a narrow salinity gradient, makes this watercourse much more sensitive to changes in the salinity gradient, and therefore it is of concern that a volume of freshwater is proposed to enter this system from the surface water tunnel discharge at Work No. 5A.
- 7.4.7 Natural England is not aware that this impact pathway has been assessed in any detail, and further information is requested in order to understand the significance of this drainage proposal in more detail. Information needed includes:
- The anticipated volume of water input to the water course;
 - The anticipated water chemistry of this input (in particular it's salinity);
 - Any pollution prevention and control proposals;
 - Any anticipated work to the sluice gate near sample point 'JN8'; and
 - Additional aquatic invertebrate sampling of the 'dog-leg ditch' to better understand the qualities of this ditch for saline lagoon fauna.
- 7.4.8 The saline lagoon fauna should ideally be assessed within the EIA as a receptor in its own right, valued as of national importance, and mitigation options should be explored. Natural England is happy to work with the Applicant on this matter, in seeking to both understand the nature and severity of the impact pathway, and explore solutions that may exist. If no practicable alternative or mitigation exists, the potential permanent losses on saline lagoon fauna arising from the project should be recorded within the EIA, and compensation identified. We note that the creation of similar wetland habitats is proposed for the field west of Coalhouse Fort, and it may be possible to integrate equivalent provision within that wetland complex.

7.5 Vascular plants

- 7.5.1 Issues relating to vascular plants were mentioned in our Relevant Representations at issues reference NE10, in the context of Natural England's investigations into notification of a SSSI in the Tilbury area. The direct impacts of the Project with vascular plants of national importance (whether as a standalone species, or as part of an assemblage of species) are limited.
- 7.5.2 The focus of our representations for vascular plants is there to explore whether and how the project may be able to complement the habitat requirements of certain rare or notable species, and in so doing to seek to extend the conditions suitable for such species in order to further their conservation and enhancement. Particular attention is made to how the project could assist with respect to:
- White horehound (*Marrubium vulgare*), and

³² <https://data.jncc.gov.uk/data/b0c3d93f-5c1d-4101-9973-0830742ca9d6/sssi-guidelines-1c-saline-lagoons-2022.pdf>

- A coastal drought-prone sward assemblage, including: Common wormwood (*Artemisia absinthium*), Little mouse-ear (*Cerastium semidecandrum*), Lesser calamint (*Clinopodium calamintha*), rough hawksbeard (*Crepis biennis*), Hound's-tongue (*Cynoglossum officinale*), slender bird's-foot trefoil (*Lotus angustissimus*), white hoarhound (*Marrubium vulgare*), toothed Medick (*Medicago polymorpha*), wild clary (*Salvia verbenaca*), clustered clover (*Trifolium glomeratum*) and vervain (*Verbena officinalis*).

7.5.3 The following general principles and specific design features should be followed in order to optimise the conditions on the site for target species within zones earmarked for open mosaic habitats at Tilbury Fields and Coalhouse Fort.

7.5.4 The use of raw substrates.
Surface dressing with topsoil must be avoided. This provides an impoverished (low nutrient) substrate which finer species are able to use without competition from robust-growing species which require more fertile conditions. Where seeding is strictly necessary use locally collected seed from the same soil types.

7.5.5 No seeding using commercial mixes and no tree planting.
Allow substrates to colonise naturally. This preserves local genetic diversity, allows populations to expand naturally and communities to exhibit patterns of succession, transitions and gradients which are important ecologically.

7.5.6 Invertebrate-led ongoing management regime.
Due to the inter-relationships between botanical and invertebrate habitat requirements in these circumstances, target plant communities are expected to respond well if habitats are optimised for target invertebrate assemblages. Specific management interventions can follow as part of the detailed design process.

7.5.7 Topographical and hydrological design variety.
The current proposal in the area of Tilbury Fields in particular includes conical and contoured landscape features which provide a variety of aspects. The slopes could replicate the species rich swards on the forts in the landscape.

7.5.8 Unlined hollows to hold rainwater creating temporary wetland habitats.
These should be separate from swales receiving road surface runoff. These would be most valuable close to the river and if they can intercept the surface of the underlying marsh (if possible); they could then support some of the 'upper saltmarsh-brackish marsh transition' plant assemblage, a further nationally important plant assemblage that Natural England's surveys have identified.

Introduction of target species

7.5.9 Natural England is aware of two specific locally notable species which would benefit from targeted efforts to expand their range within suitable habitats which are expected to be created by the Project. These are slender bird's-foot-trefoil *Lotus angustissimus* and white horehound *Marrubium vulgare*, both plant species of local importance (and which would qualify as SSSI standalone species interest features in the context of our SSSI notification project) which could be introduced as local origin seed into suitable spots. Both of these species are present as very small populations and so seed would likely need to be bulked up to avoid compromising their existing presence. In this way, a small amount of seed (approximately 10% of available seed) collected from the known local populations is cultivated ex-situ, the resulting plants producing bulk seed for reintroduction. This process is likely to take two to three

years from collection of wild seed to bulk seed being available for use. Records of introductions should be submitted to the BSBI vice county recorder and the local biological records centre. The target habitats for each species are as follows:

- Slender bird's-foot-trefoil *Lotus angustissimus* could be introduced to sandy slopes, particularly south-facing slopes which are likely to develop open swards due to summer droughting.
- White horehound *Marrubium vulgare* could be introduced to areas of chalky or coastal bare ground. Provision of access through some areas with White Horehound would provide it with a dispersal mechanism.

DHL Emergency Access Route

7.5.10 A temporary access route passes over an area of grassland known to be occupied by patches of narrow-leaved bird's-foot trefoil *Lotus tenuis*. Once the road is removed it is suggested that this area should be restored to the pre-existing pasture by natural colonisation (from the soil seedbank and the surrounding pasture) of bare substrate and grazing as part of the wider parcel. It is considered that the localised disturbance, dynamism and compaction could provide additional habitat diversity in this area.

7.5.11 The precise alignment of the route should make efforts to avoid areas of known ecological sensitivity where possible, by pre-works vegetation survey and oversight by an ecological clerk of works.

Open Mosaic Habitat Mitigation Area(s)

7.5.12 An area of OMH and acid grassland is to be created on coastal marshes to the east of the road corridor (in the fields north of Coalhouse Fort). It is recommended that this is created using green hay collected from species-rich swards on the same soil type locally (within a few kilometres) in order to preserve local genetic diversity of the component species. As mentioned above, slender bird's-foot-trefoil *Lotus angustissimus* and white horehound *Marrubium vulgare* seed sustainably produced from material collected from the local area could be introduced to such areas in order to expand the small populations of those species. Ongoing management should be directed by the requirements of the habitat and invertebrate interest.

Specific Changes Sought

7.5.13 With above objectives in mind, Natural England is seeking the following changes to Project Control Documents to ensure that a permitted is suitably framed towards these outcomes:

- OLEMP LE8.1 Open Mosaic Habitat typology.
This needs to provide a greater emphasis on natural regeneration as an establishment method, and should also allow for local 'green hay' as an option. These methods should be specifically listed within the 'Outline Prescriptions' section, to promote their use as best practise methods, although we note that 8.22.11 defers the specifics to the LEMP post-consent stage.
- OLEMP 6.4 Coalhouse Fort OMH & Tilbury Fields Management Areas.
These specific areas have been identified as suitable for specific botanical interventions for the benefit of two notable species (Slender bird's-foot trefoil

and White Hoarhound) which are regarded as nationally important. The wording of the Management Requirements should include an objective which creates a framework for the furtherance of the conservation of notable species. Natural England is happy to work with the applicant on a specific form of words.

- Code of Construction Practice
The principle of avoidance of sensitive habitats through the access route across the DHL land is described within REAC commitments TB002, however it is unclear how a pre-works survey is secured within a Control Document. Further information is required.

Summary of advice

7.5.14 In summary, Natural England continues to gather evidence and assess the case for SSSI notification in the Tilbury area, which overlaps with the Lower Thames Crossing project in part. Whilst we cannot be definitive with regard to a SSSI notification timeline, we have worked closely with the applicant in order to align the Project with the requirements of nationally important wildlife. The Project will result in the creation of some complementary habitats to a future SSSI, but should take further specific steps towards the conservation of certain notable species and assemblages at the post-consent design stage.

7.5.15 Notwithstanding this general progress, there are several aspects of the project as submitted that would be damaging to nationally important wildlife that require changes to the submission if that wildlife is to be maintained. These are:

- i. the bridleway proposed at footpath 200 at Bowaters scrubland;
- ii. the avoidance of high value invertebrate habitats around the northern portal; and
- iii. increasing the proportion of PFA within the creation of open mosaic habitats, and
- iv. The input of freshwater into a brackish water system arising from surface water discharge at the north portal.

Natural England will be pleased to provide further details on these matters as the Examination progresses.

8 Habitats of conservation importance

8.1 Ancient Woodland

8.1.1 Overall (including the ancient woodland loss from the Shorne and Ashenbank Woods SSSI), the scheme will result in the direct loss of 6.92 hectares of ancient woodland and six veteran trees. Natural England does not endorse the loss of such irreplaceable habitat and recommends that the Applicant should continue, through detailed design, to further avoid and reduce the loss of ancient woodland and veteran trees.

8.1.2 As mentioned above in relation to impacts to the SSSI, Section 5.32 of the NPSNN details that:

‘Ancient woodland is a valuable biodiversity resource both for its diversity of species and for its longevity as woodland. Once lost it cannot be recreated. The Secretary of State should not grant development consent for any development that would result in the loss or deterioration of irreplaceable habitats including ancient woodland and the loss of aged or veteran trees found outside ancient woodland, unless the national need for and benefits of the development, in that location, clearly outweigh the loss. Aged or veteran trees found outside ancient woodland are also particularly valuable for biodiversity and their loss should be avoided. Where such trees would be affected by development proposals, the Applicant should set out proposals for their conservation or, where their loss is unavoidable, the reasons for this.’

8.1.3 Natural England does not endorse the loss of ancient woodland and veteran trees. We recognise that the Secretary of State needs to consider the project in terms of the tests set out in the NPSNN and whether the impacts on ancient woodland the national designated site series are outweighed by the benefits of the scheme, considering whether all alternatives have been exhausted to avoid or fully mitigate the impacts.

8.1.4 Notwithstanding our position in relation to the impacts to the loss of irreplaceable ancient woodland, we acknowledge that the Applicant has proposed a package of woodland planting should the Secretary of State be minded to grant consent. Whilst it is not possible to compensate the loss of irreplaceable habitat, Natural England acknowledges that the Applicant has accepted our advice to help buffer remaining areas of woodland, helping to build resilience and connectivity at a landscape scale. Natural England does however have concerns regarding the lack of detail as to how the woodland will be created, given the ambiguity within the Control Documents, and how the Project will ensure that the woodland functions ecologically.

8.1.5 Other schemes undertaken by National Highways (such as the Cossington Fields woodland creation for the A2/M2 widening and the A21 Pembury to Tonbridge Dualling) have demonstrated faster establishment of woodland ground flora when ancient woodland soils that would be destroyed by the development have been translocated helping to aid landscape connectivity for the species they support. Whilst it is not possible to recreate ancient woodland, Natural England recommends that the Applicant provides much greater clarity within the Control Documents to demonstrate how the woodland compensation (and all other compensatory habitat provision) will deliver for the habitats and species impacted by the proposal. We would also recommend that the woodland soils form part of a soils management and monitoring strategy to secure this.

8.1.6 We have provided further details on these measures in Section 10 of these Written Representations in relation to the delivery, monitoring and management and indicators of success.

Summary of advice

8.1.7 Natural England does not endorse the loss of such irreplaceable habitat and recommends that the Applicant should continue, through detailed design, to further avoid and reduce the loss of irreplaceable ancient woodland and veteran trees.

8.1.8 If the Secretary of State is minded to grant consent, Natural England recommends that a much greater degree of clarity on how the replacement woodland will be created and functions.

8.2 Acid grassland

8.2.1 Natural England considers that the losses incurred by the Project on Thames Terrace Grasslands (TTG), a unique habitat type within the broad umbrella of 'lowland acid grassland' have not been adequately valued or compensated for within the submitted application. The special qualities of TTG are described below, and suggestions made for improved outcomes which seek to ensure that the habitat type is accommodated more fully within the scheme design.

8.2.2 The Environmental Statement Terrestrial Biodiversity Chapter 8 describes the area of acid grassland lost to the project in Table 8.35, although there are some inconsistencies in the figures where acid grassland is referenced in this chapter. Natural England has highlighted these to the Applicant and revised figures have been confirmed which we understand will be reported within an errata document to follow in due course.

8.2.3 Acid grassland is proposed to be compensated for at land north of Coalhouse Fort, with some high level details described within the oLEMP at sections 6.4 and 8.27. The level of submitted detail raised concerns with Natural England which we have raised with the Applicant regarding the feasibility of the compensation proposals. These discussions, as far as they have progressed, have resulted in the preparation of a Technical Note (included within Appendix I to this Representation) which has more closely examined the suitability of the receptor area in terms of its underlying geology and soils. Natural England has reviewed this information and the changes to the project arising from it, and our updated position is set out below.

Lowland acid grassland and Thames Terrace Grassland in the project area

8.2.4 The Technical Note outlines various metrics in terms of the area of acid grassland within the project zone along with what is thought to occur in the wider county of Essex. Direct comparison of the acid grassland resource in the county highlights that there is an estimated 100-500ha of this grassland type; due to losses both historical and ongoing the upper limit is likely to be a significant overestimate. The figures are also taken from old inventories (Sanderson, 1998³³), in need of urgent updating, so should be treated with caution.

8.2.5 The description of the lowland acid grassland in Essex describes the main type as

³³ Sanderson, N (1998) A review of the extent, conservation interest and management of lowland acid grassland in England (ENRR259) Chpt 13 Essex. English Nature

being of the U1 sheep's fescue (*Festuca ovina*) – common bent (*Agrostis capillaris*) – sheep's sorrel (*Rumex acetosella*) grassland. However, it is likely that the few remaining acid grasslands found in the Greater Thames Estuary National Character Area (NCA), are rare U1 types or in the case of the Thames Terrace Gravels a different or poorly defined variant unique in an England context.

- 8.2.6 Any acid grassland habitat found in this area is therefore of greater significance than comparing it to the wider county value, because the habitat types are not directly comparable. Within the NCA (the geographic reference area of search used by Natural England to determine the value of habitats in terms of their significance for SSSI notification), it is therefore suggested that the project area supports the bulk of the acid grassland resource within the NCA reference area, further emphasising its importance.
- 8.2.7 In our opinion, with reference to the evidence in the form of reports, surveys, technical notes and management guidance notes, the Lowland acid grassland found in the Greater Thames Estuary NCA is unique and not readily slotted into typical priority habitat types. It can however be given a grassland label that could be assigned within the Thames Terrace Grassland habitat, along with supporting other vegetation types. To add further to the difficulties of defining the habitat, grassland vegetation also falls into the category of Open Mosaic Habitats (OMH). In such places, acid grassland (and other grassland types) can be found often as small pockets of grass and herb-rich vegetation that may defy obvious description as per classical vegetation types such as within the National Vegetation Classification system. Helpfully, OMH has been reasonably well defined (See Buglife³⁴ and others) and recognised as in the UK Biodiversity Action Plan (UK BAP) as a Priority habitat listed within Section 41 of the Natural Environment and Rural Communities Act 2006 (NERC Act). The value of this is acknowledged by the Lower Thames Crossing Technical Note and the supporting documents submitted by National Highways.
- 8.2.8 In regard to the Thames Terrace Grassland, their value has been recognised for a while but largely in the local context of being important. The total area of the habitat is probably only <20 hectares overall (Essex BAP, 2011). In our opinion, due to the scarcity of this habitat and the exceptional importance for a suite of locally and regionally scarce plants, unique vegetation type/s and nationally important invertebrate assemblage they should be regarded as nationally important. Given this significance and importance of the Thames Terrace Grassland it is particularly unfortunate to lose any area. The alignment of the Lower Thames Crossing directly atop Low Street Pit Local Wildlife Site means that avoidance by the project of this site is effectively impossible.

Loss of acid grassland and related habitat

- 8.2.9 The key areas of interest that will be lost as a result of the Project as identified within the Technical Note amount to the loss of 1.14ha of acid grassland (of all types). All of the three sites are Local Wildlife Sites and therefore significant in local and national contexts. This may seem to be a small area, but it is important to reiterate that the loss of this acid grassland is a component of wider grassland habitat losses to the project. We are highlighting acid grassland in particular because of its unique expression within the Thames Terrace Gravel geology. There is a close ecological association between Thames Terrace Grassland and Open Mosaic Habitat habitat

³⁴ Buglife (2020) Open Mosaic Habitat: <https://cdn.buglife.org.uk/2020/01/Identifying-open-mosaic-habitat.pdf>

types, and this is expanded upon below.

Compensation for Project Impacts

- 8.2.10 Natural England recognises that the area of acid grassland creation as part of the compensation proposals north of Coalhouse Fort is significant and accepts that the increase in area (a compensation ratio of ~4:1) will compensate for the loss of this priority habitat in strict area terms (but see below for additional requirements in relation to bespoke placement). This is expected to be combined with a large area of further compensation land for other habitat types which will include within its area other grassland habitats, Natural England supports these proposals in principle. In addition, the revised detail in the Technical Note describes a revised location as laid out on Plate 5. Key to this is the relocation of the acid grassland to the northern section of the order limit north of Coalhouse Fort and Bunker; (see also - The location of this habitat creation is reported in 6.2 Environmental Statement - Figure 2.4 - Environmental Masterplan Section 9 (5 of 10) (Application Documents APP-163 sheets 18, 21, and 22).
- 8.2.11 Natural England supports the outline proposals, however the area of concern in terms of compensation centres around the loss of the Thames Terrace Grassland within those sites that will be lost. The landscape in the Greater Thames Estuary NCA presents considerable obstacles for the movement of species through this area, resulting in a fragmented landscape and species isolation. Railways, existing roads, urban areas and the agricultural landscape all provide barriers. With the addition of the Lower Thames Crossing, this will create a further barrier between the compensation site and several other sites of key importance for wildlife on the terrace gravels. Notably, the most important site at Broom Hill (11.3ha) TQ654778 will become further isolated from the compensation site and fragmenting the habitat within the area of Thurrock following the construction of the road. Whilst plans have been put in place for the creation of roadside verges and banks that will be carefully designed to accommodate appropriate grassland vegetation, the ability for the Project to maintain species dispersal remains to be seen.
- 8.2.12 Therefore, whilst it is desirable to achieve a larger single area of optimised acid grassland compensation through location on preferred geology, efforts to achieve greater connectivity should be made by integrating acid grassland requirements within the wider area, to avoid the main acid grassland compensation becoming too isolated, resulting in 'island effects' with the vulnerabilities that this brings. The project should commit to utilising tunnel arisings which are expected to generate substrates with acidic properties (such as sands and gravels) and utilise these in strategic locations with a final design to be agreed. The adjunct of acid grassland with other habitats (particularly calcareous types based on chalk or pulverised fuel ash) is especially desirable to achieve diversity leading towards greater species richness. Bearing this in mind, in our opinion a further 2ha of targeted TTG-type acid grassland is required, to be deployed within strategically helpful locations for the reasons described above. Natural England can provide further advice at an appropriate time around where additional acid grassland habitats could ideally be located.
- 8.2.13 The uniqueness of the TTG acid grassland means that it is not appropriate to work to a specific compensation ratio, but rather ensure that the project can make a meaningful contribution to the security of a rare habitat type in the local area. Bespoke measures are needed to increase the confidence in the success of the compensation proposals, and there remain residual concerns with the prospects of success in particular relating to the conversion of arable land (albeit on suitable

underlying geology). No information is supplied regarding soil nutrient levels of the compensation site which is typically a significant constraint upon successful outcomes. Without further information to the contrary to indicate suitable soil nutrient levels, Natural England advises that preferably topsoil stripping (to a depth of 25cm) and/or sufficiently deep (1m) surface placement of acidic-type substrates would be needed to optimise the success of acid grassland creation. These works will be needed to prepare the receiving site for soils salvaged as intended from donor sites. Further commitments within the Control Documents will be needed to ensure acid grassland compensation for this unique and very high distinctiveness habitat has a reasonable chance of succeeding. In our opinion, topsoil stripping should be required as described above to ensure the influence of underlying geology and subsoil can be accessed.

- 8.2.14 Additional technical considerations to maximise the prospects of success are relevant to highlight for post-consent detailed design, such as low-level seeding of wildflowers to supplement largely natural regeneration, and the recreation of structural sand/gravel strata profiles.

Management recommendations

- 8.2.15 The most appropriate management for lowland acid grassland sites is grazing. If grazing animals cannot be found for a site, then a mosaic cutting programme should be adopted to remove build-up of excess litter and to maintain a structurally diverse vegetation stand. However, with the nature of the acid grassland, the Thames Terrace Grassland and OMH a more bespoke management regime may be required to ensure the habitat remains diverse. This typically means short, medium and long stands of vegetation, bare ground, wet, temporary hollows, gravel and sandy terraces with mixed aspects and low levels of naturally regenerating scrub.
- 8.2.16 Regarding livestock stocking levels the dry, often parched nature of the acid grasslands in the Greater Thames Estuary National Character Area (NCA) means that the number of animals will necessarily be low. Current grazing levels at key sites such as Broom Hill are understood to be relatively heavy which maintains a short sward with little structural diversity overall except for where bare ground is created by the heavy grazing. It may be that periods of heavy grazing, sometimes termed pulse or mob grazing is appropriate followed by periods of limited or light grazing and even none for long periods. Monitoring for five years (or longer) to assess the nature of the vegetation and other species recovery is advised.

Overall recommendations on the acid grassland compensation proposals

- 8.2.17 Whilst Natural England supports the revised acid grassland compensation proposals as laid out in the Technical Note, some additional commitments within the project's Control Documents are required to ensure sufficient confidence in the compensation proposals. These include:
- re-valuation of TTG acid grassland habitats within the assessment;
 - re-location of acid grassland compensation to more suitable locations as per the Technical Note;
 - a requirement within Control Documents securing topsoil stripping (or other method) to overcome soil nutrient loaded; and
 - a preference for grazing management to be expressed.

Summary of advice

8.2.18 In summary, Natural England considers that the importance of acid grassland habitats generally, and the Thames Terrace Grasslands as a specific sub-habitat type, have not been adequately recognised within the submission, and therefore the compensation provision is inadequate. Whilst some steps are being taken by the project to increase the prospects of the successful compensation by re-creation of acid grassland (such as micro-siting towards more favourable geology), the following additional steps are required to be secured within the submission:

- i. An increase in the compensation ratio for acid grassland by 2 hectares (to better reflect the ecological risk factor in re-creating TTG grasslands, and to achieve enhanced connectivity);
- ii. A commitment to topsoil stripping as necessary site preparation in the area identified for acid grassland re-creation to address presumed high nutrient loading; and
- iii. Adjustments to the Environmental Masterplan to build in strategically located 'seams' of acid grassland habitat to improve the connectivity of this habitat type.

Natural England is happy to continue to work with the Applicant on these matters both as part of the Examination, and during detailed design.

9 Protected species

9.1.1 Natural England has worked constructively with the Applicant to try and progress mitigation for licensable protected species for which Natural England is the responsible organisation. We will continue to work with the Applicant during the Examination to try and resolve our outstanding concerns with a view to providing letters of no impediment where this is possible.

9.2 Bats

9.2.1 Natural England welcomes the surveys undertaken for bats and the collaborative working in relation to the proposed mitigation. Given the linear nature of the project, habitat severance at the landscape scale is a key conservation concern. Whilst we are continuing to engage with the Applicant to try and reach resolution on our concerns regarding the assessment of impacts and the appropriateness of the mitigation measures at present, we are not able to agree a letter of no impediment.

9.2.2 Natural England currently requires the following outstanding information from the Applicant:

- Greater clarity on the survey information for crossing points used by bats (both along the existing highway infrastructure to be impacted and the new sections of road). This is required due to the potential impacts from habitat severance and to give confidence that the mitigation measures to maintain landscape connectivity for bats will be effective;
- Further detailed information on the number of trees with potential roost features for bats that will be directly impacted along within the order boundary. This information is required to ensure that the mitigation measures proposed fully compensate for the loss of any potential roosts;
- A replacement hibernation bunker is to be provided as part of the mitigation for the scheme in Kent. To maximise the likely success of this, the Applicant should provide baseline survey data of the thermal properties of the existing bunker to ensure that these can be replicated within the compensatory hibernation roost; and
- Further clarity regarding how all trees with either a confirmed bat roost or potential roost features to be impacted will be felled. This information is required at this stage to ensure that impacts to the bat species are minimised.

9.3 Dormice

9.3.1 Natural England welcomes the collaborative working in relation to the proposed mitigation for dormice. As with bats, given the nature of the project habitat severance at the landscape scale is a key conservation concern for dormice. Whilst we are continuing to engage with the Applicant to try and reach resolution on our concerns regarding the assessment of impacts and the appropriateness of the mitigation measures at present, we are not able to agree a letter of no impediment.

9.3.2 Natural England currently requires the following further information from the Applicant:

- Much greater clarity on how dormouse habitat connectivity will be retained/reinstated as a result of the Lower Thames Crossing. This needs to include clear information on how the proposed green bridges will provide habitat connectivity at a landscape scale considering both the Lower Thames

Crossing itself and other adjacent infrastructure such as local roads and the High Speed 1 Rail Line, for example; and

- Further detailed survey information for the areas where habitat is to be directly lost and capture and translocation of animals is proposed but not surveys have yet been undertaken to understand the level of impact and appropriateness of the mitigation measures proposed.

9.4 Great crested newts

9.4.1 Natural England has been able to agree the mitigation measures for great crested newts and we issued the formal letter of no impediment to the applicant on the 30 June 2023.

9.5 Water voles

9.5.1 Whilst we are continuing to engage with the Applicant to try and reach resolution on our concerns regarding the assessment of impacts and the appropriateness of the mitigation measures at present, we are not able to agree a letter of no impediment.

9.5.2 Natural England currently requires the following information from the Applicant:

- Further detail is to allow Natural England to reach agreement on the timings for the capture and release of water voles; and
- Further detail regarding the receptor site location where captured water voles will be released.

9.6 Badgers

9.6.1 Natural England has worked closely with the Applicant and agreed a letter of no impediment on the 31 March 2023 in respect of the Lower Thames Crossing for this species. We therefore have no comments to make regarding badgers.

Summary of advice

9.6.2 Natural England has agreed letters of no impediment regarding the mitigation measures for great crested newts and badgers and are satisfied with the mitigation proposed by the Applicant for these species.

9.6.3 Natural England requires additional information to understand the impacts resulting from the scheme and the appropriateness of the mitigation measures for bats, dormice and water voles. We are not yet able to provide letters of no impediment for these species.

10 Biodiversity net gain

- 10.1.1 Natural England has supported the Applicant's commitment for the Lower Thames Crossing to achieve a net gain for biodiversity, being one of the first projects undertaken by National Highways to commit to this.
- 10.1.2 As Biodiversity Net Gain (BNG) is pre-mandatory, we are not yet able to strictly require specific measures and would defer to the relevant responsible body for Biodiversity Net Gain. However, there are some aspects of the BNG proposals that we would like to provide advice on, consistent with the Applicant's aspirations to achieve BNG.
- 10.1.3 The current proposals show a 7% net gain for area-based habitats and a net loss for hedgerows and watercourses. Natural England advises that a project of this scale has the potential to provide a positive environmental legacy for the area within which it is proposed, with considerable long-term benefits for people and nature. Although we welcome the Applicant's commitment to providing BNG in advance of it being a mandatory requirement, the proposals should be seeking to deliver a minimum 10% net gain across all three habitat types (area-based, linear and watercourses). The shortfall to this target is therefore disappointing, and we encourage the Applicant to review their design scheme and look at additional habitat creation/enhancement options to achieve this, including off-site provision where appropriate.
- 10.1.4 Natural England has been briefed by the Applicant regarding their lower-than-expected BNG scores. We generally understand why the outcome is lower than expected and have supported the Applicant's efforts to secure outcomes that deliver at a landscape scale, rather than merely to hit a nominal target percentage BNG score. Nevertheless, we consider that it should have been possible for a project of this scale to achieve a higher BNG score.
- 10.1.5 Sections 7.2.1 to 7.2.6 of the Biodiversity Metric Calculations outline several recommendations for refining the project design and improving the biodiversity scores. These should be followed to improve ecological outcomes and reduce uncertainty.
- 10.1.6 The report notes that there are some situations where the metric trading rules are not met. Natural England would like to re-iterate the importance of the trading rules. Rule 3 of the Metric User Guide states that 'Trading down' must be avoided. Losses of habitat are to be compensated for on a 'like for like' or 'like for better' basis. New or restored habitats should aim to achieve a higher distinctiveness and/or condition than those lost. Ecological judgement should always be applied in determining the most appropriate replacement habitats, based on the nature of the habitats being lost and the location.
- 10.1.7 We note that baseline surveys were largely undertaken before the publication of the metric. Given the survey limitations and the timing of the metric release, we are supportive of the precautionary approach that has been taken to the condition assessments, including assumptions for a 'worst-case scenario'. However, our advice is that the habitat surveys and condition assessments should be updated (using UK Habitat Classification rather than Phase 1 methodology) to reduce the number of assumptions and limitations. This should be undertaken prior to the detailed design of the Project and we would recommend this is secured through the DCO and associated Control Documents, should consent be issued.
- 10.1.8 Natural England note that the proposals are largely based on Metric 3.1 and there is

now a later version of the metric (4.0). The guidance (FAQ section of the metric) suggests that it is acceptable to continue using an older version of the metric if a project has already begun, although we welcome the consideration of Metric 4.0 for future metric calculations at the detailed design stage.

- 10.1.9 We note that section 5.3.3 of the Biodiversity Metric Calculations states ‘within the Metric, it is not possible to identify singular non-urban trees as a primary habitat, and therefore it is not possible to include these areas in the Metric 3.1’.
- 10.1.10 Metric 4.0 now includes provision for both ‘Rural’ and ‘Urban’ individual trees. Given the advance stage of the Project, Natural England suggested to the Applicant that it would be appropriate to re-run the calculation through the latest version of the metric at the detailed design stage and individual non-urban trees should therefore be fully considered in future iterations.
- 10.1.11 The assessment of the Project does however include biodiversity units generated by essential ecological mitigation areas included within the Order Limits to mitigate and compensate for effects on protected species. For these areas, the direct impacts they are addressing fall within the Order Limits and do not relate to irreplaceable habitats. Including these areas gives a full assessment of the biodiversity units generated by the current landscape design within the Environmental Masterplan (Application Document 6.2).
- 10.1.12 We would refer the Applicant and the Examining Authority to the latest government guidance regarding additionality³⁵. Mitigation and compensation for protected sites or species can be counted towards a development’s BNG calculation but only up to ‘no net loss’ (and excluding irreplaceable habitats). At least 10% of the total post-development biodiversity score should be from measures which are not undertaken to address impacts on protected species or sites.
- 10.1.13 We note that some habitats will be temporarily lost and then re-instated at their original habitat condition. We encourage the Applicant to consider options to enhance these habitats further rather than simply re-instating. This is particularly the case for hedgerows where there is a forecast net loss of 18%. Although we note an overall increase in extent of hedgerows of 12km, further options should be explored for enhancing rather than re-instating where a temporary loss is expected.
- 10.1.14 Likewise, for watercourses we would encourage the Applicant to consider enhancements to drainage ditches currently expected to be of ‘limited biodiversity value’ and again to look at enhancement rather than re-instating temporary losses.

Summary of advice

- 10.1.15 Natural England welcomes the commitment from the Applicant to ensure that the Project achieves Biodiversity Net Gain in advance of it becoming mandatory for Nationally Significant Infrastructure Projects.
- 10.1.16 Given the nature and scale of the scheme, Natural England considers that the Applicant should commit to achieving a greater percentage gain than is currently proposed. We would recommend that they strive for a minimum 10% gain.

³⁵ <https://www.gov.uk/government/consultations/consultation-on-biodiversity-net-gain-regulations-and-implementation/outcome/government-response-and-summary-of-responses>

11 King Charles III England Coast Path

- 11.1.1 The King Charles III England Coast Path (ECP) is a long distance, pedestrian route around the coast – a National Trail. Where developments such as the proposed Lower Thames Crossing affect the England Coast Path, the National Trail should be protected and enhanced in line with paragraph 98 of the National Planning Policy Framework.
- 11.1.2 The creation of the ECP also creates an area of coastal access rights between the line of the Trail and mean low water. This accessible coastal margin may also require a temporary restriction on the public access to this land.
- 11.1.3 It is recognised that the proposed Order Limits, largely, do not overlap with the alignment of the England Coast Path and the accessible coastal margin and where they do, only one section of the route is expected to be affected by the Project.
- 11.1.4 It is understood that the proposed impacts to the ECP are to be of a temporary nature, as a result of a closure (for a period of less than one month) in order to allow for a section of the route to be upgraded for use by pedestrians and cyclists. Whilst Natural England supports the proposed upgrades to the access along this stretch of coastline we would strongly encourage National Highways to engage with Thurrock District Council who have responsibility for managing the King Charles III England Coast Path National Trail. They can develop and will need to agree to and publicise any diversions. Thurrock Council will also be able to consider if any restriction is required over the accessible coastal margin and take appropriate actions if necessary to suspend this.
- 11.1.5 We welcome the indication by the applicant to reinstate any affected Public Rights of Ways (PRoWs) with provision of either under or overbridges, or a suitable alternative; and the consideration that has been made towards repairing existing PRoW severance, and where practicable, improving existing access. It should be noted that Natural England is supportive of measures that facilitate improved and appropriate access to the natural environment.
- 11.1.6 Were the line of the King Charles III England Coast Path not to be reinstated on the official route, then we would encourage National Highways to work with Thurrock Council to develop a variation order. If the fact that the ECP is not to be reinstated on the official line is known, prior to any Secretary of State sign off for the Lower Thames Crossing, this new alignment can be built into these proposals negating the need for a variation report and further Secretary of State approvals.

Summary of advice

- 11.1.7 Natural England notes that the Project will result in temporary impacts to the route of the England Coast Path in the Tilbury Area. We would expect the Applicant to confirm that an alternative diversion route is provided during the period of impacts to ensure that a continuous path is available for users.

12 Landscape scale connectivity for people and wildlife

- 12.1.1 Given the linear nature of the project and its length, the Lower Thames Crossing will result in significant new and additional landscape scale severance along the route for wildlife and people. As part of the overall mitigation for the Project, Natural England has sought, and welcomed the commitment from the Applicant, to delivering a landscape scale approach to mitigation and habitat connectivity. The proposed installation of green bridges along the route is a welcome part of this commitment. Despite Natural England providing detailed advice during the pre-application period, we have significant outstanding concerns and consider that much greater opportunity exists for the Applicant to deliver green bridges which will meet the Project's stated objectives.
- 12.1.2 Well-designed, extensive green bridges which connect to habitat and the public rights of way network present an opportunity for the Applicant to deliver a more innovative, exemplar development for people and wildlife. As detailed above in our comments for species and landscape, we consider that the Applicant should provide significant additional information at this stage to demonstrate their effectiveness in mitigating the impacts.
- 12.1.3 From a species perspective, the location of the green bridges should be selected to maximise the likelihood of their use by the species concerned. Their location should be based upon robust survey information to demonstrate where animals are currently using the landscape or where habitat severance is likely to result.
- 12.1.4 Within Clause STR.08 of the Design Principles document, it is stated that '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' which is supported by Natural England.
- 12.1.5 Using the Thong Lane south and Brewers Road green bridges as an example, Clause S1.04 of the Design Principles document details that:

'The bridges shall be designed to meet the following criteria:

- 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 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 reasonably practicable.
- To act as local landmarks and to signal entry into the Kent Downs AONB for drivers, the vegetation on the bridges shall be visible on the horizon on their approach to the area from the east for Brewers Road green bridge, and from the west for Thong Lane green bridge south.
- To provide a bridge with soil depth suitable to establish appropriate shrubs and intermittent tree species, reflective of the surrounding character and species makeup of the Kent Downs AONB. Variations in soil depth on the bridge can provide diversity in planting species and heights.
- To provide a high-quality experience for users crossing the bridge through vegetation and woodland planting. The green bridge shall improve recreation access across the A2/M2/Lower Thames Crossing corridor.
- To provide 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.'

- 12.1.6 Whilst these Design Principles are supported by Natural England, in their current form these bridges are unlikely to realise the Applicant's stated aims. In terms of habitat connectivity, the green elements of the bridges do not connect into the woodland habitat either side of the A2 corridor. Using Thong Lane South as an example, the green bridge does not provide a habitat link over the Darnley Lodge Lane to the south of the much-widened A2 corridor so species (particularly non volant species such as the target dormice, badgers, reptiles and amphibians) will not have continuity of habitat provision.
- 12.1.7 There is an existing green bridge crossing the High Speed 1 Rail Line to the west of the Thong Lane bridge (which also provides a low use access road) which connects the grassland and woodland habitat running parallel to the north and side of the High Speed 1 Rail Line. To meet the Applicant's principle of providing habitat connectivity for species, the green bridges should provide a direct, habitat corridor from semi-natural habitats to the north of the A2 to those on the southern side of the High Speed 1 Rail Link to link into the wider wooded landscape of the Kent Downs AONB. A similar lack of habitat connectivity is also expected from the current design of the Brewers Road green bridge with limited habitat connectivity either side of the widened A2 corridor.
- 12.1.8 Given the increased severance for recreational users within the Kent Downs AONB, well designed, attractive green bridges with users able to experience and benefit from routes through the habitats on the bridge and being separated from vehicular traffic could provide a beneficial impact. We welcome the desire from the Applicant to 'provide a high-quality experience for users crossing the bridge[s]'. However, in their current form Natural England does not consider that they will provide a high-quality user experience. There will be limited, if any noise attenuation for recreational users, there is no real separation from the traffic using the bridges and the current proposals do not appear to support users being immersed within the green elements of the bridges.
- 12.1.9 In addition, for the Thong Lane South green bridge, once recreational users have crossed, they will be walking parallel to the widened A2 corridor sandwiched between the A2 and the Darnley Lodge Lane with limited, if any noise attenuation or separation from the local road. The increased urbanisation and reduction in tranquillity for users in this part of the AONB will result in additional impacts for people's enjoyment of the Kent Downs. Natural England therefore recommends that a much stronger commitment from the Applicant to delivering further mitigation for recreational users including an enhanced green bridge offer is provided.
- 12.1.10 Given these examples, and similar connectivity concerns for wildlife and people on some of the other proposed green bridges, Natural England recommends that the Applicant provides much greater clarity on how these necessary mitigation measures will function for people and wildlife.

Summary of advice

- 12.1.11 Natural England welcomes the consideration of landscape severance for people and wildlife by the Applicant. Given the length and linear nature of the scheme, fully mitigating these impacts will be critical to avoid permanent impacts.
- 12.1.12 The provision of green bridges along the route has the potential to help mitigate the

severance resulting from the scheme. In their current form, Natural England does not consider that they will meet the Scheme's objectives to maintain habitat and landscape connectivity. We therefore consider that that Applicant should, or be obligated to, maintain habitat connectivity and provide greater clarity on how the green bridges will achieve their stated aims.

13 Management and Monitoring of mitigation and compensation measures

- 13.1.1 Notwithstanding our concerns regarding the dDCO and the associated Control Documents to secure the required mitigation and compensation measures, Natural England recommends that much greater clarity is provided on the management and monitoring measures proposed. Key to the successful delivery of any environmental mitigation scheme is a robust monitoring and feedback mechanism to deliver any necessary remedial measures to ensure the objectives of the mitigation are delivered in full.
- 13.1.2 Natural England acknowledges that the Applicant is proposing, in the main, a habitat-based monitoring strategy for habitats impacted but Natural England strongly supports a much broader 'indicators of success' approach. Such an approach, looking both at habitat establishment and also more broadly at the functioning of the habitat to ensure that it works from an ecological perspective with key species groups being monitored alongside the habitat.
- 13.1.3 Such a holistic approach to monitoring the establishment and functioning of the ecosystem was adopted by National Highways on the recent A21 Pembury to Tonbridge Dualling whereby a suite of species groups (including plants, invertebrates, breeding birds and mammals) are subject to monitoring at defined periods to ensure that the habitat is functioning and supporting the assemblage of species that would be expected. Natural England supports this broader approach and would strongly advocate that the Applicant makes a formal commitment to and/or is subject to an obligation of working with all relevant organisations to agree a suite of indicators to ensure their environmental mitigation for biodiversity and landscape impacts delivers the outcomes.

Summary of advice

- 13.1.4 Given the scale and nature of the mitigation and compensation measures required, Natural England considers that a robust monitoring and management strategy should be secured. This is necessary to ensure that the objectives of the scheme in terms of the ecological and landscape impacts are fully achieved.
- 13.1.5 A robust, holistic monitoring strategy considering both the habitat establishment and how the habitats are functioning for key species/species groups is an integral part of this combined with a feedback mechanism to implement any remedial management required. We recommend such an 'indicators of success' approach as used by National Highways on other schemes is secured.
- 13.1.6 Natural England therefore recommends that a robust, habitat and species indicators of success approach is secured along with a rigorous feedback mechanism for management. All habitats created to mitigate or compensate the impacts resulting from the Project should be secured in perpetuity.

Annex E: Initial list of concerns regarding the clarity within the securing mechanisms

14 Natural England has undertaken an initial review of the following Control Documents:

- The draft Development Consent Order;
- The Code of Construction Practice incorporating the Register of Environmental Actions and Commitments; and
- The Design Principles.

14.1.1 Whilst we have not been able to review all the Control Documents in detail, we have below provided examples of the scale of the concern we have in the lack of certainty provided by the Applicant on what will be delivered post consent. As explained in Section 3 of this letter, the use of phrases such as ‘where reasonably practicable’ provide a high degree of uncertainty as to what will be delivered to mitigate and compensate the impacts of the scheme to the natural environment. We therefore recommend that the Applicant commits to providing much greater clarity on the measures that they will implement should consent be granted.

14.1.2 For the avoidance of doubt, this is not a comprehensive list of areas of concern regarding the degree of clarity the Applicant is currently providing in relation to delivering the avoidance, mitigation and compensation measures necessary for the scheme.

14.1.3 For clarity, we have we have emphasised the areas of concern with the wording through the use of italics when we have quoted the application documents.

14.2 Draft Development Consent Order

14.2.1 The draft DCO details that:

‘Construction and handover environmental management plans

4.—(1) The preliminary works must be carried out in accordance with preliminary works EMP. (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 authorities, highway authorities and bodies identified in Table 2.1 of the Code of Construction Practice to the extent that it relates to matters relevant to their respective functions.’

Area of concern and suggested resolution

The phrase ‘substantially in accordance with’ allows the Applicant a significant degree of flexibility post consent for deviation to the elements currently proposed. Given the Applicant’s desire to defer significant detail to the post consent stage, we would expect a much greater degree of certainty to be provided within the dDCO and Control Documents at this stage. We would therefore support the removal of the word ‘substantially’ from the dDCO.

14.2.2 The dDCO staets:

‘Discharge of water

19 (6) The undertaker must take such steps as are reasonably practicable to secure that any water discharged into a watercourse or public sewer or drain pursuant to this article is as *free as may be practicable* from gravel, soil or other solid substance, oil

or matter in suspension.’

Area of concern and suggested resolution

Given the discharge of the construction compound drainage into a ditch within the Thames Estuary and Marshes Ramsar Site, Natural England has agreed a suite of chemical and biological parameters for any discharge which must be met and was part of the Habitats Regulations Assessment (as detailed in RDWE033). As such, we recommend that the ‘may be practicable’ is removed from this section of the DCO

14.2.3 The dDCO details:

‘Special Category Land

40(4) *As soon as reasonably practicable* after paragraph (3) takes effect in relation to the Orsett Fen common land and the Tilbury Green common land respectively, the undertaker must apply under section 14 (statutory dispositions) of the 2006 Act and paragraph 8 of Schedule 4 (applications pursuant to section 14: statutory dispositions) to the Commons Registration (England) Regulations 2014(a) to amend the relevant register of common land accordingly’

Area of concern and suggested resolution

The wording in its current form does not give certainty as to when the register will be updated; as such Natural England recommends that the Applicant provides a clearer commitment to when they will make a request to amend the register within the dDCO or Control Documents.

14.3 Code of Construction Practice – first iteration of the Environmental Management Plan incorporating the Register of Environmental Actions and Commitments

14.3.1 REAC reference LV001 states that ‘Detailed design for the Project, including diverted utilities, will aim to *reduce the removal of trees and vegetation as far as reasonably practicable*, and in accordance with the LEMP and the Environmental Masterplan (Figure 2.4, Application Document 6.2)’.

Area of concern and suggested resolution

The removal of trees and vegetation to facilitate the scheme should be kept to the minimum necessary to facilitate the scheme and we would recommend that this is reflected within the wording.

14.3.2 REAC reference LV002 details that ‘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 (Figure 2.4, Application Document 6.2) or under the terms of article 35 of the draft DCO, which sets out the temporary possession powers’.

Area of concern and suggested resolution

The Environmental Masterplan allows for alternative after uses in select areas so for those not subject to these constraints, the project should use best endeavour to ensure that the land is reinstated to the same or better quality.

14.3.3 REAC reference LV007 states that ‘Construction 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'. compound facilities

Area of concern and suggested resolution

Given the potential impacts to the setting of the Kent Downs AONB, we recommend that the Applicant commits to fully mitigating the visual impacts of the construction compounds. If the compounds cannot be sited as far south-westerly as possible, then additional impacts to those stated within the Environmental Statement may result. We would therefore support a much clearer commitment to the siting and/or the need for any additional mitigation measures to be implemented.

- 14.3.4 REAC reference LV009 states '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*'.

Area of concern and suggested resolution

Natural England would expect the Applicant to ensure that the impacts from the temporary stockpiles are mitigated for the duration of the impact given their location adjacent to the AONB, not for 'as long as reasonably practicable', as proposed. We would therefore support a much clearer commitment from the Applicant to mitigate the impacts for the duration of the stockpiles being in place.

- 14.3.5 REAC reference LV013 details that 'Where excavation for installation of utilities would require the removal of ancient woodland, trees subject to tree preservation orders or hedgerows subject to the Hedgerows Regulations 1997, trenchless installation methods will be used to *avoid removal where reasonably practicable*, unless this would give rise to new or materially different environmental effects'.

Area of concern and suggested resolution

Natural England would expect the Applicant to endeavour to ensure that scale of impacts to habitats are the minimum necessary to facilitate the scheme, should consent be granted. If trenchless installation measures are not possible then additional impacts to those stated within the Environmental Statement may result. We would therefore support a clearer commitment from the Applicant with regards to LV013.

- 14.3.6 REAC reference LV028 details 'An Arboricultural Method Statement and Tree Protection Plan would be prepared in accordance with BS 5837:2012, identifying measures for the protection of retained woodland, trees and hedges prior to the commencement of site clearance works. All works to woodland, trees and hedges and vegetation removal would be implemented under the supervision of the Environmental Clerk of Works having regard for the commitment to *reduce the removal of trees and vegetation as far as reasonably practicable* as set out in LV001'.

Area of concern and suggested resolution

Natural England would expect the Applicant to endeavour to ensure that scale of impacts to habitats are the minimum necessary to facilitate the scheme, should consent be granted. If trenchless installation measures are not possible then additional impacts to those stated within the Environmental Statement may result.

We would therefore support a clearer commitment from the Applicant with regards to LV028.

- 14.3.7 REAC reference LV029 states 'Planting identified on the Environmental Masterplan (Figure 2.4, Application Document 6.2) would be undertaken at the *earliest practicable opportunity*. Where planting is being undertaken to landscape or provide environmental mitigation on land used temporarily for the authorised development, planting for the implementation of environmental mitigation would be undertaken at the *earliest practicable planting season after completion* of that part of the construction works and in accordance with the LEMP. Planting on land taken solely for environmental mitigation purposes would be undertaken at the *earliest practicable planting season* following commencement of authorised development and in accordance with the LEMP'.

Area of concern and suggested resolution

The use of 'earliest practicable' season provides a high degree of uncertainty as to the delivery of the mitigation measures. Landscape and ecological planting to mitigate or compensate the impacts of the scheme will take time to establish and become effective. The lack of clarity on when the planting will take place means that the effectiveness of the mitigation/compensation measures detailed within the Environmental Statement may be unclear. For example, the visualisations for the landscape mitigation within the Kent Downs AONB are shown at year 15 but if the planting is delayed, then these may be an overestimate of the effectiveness of the mitigation measures. As such, Natural England would support a stronger commitment to when the planting will occur, perhaps 'the first planting season following completion of that part of the construction'.

- 14.3.8 REAC reference LV030 states 'In accordance with standing advice prepared by Natural England and the Forestry Commission (2022), the following measures would be developed to protect retained veteran trees and trees in ancient woodland identified on the Environmental Masterplan (Figure 2.4, Application Document 6.2): 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 ancient or veteran trees the buffer would be a minimum of 15 times the diameter of the tree trunk or 5m beyond the canopy, where practicable, whichever is the greater.* - *For ancient woodland, a buffer of at least 15m from the boundary of the woodland would be maintained between the proposed construction activity and the asset where practicable.* These measures would be followed by the Contractors unless specifically agreed by National Highways, following the advice of a qualified arboriculturist, and following assessment which demonstrates that the implementation of other mitigation measures would permit a smaller buffer whilst still maintaining the viability of the tree or woodland. The above measures shall not apply to those trees shown to be removed on Figure 7.24 of the Arboricultural Impact Assessment (ES Appendix 7.12, Application Document 6.3) or if the Secretary of State certifies that not implementing such measures would not result in new or materially different environmental effects to those reported in the ES'.

Area of concern and suggested resolution

Natural England is concerned that the use of 'where practicable' when defining the root protection zone buffers around ancient woodland and veteran trees means that the Applicant could significantly reduce the minimum buffers detailed within the

Natural England and Forestry Commission good practice guidance³⁶. Any reduction in the buffer has the potential to result in damage to the root balls of the trees and result in greater impacts. Natural England would support a clearer commitment from the Applicant to ensure that the minimum distances are delivered and any reduction in them needs to be agreed in writing by the Secretary of State.

- 14.3.9 REAC reference TB001 details 'Hedgerow habitat lost during construction would be compensated by creating new hedgerows at locations shown on the Environmental Masterplan (Figure 2.4, Application Document 6.2), 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'.

Area of concern and suggested resolution

The use of as 'early in the construction programme as reasonably practicable' again provides a high degree of uncertainty as to the delivery of the replacement habitat. All planting to mitigate or compensate the impacts of the scheme will take time to establish and become effective.

The lack of clarity on when the planting will take place means that the effectiveness of the mitigation/compensation measures detailed within the Environmental Statement may be unclear. As such, Natural England would support a stronger commitment to when the planting will occur, perhaps 'the first planting season following the commencement of construction or the completion of that part of the construction, whichever is earliest'.

- 14.3.10 REAC reference TB012 details 'Bird nest boxes would be provided within areas of retained woodland, trees and hedges shown on the Environmental Masterplan (Figure 2.4, Application Document 6.2) 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 numbers within retained vegetation*. The measures would be implemented under the supervision of the Environmental Clerk of Works'.

Area of concern and suggested resolution

The erection of nest boxes for bird species along the route is welcomed but Natural England would support greater certainty on the delivery of these measures. If the Applicant cannot deliver the stated density of nest boxes, then we would recommend the Applicant should commit to additional measures, but the current commitment does not require this. We would therefore support a stronger commitment from the Applicant to ensure that the figures within TB012 are the *minimum* levels that are delivered.

- 14.3.11 REAC reference TB028 states 'Areas identified on the Environmental Masterplan (Figure 2.4, Application Document 6.2) for compensatory ancient woodland planting

³⁶ <https://www.gov.uk/guidance/ancient-woodland-ancient-trees-and-veteran-trees-advice-for-making-planning-decisions>

to offset the loss of ancient woodland *would be inoculated, where reasonably practicable*, with soils from ancient woodland sites within Order Limits, as indicated on ES Figure 8.1, Designated Sites (Application Document 6.2), 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 for example heavy rainfall; timing conflicts with protected species licensing activities (for example 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 prepared adjacent receptor sites, following guidance from CIRIA within Habitat Translocation - A Best Practice Guide (C600)'.

Area of concern and suggested resolution

As detailed in the main body of our Written Representations, Natural England recommends that the Applicant provides greater clarity on the measures that will be implemented to ensure that the created woodland maximises the wildlife value and develops into a functioning ecosystem as quickly as possible. As part of this, we recommend that the Applicant provides clarity on the areas that they are proposing to translocation salvaged soils and the indicators of success that will be agreed to ensure the successful establishment of the woodland habitat. We would therefore support a stronger commitment from the Applicant and a much higher degree of certainty being provided within TB028.

14.4 Design principles

- 14.4.1 Design Principle PEO.03 states '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*'.

Area of concern and suggested resolution

Given the proposed works to public rights of way within the Shorne and Ashenbank Woods SSSI and other areas of conservation importance, inappropriate surfacing could result in additional impacts. As such, Natural England recommends that the Applicant provides clarity on the type and nature of any works to the public rights of way and permissive route network to give confidence that impacts will not result.

- 14.4.2 Design Principle PLA.01 details that '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'.

Area of concern and suggested resolution

Given that the scheme, including the widened A2 corridor passes through the Kent Downs AONB and the setting the amount of visual clutter should be reduced to the minimal level required for safe operation of the scheme. As such we would support the Applicant providing a much greater clarity at this stage on how they proposed to make efficient use of highway infrastructure to reduce the landscape and visual

impacts within the Kent Downs.

- 14.4.3 Design Principle PLA.02 states ‘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 National Highways standards), while promoting safety requirements/targets through its location, mounting and lighting’.

Area of concern and suggested resolution

Given that the scheme, including the widened A2 corridor passes through the Kent Downs AONB and its setting the amount of visual clutter should be reduced to the minimal level required for safe operation of the scheme. As such we would support the Applicant providing a much greater clarity at this stage on how they proposed to make efficient use of highway infrastructure to reduce the landscape and visual impacts within the Kent Downs.

- 14.4.4 Design Principle PLA.05 states that ‘Design proposals shall prioritise improving connectivity between existing habitats *wherever reasonably practicable*, as defined within the Environmental Masterplan (Application Document 6.2, Figure 2.4). 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.

Area of concern and suggested resolution

Whilst Natural England supports the Applicant’s approach to minimise fragmentation, as we have explained in our Written Representations the project is likely to result in significant new and additional severance of habitat for people and wildlife. Some of the measures, such as the green bridges in their current design/form, are unlikely to deliver habitat connectivity for the reasons detailed in the main body of our letter and we are concerned that the Design Principle could further reduce the effectiveness of the measures to mitigate the effects of severance. Natural England would therefore support a much stronger and clearer commitment from the Applicant to ensure that the scheme does not result in severance for people and wildlife.

- 14.4.5 Design Principle PRO.04 details that ‘The detail 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’.

Area of concern and suggested resolution

Natural England considers that the Applicant should commit to maximising the biodiversity value of the scheme within the constraints of the DCO; the inclusion of ‘where reasonably practicable’ seems unnecessary in this context and we would support the Applicant committing to a much clearer, stronger principle.

- 14.4.6 Design Principle STR.06 details that ‘Project Enhanced Structures (ref. STR.01-05, STR.08 and STR.15) shall share the following consistent design approach:...
- Materials shall be self-finished, (as far as *technically practicable* whilst complying with DMRB standards) minimising maintenance while being consistent and appropriate to the colour palette required in the Kent Downs AONB
 - Parapet material and form shall be distinctive and consistent across the Project. Parapets and acoustic barriers shall be combined *where reasonably practicable*

- The natural light under bridge structures shall be maximised as much as is reasonably practicable.
- Structures such as earth-retaining walls, abutments, piers and parapets shall seamlessly integrate within the landscape, avoiding exposed wing walls and visible concrete retaining structures *where reasonably practicable*.
- Access requirements, including for maintenance, shall be coordinated *where practicable* to avoid duplication. Where access structures (for example, galleries) are required, these shall be integrated within the Project rather than added on.'

Area of concern and suggested resolution

The design of the structures has the potential to help mitigate the landscape impacts resulting from the project through careful design. Given the route passes through the Kent Downs AONB, Natural England would expect the Applicant to commit to delivering a comprehensive mitigation package which would include the finish and design of the structures and street furniture.

The approach taken within STR.06 does not currently provide confidence that the Applicant will take all opportunities to mitigate the impacts of the scheme unless they are 'reasonably practicable'. To allow us to advise the Examining Authority on whether the landscape and ecological mitigation is appropriate, we would recommend that the Applicant provides much greater clarity on the measures they are committing to at this stage; if it is not possible to confirm the measures then it is unclear how the conclusions within the Environmental Statement have been met. We have similar concerns with Design Principle STR.07 (Bridges) in its current form.

- 14.4.7 Design Principle STR.10 states that '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. Required noise mitigation structures shall be designed and (*where reasonably practicable*) screened with planting to minimise the perception of the urbanisation in rural areas. 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 (for example, weathering steel, timber)'

Area of concern and suggested resolution

Whilst Natural England has concerns with the lack of certainty provided within STR.10, we welcome the confirmation that if screening is not possible, alternative mitigation measures will be provided which are appropriate to the context and landscape within which they sit. Such an approach would be welcomed for all of the other Principles where the Applicant has not provided clarity on what will be delivered if the measures are 'not reasonably practicable'.

- 14.4.8 Design Principle LST.10 states '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'

Area of concern and suggested resolution

Natural England has concerns regarding the scale of street furniture and signage

proposed within the Kent Downs AONB and the impacts this will have. We therefore support the minimisation of the amount of street furniture which will help reduce the impacts. We are however concerned that this Principle does not provide clarity on how the Applicant will achieve this or what additional mitigation measures will be implemented should significant additional furniture be installed. We would therefore support the Applicant providing much greater clarity on the measures they are proposing to reduce the impact so that there is confidence in the assessment of effects and effectiveness of the mitigation measures.

- 14.4.9 Design Principle LST.02 states that 'To preserve the rural and historic nocturnal character of the landscape along the Project route (including the A2/M2 Corridor) and to maintain dark corridors for wildlife, lighting will be *minimised wherever it is reasonably practicable* and safe to do so, but shall remain in accordance with relevant standards.

Area of concern and suggested resolution

Natural England supports the need to minimise light pollution within the Kent Downs AONB but are concerned that this Principle does not provide confidence that impacts will be minimised. We would support the Applicant providing much greater clarity at this stage as to what the minimum level of lighting to comply with relevant standards is and the Principle amended to reflect this.

- 14.4.10 Design Principle LST.03 states 'To preserve local nocturnal character and habitats, lighting required at 'off-line' operational areas and to maintain dark corridors for wildlife, (such as at the portals) shall be controllable, *directional and as low-level as is practicable* and safe (floodlighting shall be avoided).

Area of concern and suggested resolution

Natural England supports the need to minimise light pollution but are concerned that this Principle does not provide confidence that impacts will be minimised. We would support the Applicant providing much greater clarity at this stage as to what the minimum level of lighting to comply with relevant standards are and the Principle amended to reflect this.

- 14.4.11 Design Principle LSP.02 states '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. It shall comprise only 'plant healthy' accredited stock where reasonably practicable'

Area of concern and suggested resolution

Natural England considers that the planting palette for mitigation of biodiversity rich, semi-natural habitats should aim to replicate the habitat that is being impacted, both in terms of the structure and the species mix, using native species of local provenance. We are concerned that LSP.02 could result in non-native species being introduced into areas to mitigate high value habitats. Natural England would therefore support the Applicant providing greater clarity on the areas that non-native species are proposed to be planted at this stage.

- 14.4.12 Design Principle LSP.02 states 'The detail design shall use planting to soften the edge of the earthworks and integrate the Project as defined in the Environmental

Masterplan (Application Document 6.2, Figure 2.4). 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 landscape within the Order Limits adjacent to the receptor to mitigate the loss of visual screening.'

Area of concern and suggested resolution

Natural England welcomes the clarity provided by the Applicant on the additional measures that will be provided should it not be 'reasonably practicable' to integrate the earthworks into the landscape. We would strongly support the Applicant taking a similar approach for all of the Design Principles.

- 14.4.13 Design Principle LSP.05 states 'To retain the character of the landscape, where land is utilised during construction, it shall be *reinstated to its original use as far as reasonably 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'.

Area of concern and suggested resolution

Natural England is concerned that land may be returned from the Applicant to the landowner in a condition worse than its original ecological value. To guard against this, we are seeking for the DCO to require an audit which agrees the condition (including the ecological condition) of land temporarily required by the Project, such that it can be confidently returned in an equivalent (or better) condition. Should there be a discrepancy between the condition of the land acquired and the land returned from an ecological point of view, then such an audit would serve to flag the deterioration and identify remedial actions. This is requested in order that the condition the land is returned to the landowner is of the same (or better) ecological value prior to the Project taking temporary possession and can be appropriately audited in a transparent way.

- 14.4.14 Design Principle LSP.20 states 'Grassland on roadside verges and earthworks including embankments, cuttings and false cuts shall be seeded to become species-rich grassland and include wildflowers, suitable to underlying soil and subsoil type. Wildflower mixes shall include yellow rattle to help suppress the growth of grass. *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'.

Area of concern and suggested resolution

Natural England welcomes the commitment to species rich grassland being the default planting for road verges. However, if this is not 'reasonably practicable' we would support the Applicant providing greater clarity on the additional measures they will implement to ensure that the biodiversity impacts of the scheme are fully mitigated, and the biodiversity net gain delivered.

- 14.4.15 Design Principle LSP.23 states '*Where reasonably practicable*, planting shall be undertaken early in the construction programme to maximise the maturity of the planting scheme at road opening'.

Area of concern and suggested resolution

Given the time for maturation of habitats and landscape mitigation, Natural England support the early planting. We are concerned regarding the lack of clarity on when planting will be undertaken within LSP.23; if the planting is delayed then the impacts within the Environmental Statement may be greater than stated. We would therefore support the applicant providing much greater clarity on the phasing of the planting for ecological and landscape mitigation/compensation.

- 14.4.16 Design Principle LSP.24 states 'The detail design of planting mitigation and planting compensation areas shall aim to maintain the key views/vistas identified in the area-specific design principles'.

Area of concern and suggested resolution

As detailed in our Written Representations, Natural England has concerns that the ecological mitigation may result in additional landscape impacts for the Kent Downs AONB. The wording in LSP.24 does not appear to commit the Applicant to maintaining key views and we would support the wording being amended, perhaps something along the following line '...areas shall maintain the key views/vistas...'.

- 14.5 As mentioned above, this is not a comprehensive list of the areas of concern with the lack of clarity within the securing mechanisms but an initial review in the available time to help explain our concerns with the approach. We will endeavour to continue reviewing the documents and will submit this at a subsequent Examination Deadline if you consider this would be helpful.

Annex F: Natural England's confidential annex sent under separate cover

Annex G: Natural England's air quality technical advice shared with National Highways and the Lower Thames Crossing Project Team 11 April 2023

Summary of advice received on National Highways Air Quality assessment.

Two issues have been highlighted to Natural England in the methodology used in National Highways' approach to the assessment of potential effects from road schemes upon designated nature conservation sites. These issues mean that Natural England is currently unable to support the approach adopted, as it is not compliant with case law.

These are:

- How National Highways has identified and considered **other plans and projects** acting in combination (i.e. risk of proliferation of imperceptible changes adding up to become a significant impact).
- How "**imperceptible impacts**" from ammonia (NH₃) and nitrogen deposition (Ndep) are derived from NOx modelling.

Consideration of other plans and projects

The approach to identifying whether a road requires further assessment is based on the difference between the "do something" traffic model (i.e. with the scheme) compared to the "do minimum" forecast traffic (without the scheme) in the opening year of the scheme. The "1000AADT" criteria (or other criteria relating to HDV AADT, speed banding or road alignment) is applied, and only then is the 1% threshold (of the relevant ecological end point – in this case the critical level for annual NOx) applied. Therefore, if the 1000AADT criteria is not met (in the opening year) – no further ecological consideration is made.

The UK Courts have specifically considered (In the case of Wealden DC concerning the impacts of traffic associated with increased housing development³⁷) the line of reasoning that the contribution from a proposal can properly be ignored on the basis of its magnitude (i.e. if the 1000AADT criteria is not met by the road alone, no further ecological consideration is required) and in such a case no further assessment in-combination with other plans and projects is necessary.

The court found that the use of the 1000AADT threshold 'alone' brought about a clear breach of the Habitats Regulations in that several schemes with <1000 AADT may need to be considered together. This applies even though <1000 AADT (or the 1% threshold, for which the 1000AADT threshold is a rough approximation) may correctly be considered trivial/inconsequential.

Therefore, although the approach in DMRB carries out a limited in-combination assessment (as the predicted opening year traffic flows takes account of some anticipated future growth) it appears that predicted increases in traffic flows which might arise from some other plans and projects are excluded where these occur after the opening year. For example:

- Traffic-generating proposals which are in the pipeline but not 'operational' on the opening year – for example, a large traffic-generating project predicted to be operational in 2025 would not be included in a DMRB in-combination assessment for a road predicted to open in 2024. This would mean emissions from this project would not be addressed in the assessment which would underestimate "committed" in-combination emissions to a protected site;
- Traffic-generating proposals for which applications have been submitted but which are not yet consented or e.g. allocations in local plans; and
- Contributions from non-road-based emissions from other plans and projects.

Therefore, the 1000AADT (and the 1%) threshold does not appear to be applied to the

³⁷ Wealden DC v SoS and Lewes DC and South Downs National Park Authority [\[2017\] EWHC 351 \(Admin\)](#)

scheme in a manner which takes account of other plans and projects in a robust manner.

Natural England has been advised that this approach is vulnerable to challenge for failing to properly consider other projects in combination.

Imperceptible modelled Nox and its application to NH₃ and N deposition

National Highways considers that changes below 1% of an air quality threshold can be regarded as imperceptible or inconsequential. Changes above 1% of an air quality threshold are considered further. Therefore, in the case of Nox concentrations (i.e. using the Nox critical level of 30µg/m³ – the concentration of Nox in the atmosphere, above which direct adverse effects on plants or habitats may occur, according to present knowledge³⁸) modelled changes of greater than 0.3µg/m³ are subject to further consideration.

The methodology National Highways uses for calculating other pollutants – in this case ammonia (NH₃) concentrations and nitrogen deposition (Ndep) – are dependent on Nox concentrations. However, these pollutants will only be routinely calculated if modelled changes in Nox concentrations are greater than 0.3µg/m³.

This approach can lead to a situation where the 1% threshold of the critical level for ammonia concentrations or the critical load for Ndep can be exceeded, but concentrations of these pollutants have not been calculated, as Nox concentration is <0.3µg/m³. In this circumstance, the assumption that changes above 1% of the relevant threshold are considered further is not applied in practice to ammonia and Ndep.

As an example, Table 1 overleaf shows that converting 1% of the critical load for Nox (0.3µg/m³) to ammonia and Ndep, results in concentrations for those pollutants that reach or exceed 1% of their respective critical level (for ammonia) or critical load for Ndep. For example, the critical load for a heathland habitat or broadleaved woodland³⁹ is 10-20kgN/ha/yr (some habitats such as bogs have even lower critical loads – e.g. 5-10kgN/ha/yr) and when the 0.3µg/m³ threshold of Nox is reached, the associated Ndep would be at 2% or 3% of the critical load for moorland/ woodland habitat types respectively, and the ammonia concentration would be at up to 3% of its relevant critical level. On this basis, the application of factors to convert concentrations to deposition will arguably make an imperceptible effect become a perceptible one.

³⁸ [Critical Loads and Critical Levels - a guide to the data provided in APIS | Air Pollution Information System](#)

³⁹ As listed on APIS – [Indicative values within nutrient nitrogen critical load ranges for use in air pollution impact assessments | Air Pollution Information System \(apis.ac.uk\)](#)

Table 1 – Nitrogen Deposition for Moorland/ Grassland and Woodland Based a Nox change of 1% of the Critical Level

Scenario	Threshold	1% of threshold		NO _x	NO ₂	NH ₃	Total Ndep (kg N/ha/yr)	% of 10 kg N/ha/yr lower critical load	% of 1 µg/m ³ critical level for ammonia ⁴⁰	% of 3 µg/m ³ critical level for ammonia ⁴¹
Nox Critical Level	30µg/m ³	0.3 µg/m ³	Concentration (µg/m ³)	0.30	0.15 ₄₂	0.03 ₄₃	-	-	3%	1%
			Nitrogen Deposition – moorland (kg N/ha/yr)	-	0.021 ₄₄	0.17 ₁	0.192	1.92% (3.84% for a 5kgN/ha/yr critical load)	-	-
			Nitrogen Deposition – woodland (kg N/ha/yr)	-	0.044	0.25 ₆	0.300	3%	-	-

⁴⁰ Habitat where bryophytes or lichens are an integral part

⁴¹ Habitat where bryophytes or lichens are not an integral part

⁴² Based on Defra's published NO_x to NO₂ calculator. Defra's tool takes as inputs the year, road NO_x, background NO₂ concentrations (taken from Defra's background concentrations maps) and the road type. The latter element defines the primary NO₂ value for the calculation to determine the total NO₂ from the road. The values provided in Table 1 are indicative for a general road type, as provided in National Highways position paper on the modelling approach for protected sites.

⁴³ National Highways has developed a tool to calculate an equivalent NH₃ concentration based on the modelled road NO_x. The research that underpins this NH₃ tool identified different ratios of NO_x:NH₃ emissions for light duty vehicles (LDVs) [cars and vans] and heavy duty vehicles (HDVs) [lorries and buses / coaches]. To enable the calculation of NH₃, the total road NO_x is split into the contribution from LDVs and HDVs and entered into National Highways' NH₃ tool. The tool then calculates an equivalent NH₃ concentration for LDVs and HDVs and sums the NH₃ values to calculate a total road NH₃ concentration for each receptor location.

⁴⁴ Deposition velocities and dry deposition flux conversion factors for grasslands or woodland, which differ for NO₂ and NH₃, are applied to the modelled concentrations to calculate an equivalent N deposition load separately for NO₂ and NH₃. The N deposition loads from the NO₂ and NH₃ concentrations are summed together to calculate the total N dep load from the road at each receptor. Deposition velocities and deposition fluxes (and the relevant calculations) are taken from AQTAG 06.

The argument that small modelled contributions can be ignored was rejected by the UK Courts in the Wealden decision. In that case it was whether further consideration of other plans and projects in combination was required when a project alone generated <1000AADT – in this case it is whether the concentration of ammonia and Ndep requires to be considered when Nox concentration are below 0.3 µg/m³ at a protected site. However, the same point applies in that the sum of several imperceptible effects can, in principle, become perceptible.

In addition, the Wyatt ruling (2021)⁴⁵ considered whether the use of uncertainty in modelling could be used to cast doubt over the requirements of the Habitats Regulations. The argument was that uncertainty precluded a decision-maker from being able to conclude ‘no adverse effect to site integrity’, as reasonable scientific doubt would remain. The conclusion was that the use of precautionary variables must be used in modelling to ensure that any doubt erred on the precautionary side. This is contrary to the position of National Highways, that doubt in the modelling should be used to discount the findings of that modelling (in this case, that Nox under 0.3µg/m³ is imperceptible so cannot be used to generate ‘perceptible’ concentrations of other pollutants).

The exclusion of proposals on the basis of their contribution being ‘small’ is therefore contrary to established caselaw. As there is a requirement to consider effects in combination with other plans and projects, there is a requirement to consider such ‘small’ impacts.

Natural England has been advised that accepting this approach (i.e. that very small effects may be dismissed without further consideration, either due to their scale or uncertainties in their derivation) would be vulnerable to legal challenge and would also be inconsistent with the advice provided by Natural England to other public bodies.

Ways forward

There is potentially a methodology that National Highways could adopt to ensure that the use of threshold-based approaches is evidenced and could comply with the established caselaw. It is not necessarily the case that any impact, no matter how small, requires further assessment (Advocate General’s Opinion in the Sweetman case). However, the approach at present does not engage with the fact that multiple imperceptible impacts (whether in-combination, or due to the nature of their size and modelling uncertainty) could become perceptible. The approach would have to take into account proliferation risk amongst plans and projects generally, the relative contributions from different types of plans and projects, and the differing decision-making approaches which apply.

However, in the absence of this methodology, it is recommended that National Highways follows the methodology outlined in Natural England guidance NEA001 which takes into account the Wealden decision in terms of in-combination assessment. It is also recommended that Nox, ammonia and nitrogen deposition are calculated separately for each protected site, and compared against the relevant critical levels and critical load. If the 1% threshold for any of them is exceeded, further consideration will be required within an appropriate assessment.

⁴⁵ [Wyatt v Fareham BC](#) [2021] EWHC 1434 (Admin)

Lower Thames Crossing Technical Note Coalhouse Point Mitigation Progress Update

Date issued: 30 June 2023

Aim: To demonstrate that the mitigation proposals at Coalhouse Point are feasible in response to Natural England advice / comments

Introduction

The Habitats Regulations Assessment (HRA) and Environmental Impact Assessment (EIA) rely on the proposed wetland mitigation at Coalhouse Point to mitigate effects on wintering and passage birds from the Thames Estuary and Marshes SPA/Ramsar and on invertebrates. Additionally, the site falls within a proposed SSSI, which is proposed for designation for additional features such as ‘the breeding bird assemblage of open water and its margins’, and so the site should be established and managed compatibly with that forthcoming designation. It must be demonstrated therefore that it is feasible to establish and maintain a range of suitable conditions for all these the target species features.

The proposed mitigation would be delivered through the creation of a wetland habitat formed of shallow scrapes and a network of ditches, delivered through the realignment of the existing land drainage that conveys flows from south to north towards Star Dam. Hydrology studies indicated that there is insufficient water in the natural catchment to maintain water levels at their design capacity throughout the year and therefore provision for a secure and suitable water supply to ensure the long-term delivery of the ecological objectives was included within the Development Consent Order Application in October 2022 via a water inlet directly from the River Thames.

Additionally, Natural England have advised that a range of salinities would need to be maintained across the site to provide suitable conditions for the range of target species, which requires sufficient quantities of river water to be available.

Plate 1 presents the location and indicative design of the proposed mitigation area at Coalhouse Point in the context of the Lower Thames Crossing alignment as presented in the DCO application in October 2022.

Plate 1: Proposed location and indicative design of HRA and ecology mitigation at Coalhouse Point



In light of recent feedback from Natural England, this paper sets out the following:

- Set out the DCO position
- Provide an update on the following matters:
 - Design assumptions for the mitigation
 - Water demand requirements
 - Construction assumptions
- The Project's response to recent engagement with Natural England

DCO position

Table 1 sets out the key references to the mitigation at Coalhouse Point within the DCO application, including the relevant securing mechanisms for its delivery and the management of effects related to its construction.

Table 1 Key references to the mitigation at Coalhouse Point within the DCO application

DCO Application Document Number/ Title	Reference	Relevant text
6.5 Habitats Regulations Assessment - Screening Report and Statement to Inform an Appropriate Assessment APP-487	Paragraph 7.1.21 - 7.1.22	<i>Two habitat parcels within the functionally linked land area will be enhanced to improve functionality during the construction phase. The land parcel at Coalhouse Point (Design Principle S9.13) will also continue to provide an enhanced functionality during operation. The integrity of the site is reliant on there being sufficient functionally linked habitat outside the SPA and Ramsar site. This mitigation ensures that the functionality of that habitat, in maintaining the qualifying bird feature populations, is not reduced throughout construction or operation. In this way the integrity of the SPA and Ramsar site is not adversely affected because the function of habitats outside the</i>

DCO Application Document Number/ Title	Reference	Relevant text
		<i>designated site will be maintained.</i>
6.1 Environmental Statement - Chapter 8 - Terrestrial Biodiversity APP-146	Paragraph 8.5.37	<i>This would comprise approximately 97ha of habitat creation and has been designed to compensate the predicted habitat losses within designated sites to the north of the River Thames, as well as other important semi-natural habitats that fall outside the boundaries of designated sites. It would include a number of different habitats created to enhance the environment adjacent to the River Thames, while also increasing the area's biodiversity value. It would comprise wetland habitat (refer to Design Principles (Application Document 7.5) Clause no. S9.13), together with some areas of ponds, wet grassland and scrapes. The central ditch would also be realigned to increase its length, replicating historic drainage ditches in this area, and would be replanted to increase its biodiversity interest. This ditch would retain its existing salinity gradient, supporting the terrestrial and aquatic invertebrate species present in this area.</i>
7.5 Design Principles APP-516	S9.13 states	<i>The land parcel (34.4ha) at Coalhouse Point shall be used for habitat enhancement to maintain baseline functionality of functionally linked land associated with the Thames Estuary and Marshes SPA/Ramsar site. The land will be used to create a series of shallow scrape habitats, high tide roost features and coastal grazing marsh habitat suitable for use by the qualifying features of the SPA/Ramsar site (LE6.2 Banks and ditches, LE6.1 Water bodies and associated plants, LE6.4 Marsh and wet grassland)</i>
6.3 Environmental Statement - Appendix 2.2 - Code of Construction Practice, First Iteration of Environmental Management Plan APP-336	Table 7.1 REAC table HR010 states	<i>The habitat creation at the land adjacent to Coalhouse Point, indicated on the Environmental Masterplan (Figure 2.4, Application Document 6.2) and described in Clause S9.13 of the Design Principles (Application Document 7.5) will be carried out prior to the commencement of works at the Northern tunnel entrance compound. The water required to maintain a range of depths within the habitat consistent with the guidance in "Manage lowland wet grassland for birds" (DEFRA 2021) will be secured prior to completion of the habitat creation works and will, unless otherwise agreed with the Secretary of State, be sourced from the River Thames by means of a water inlet with self-regulating valve or equivalent structure, passable by eels, constructed (in accordance with HR011) in the sea wall, at approximately TQ686761, to allow regulated tidal exchange, unless a formal agreement with Thurrock Council to release water on request from the Coalhouse Fort moat system has been secured.</i>
	HR011 states	<i>Works to construct a water inlet with self-regulating valve or equivalent structure (HR010) would be undertaken with the following constraints:</i> <ul style="list-style-type: none"> • <i>All works requiring access to the inter-tidal zone would be completed to suit tidal cycle and at</i>

DCO Application Document Number/ Title	Reference	Relevant text
		<p><i>periods of low water.</i></p> <ul style="list-style-type: none"> • <i>All piling works would be completed during periods of low water to avoid transmission of underwater noise.</i> • <i>All piling works would utilise soft start piling and other best practice techniques, as per the JNCC 2010 guidance (Statutory nature conservation agency protocol for minimising the risk of injury to marine mammals from piling noise), to help avoid noise and vibration impacts. d. Excavated arisings would be retained within the coffer dam or stored on a support barge.”</i>

Table 1 sets out a clear framework for securing the mitigation and demonstrates the commitment to its delivery. However, in due regard to advice from Natural England and other stakeholders, further review has been carried out on a without prejudice basis to build confidence that the mitigation will be feasible and can be delivered within the envelope described by the controls in Table 1.

Design assumptions for ditches, scrapes and water levels

The proposed mitigation comprises a series of scrapes and a realigned ditch network. The alignment of the proposed ditches would replicate the historical drainage pattern and would provide a hydraulic connection between the scrapes and the water supply. Preliminary ditch profiles for the proposed ditches and scrapes have been developed based on the requirements for a range of ecological features to provide a range of conditions across the site with multifunctional benefits. The concept profiles are set out in

Plate 2 to Plate 5 for the proposed scrapes and realigned ditches.

Plate 2: Profile assumptions for scrapes – cross-section

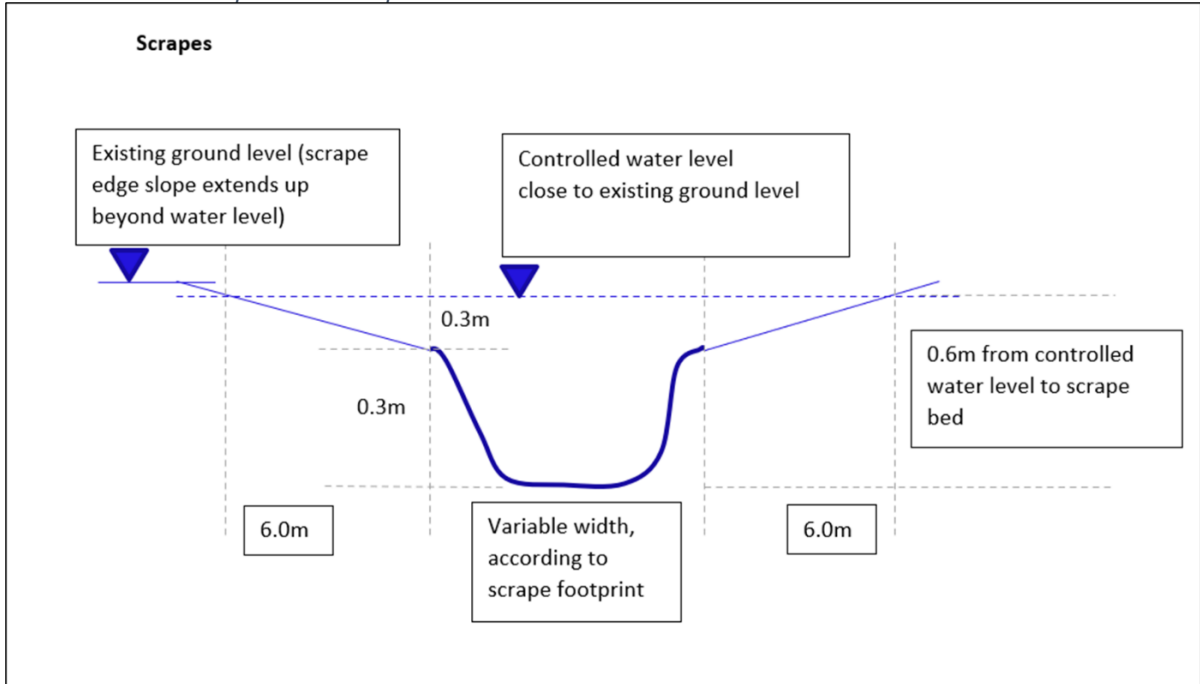


Plate 3: Profile assumptions for scrapes – indicative plan view

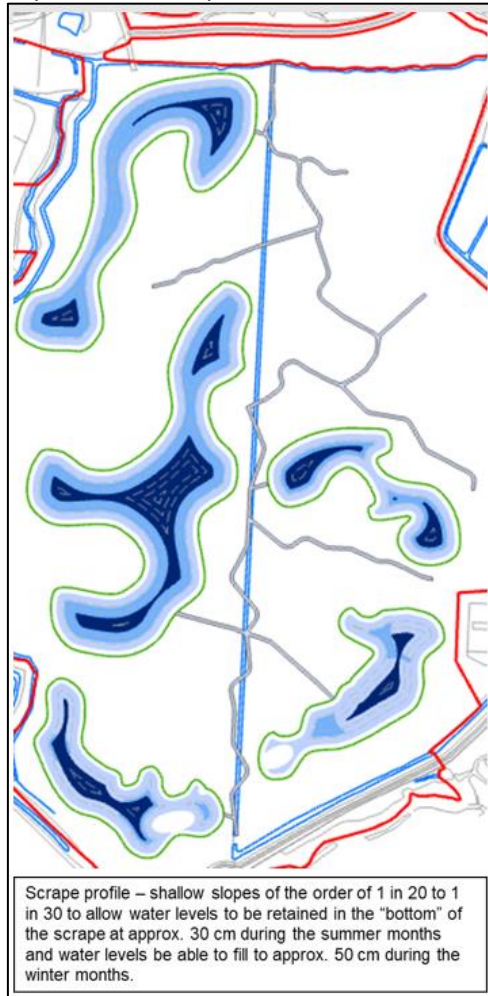


Plate 4: Profile assumptions for central ditch

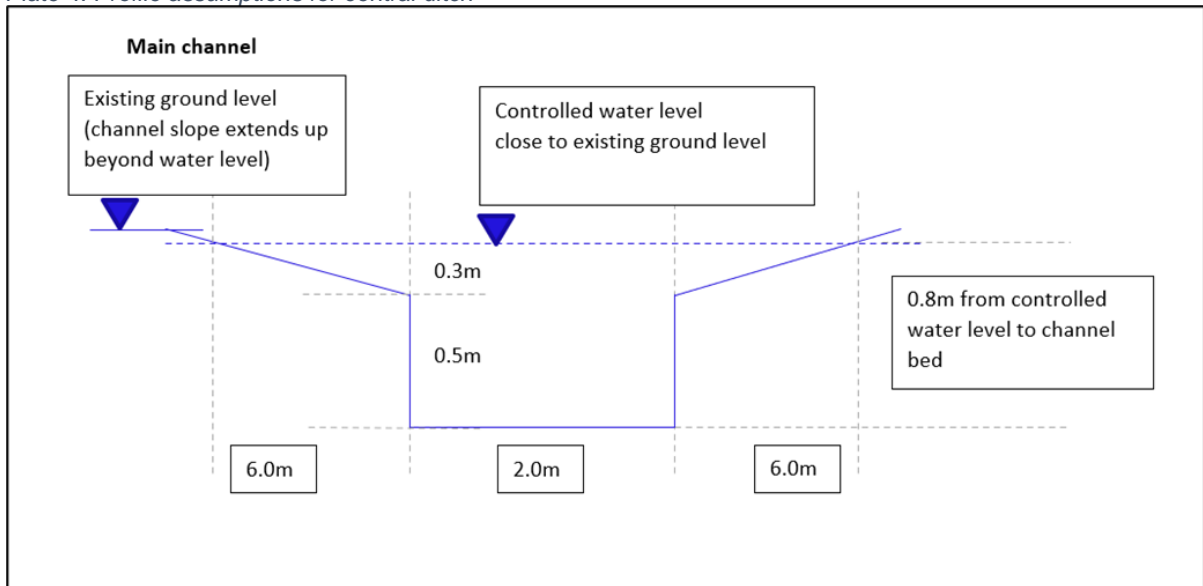
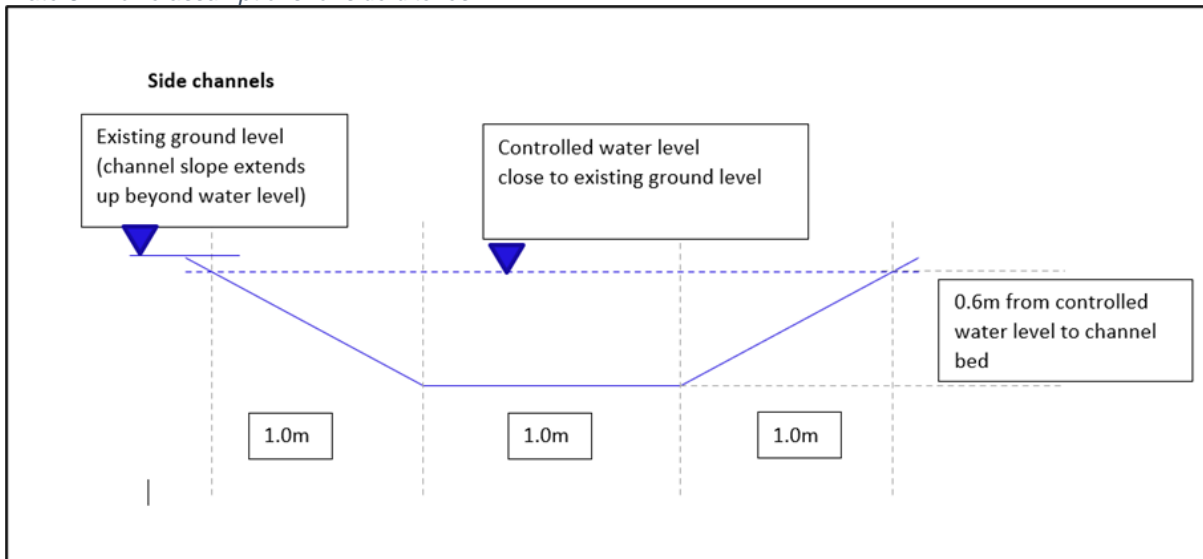


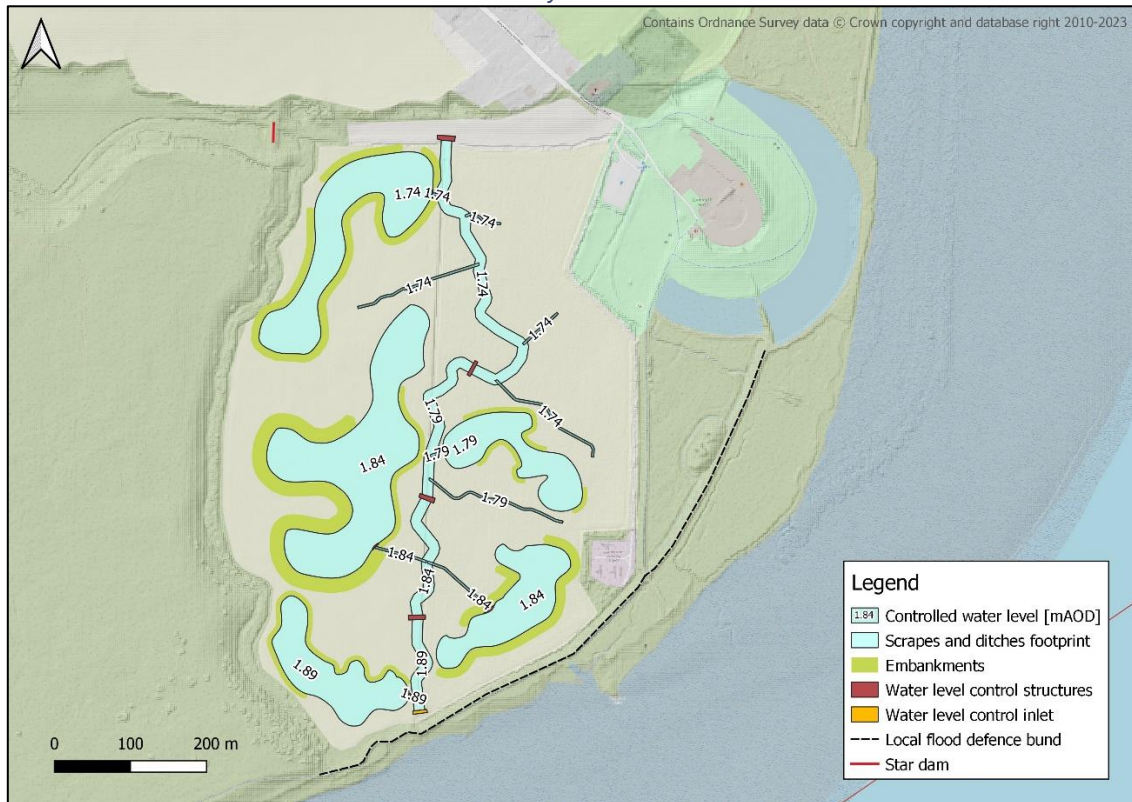
Plate 5: Profile assumptions for side ditches



The existing ground levels and requirement for water level control was reviewed to demonstrate that the scrapes and ditches can be established and appropriately managed in the long-term. The assumptions included being able to maintain water levels at near to ground level across the site (in light of detailed topographical survey information) and being able to facilitate partial drying of parts of the system to expose wet mud and encourage vegetation growth to provide foraging for target species.

Plate 6 presents the assumed water levels and water management structures to be able to manage water levels throughout the site.

Plate 6: Design assumptions for interconnections of ditches and scrapes and location of water level management system



Refinement of design assumptions for water demand

An updated estimate of the wetland water demand volumes was calculated assuming water levels would be at or near to ground level. Maximum water levels have been calculated to demonstrate that sufficient water can be delivered and secured through the DCO design. It may be desirable for some of the site to partially dry out. This could be achieved through release of water at the site's outfall from the central ditch at the northern boundary of the site and can be accommodated through the ongoing management of the wetland.

A simple annual water balance was produced with a monthly timestep to identify seasonal top up volume requirements and water level change if no top ups were possible. Monthly rainfall contribution (based on Met Office data for a rain gauge at Standford Le Hope monthly average rainfall totals 1991-2020) and Evaporation losses based on monthly mean evaporation for south-east England were calculated. An allowance for losses to ground due to infiltration was also included in the water balance.

Table 2 and *Table 3* show the water balance calculations for long term average rainfall and a dry summer. The results show that water demand will exceed natural (freshwater) supply in April, May, June, July and August (and September in a dry summer), but that the volumes are relatively small with peak demand being for only 9,580m³ in July of a dry summer.

Table 2 Monthly water balance for long term average rainfall

Month	Average Water Depth in Scrapes (m)	Average Depth in Central Ditch / Side Ditches (m)	Top Up Needed to Maintain Average Depths?	Top Up Vol (m³)	Average Daily Top Up Volume (m³/day)	Water Level Change with no Top Up (m)
January	0.5	0.8 / 0.6	No	-	-	+ 0.04
February	0.5	0.8 / 0.6	No	-	-	+0.03
March	0.3	0.7 / 0.5	No	-	-	+0.01
April	0.3	0.7 / 0.5	Yes	373	12	-0.004
May	0.3	0.7 / 0.5	Yes	1501	48	-0.017
June	0.3	0.7 / 0.5	Yes	3003	100	-0.033
July	0.1	0.7 / 0.5	Yes	2406	78	-0.027
August	0.1	0.7 / 0.5	Yes	2575	83	-0.029
September	0.1	0.7 / 0.5	No	-	-	+0.001
October	0.1	0.7 / 0.5	No	-	-	+0.03
November	0.3	0.8 / 0.6	No	-	-	+0.05
December	0.5	0.8 / 0.6	No	-	-	+0.05

Table 3 Monthly water balance for a dry summer scenario

Month	Target Average Water Depth in Scrapes (m)	Average Depth in Central Ditch / Side Ditches (m)	Top Up Needed to Maintain Average Depths?	Top Up Vol (m ³)	Average Daily Top Up Volume (m ³ /day)	Water Level Change with no Top Up (m)
January	0.5	0.8 / 0.6	No	-	-	+0.04
February	0.5	0.8 / 0.6	No	-	-	+0.03
March	0.3	0.7 / 0.5	No	-	-	+0.01
April	0.3	0.7 / 0.5	Yes	373	12	-0.004
May	0.3	0.7 / 0.5	Yes	2987	96	-0.033
June	0.3	0.7 / 0.5	Yes	6419	214	-0.071
July	0.1	0.7 / 0.5	Yes	9580	309	-0.106
August	0.1	0.7 / 0.5	Yes	9128	294	-0.101
September	0.1	0.7 / 0.5	Yes	2806	94	-0.031
October	0.1	0.7 / 0.5	No	-	-	+0.03
November	0.3	0.8 / 0.6	No	-	-	+0.05
December	0.5	0.8 / 0.6	No	-	-	+0.05

Refinement of design assumptions for the inflow capacity of the water inlet

Data from the TE2100 model of the River Thames has been used to understand the frequency at which tide levels would exceed the invert level of the proposed water inlet with self-regulating valve or equivalent structure (at 2m AOD). Tides above this level indicate the potential for water to flow into the created wetland features and meet any water demand. Calculations have also been completed to quantify the conveyance capacity of the proposed inlet and to approximate the time it would take to fill the wetland features based on this capacity.

Tidal water levels were extracted from the closest geographical node in the TE2100 model (East Tilbury Marshes) and an approximate Mean High Waters Spring (MHWS) tide cycle was calculated over a three day period. In this period water levels would exceed 2m AOD for a total duration of 24 hours. A spring tide occurs twice each lunar month, irrespective of season.

Based on an assumed 0.3m diameter inlet, it has been estimated that sufficient volume of flow through the inlet to fill the created wetland features to the desired water levels would be conveyed within approximately 50 hours. The system could therefore be filled from a dry state within two consecutive three-day MHWS tide cycles.

Refinement of design assumptions for the predicted outflows from the water inlet

The proposed water inlet pipe is designed to only allow water into the Coalhouse Point mitigation area. It has been modelled at 2mAOD and is higher than the proposed wetland at 1.89 to 1.74 AOD. Therefore it would not be possible for the newly created scrape and ditch system to drain below the design levels even if the water inlet self-regulating valve or equivalent was compromised and remained open for any period of time.

There are no specific design assumptions with respect of eels. Eels would be able to pass through the inlet when open at high tide, and although this is a one-way valve to allow inflow of water the system is not closed and eels would be able to exit the system as per the existing arrangement at Bow water sluice. There is no connection to any other water catchments in the system currently and this would remain the case with the proposed system at the Coalhouse point mitigation area.

Refinement of design assumptions for calculation of monthly water balance

Table 4 sets out the design assumptions with regard to the monthly requirement for water to maintain the controlled water levels set out in Plate 6 and the % of the month where high tide is greater than 2.0m AoD and therefore allow filling of the system to make up the shortfall in water capacity.

Table 4 Monthly water balance calculations

Month	Natural catchment (freshwater) worst case shortfall to fill all scrapes and ditches to capacity (m³)	% of month where high tide is above 2m AoD (which would allow filling)
January	0	20
February	0	20
March	0	20
April	267	20
May	2,794	20
June	4,889	20
July	5,500	20
August	4,714	20
September	1,222	20
October	0	20
November	0	20
December	0	20

Refinement of design assumptions for construction approach

The design assumptions for the construction of the self-regulating tidal gate or equivalent are as described in the Technical Note (Coalhouse Point Water Supply HE540039-LTC-EWE-S07-REP-ENV-00001_D01) shared with Natural England in July 2022.

In terms of the assessment potential disturbance, the HRA is clear that the construction

would have inconsequential effects due to the temporary nature of the works and so no refinement of construction assumptions would add to the refinement of the assessment of disturbance.

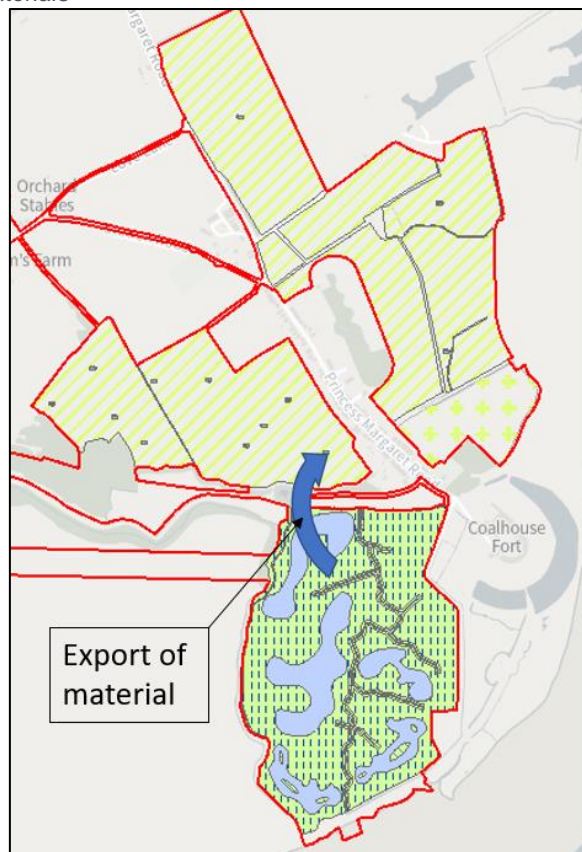
The materials balance for the excavation of the scrapes and ditches was calculated based upon the updated assumptions for the wetland design. Localised ground level raising would be required to deliver the wetland design to manage water levels and flood risk across the wetland site. In addition, excavated materials would be used to fill the existing watercourse alignment.

The construction of the wetland habitat is assumed to require the following plant over a 2-3 month period:

- Five excavators (one for each scrape and associated ditches)
- Ten 40-ton dumpers (two to service each excavator – one being loaded and one moving material)

Excavated material which is not accommodated within wetland habitat at Coalhouse Point would be retained and managed within the Order Limits as part of the overall balance of materials across the Project. For example to support the delivery of essential ecological mitigation areas to the north of the Coalhouse Point wetland area (see *Plate 7*).

Plate 7: Export of excess materials



The Outline Landscape and Ecology Management Plan ([APP-490](#)) management and monitoring prescriptions for the habitat at Coalhouse Point includes monitoring visits to check habitat suitability against the measures of success. Whilst these outline measures are not specifically related the water inlet the need to confirm that the water table is at or near the surface throughout the year will mean that the water inlet structure would also be

monitored as standard best practice to ensure that this would occur. The construction of the self-regulating tidal gate or equivalent will be carried out with a temporary footpath closure (The Two Forts Way) for the duration of the works. There is an alternative route option available, via the realigned South Coast Path.

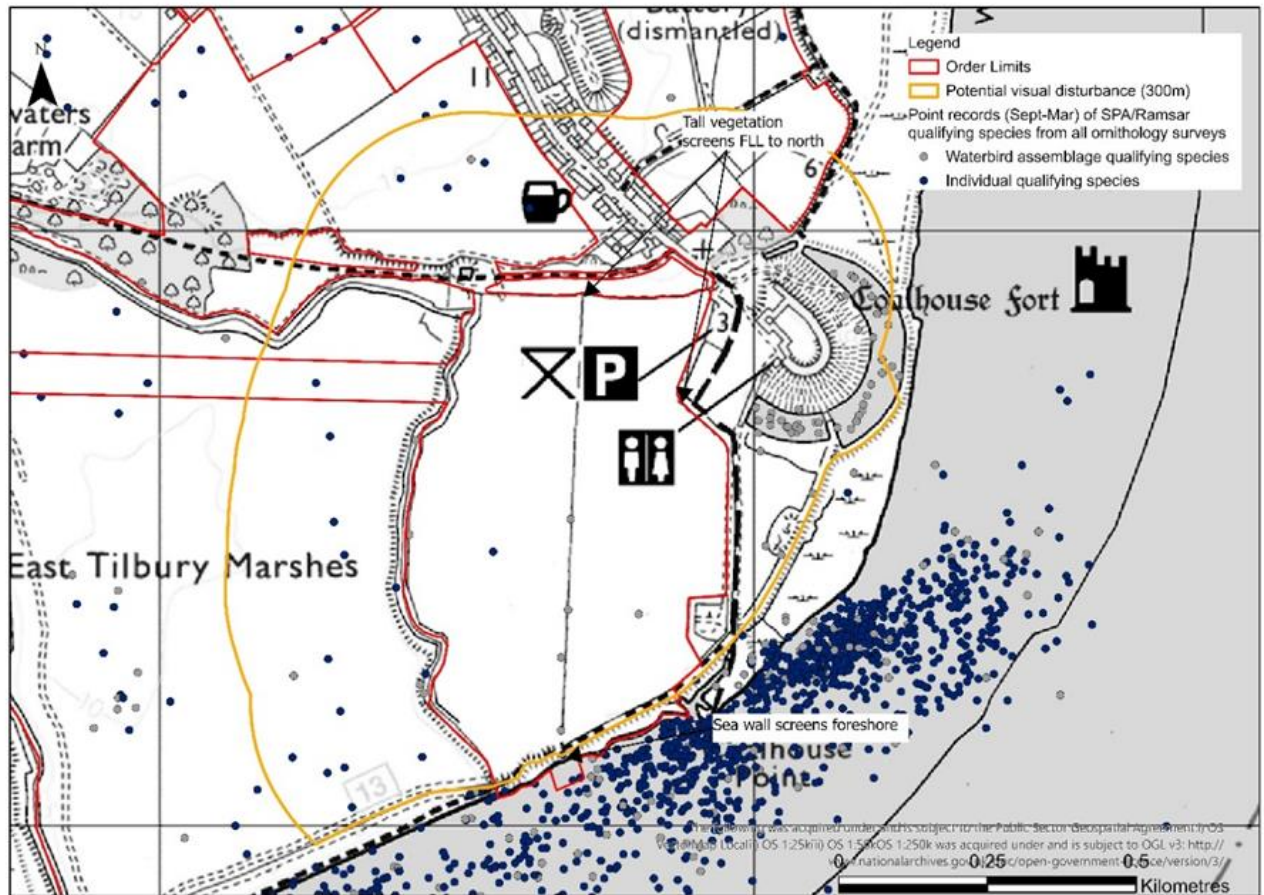
Assessment of potential disturbance from works

In response to Natural England's advice that work to create the habitat and construct the water inlet with self-regulating valve or equivalent structure should be seasonally constrained to avoid disturbance to birds from the Thames Estuary and Marshes SPA/Ramsar, we have further assessed the potential disturbance on a without prejudice basis.

The assessment of potential disturbance of the water inlet structure construction is within figures 18 and 26 and paragraphs 7.1.29 to 7.1.31 of the HRA. In summary because of the temporary nature of the works on the water inlet, and the tolerance of disturbance of the species present in significant numbers in the Zol, the effect would be inconsequential. This is despite the relatively large numbers of birds foraging on the foreshore mud, which is where the large majority of the qualifying features forage, albeit the highest concentrations are present in areas of mud outside the Zol in the abundant alternative habitat any displaced birds could move to.

Plate 8 below shows the distribution of qualifying and assemblage species records overlaying the habitat creation area and potential visual disturbance buffer (300m) for the habitat creation works.

Plate 8: Visual Disturbance ZOI overlaid with wintering and passage bird records



The ZOI of disturbance to SPA/Ramsar birds from the habitat creation works would not extend onto the foreshore mud as the sea defences would act as both a visual barrier between the works and the birds on the mud, and a noise attenuating feature that would prevent the disturbance thresholds being exceeded. Equally, birds using functionally linked land to the north and east of the works would be shielded from disturbance due to the taller vegetation surrounding the north and east boundaries of the habitat creation area.

The species recorded in the over winter and passage seasons within the ZOI of disturbance were, with the exception of lapwing, limited to the overwintering assemblage. *Table 5* sets out the peak counts recorded between September and March.

Table 5: Peak counts of qualifying features recorded (Sept-Mar) within the area affected by creation of the mitigation habitat

Species recorded	Individual/Assemblage QF	Peak count	Month peak count recorded	Potential % of Thames Estuary and Marshes SPA/Ramsar site
Lapwing	Individual QF	60	Feb	All contribute to Overwintering assemblage (see below)
Curlew	Assemblage	19	Dec	
Greylag goose	Assemblage	6	Sep	
Little egret	Assemblage	2	Dec	
Little grebe	Assemblage	14	Oct	
Mallard	Assemblage	19	Oct	
Shelduck	Assemblage	14	Dec	
Teal	Assemblage	34	Nov	

Species recorded	Individual/Assemblage QF	Peak count	Month peak count recorded	Potential % of Thames Estuary and Marshes SPA/Ramsar site
Total Overwintering assemblage		108	Sept-Mar	0.1%

The number of birds recorded within the theoretical disturbance ZOI of the habitat creation works are insignificant. The number of birds contributing to the overwintering assemblage does not exceed 1% of the SPA/Ramsar population of assemblage species. The lapwing peak count was above 1% of the SPA/Ramsar population, but it is a more ubiquitous species with very broad habitat usage. Given the land used by lapwing in the functionally linked land is primarily agricultural (which is abundant in the area), the birds are not using the affected areas exclusively but in conjunction with other agricultural areas within the functionally linked land and so the area within the ZOI would not be of significance for the support of the species in its own right. Additionally, the species using these areas are generally species with high tolerance of disturbance and/or use a wide range of habitats which are abundant in the area. It can be concluded therefore that no consequential impact would occur.

Response to Natural England advice in regard to the feasibility of Coalhouse Point proposals

SoCG

Item 2.1.4 (Matter agreed*): Natural England considers that the consultation on the mitigation requirements and the permitting of them has been constructive, and that the proposed mitigation is feasible, subject to the Environment Agency concluding that it is likely that the permits will be authorised at the appropriate time to facilitate the effective implementation of the mitigation.

LTC response: We continue to engage with the Environment Agency through the SoCG process.

Item 2.1.68 (Matter agreed*): Timing restrictions should be in place to ensure activities resulting in significant disturbance are undertaken outside sensitive periods of the year. This requirement should be included as part of the overall mitigation measures. Where, despite best efforts, this is not possible, additional mitigation measures may be required.

LTC response: Please see response to Relevant Representation NE04 below in regard to Coalhouse Point proposals.

Item 2.1.92 (Matter agreed*): Natural England agrees with the Appropriate Assessment conclusions, with the exception of those relating to air quality (see SoCG items 2.1.94 and 2.1.95), and the feasibility of the wetland at Coalhouse Point (see SoCG item 2.1.93). Natural England is continuing to hold constructive discussions with National Highways on these matters.

LTC response (Matter under discussion): Please see responses to SoCG item 2.1.93 and Relevant Representation NE04 below.

Item 2.1.93: Natural England agrees that the functionally linked land mitigation at Coalhouse Point is feasible and would provide appropriate mitigation. Natural England sought clarity from specialists about the wording of the proposed REAC commitments HR010 and HR011 in relation to the necessary supply of water from the Thames for wetland creation and provided further advice to National Highways on 09.02.2023 and 24.05.2023. Natural England is confident that agreement on this matter can be achieved within Examination timeframes.

LTC response: A suitable supply of water from the Thames is secured through REAC

commitment HR010 by means of a water inlet with self-regulating valve or equivalent structure, constructed in the sea wall. Although other potential sources of water from the Thames are still being investigated, the DCO would provide the ability to source suitable quantities of Thames water irrespective of the potential for any alternative sources. Therefore, the feasibility of implementing the mitigation's water supply is secured. The refinement of the design assumptions, water demand and capacity of supply from the inlet (as described above) demonstrate that the secured inlet will provide an adequate supply of suitable water to establish and maintain suitable conditions in the habitats of the mitigation.

The consideration of potential alternative sources of Thames water will continue through detailed design and if an alternative source is demonstrated to provide sufficient quantities and is preferential to the secured inlet source, this would be consulted on and proposed during the secondary consenting process, requiring consultation with Natural England and approval from the Secretary of State.

Relevant Representation NE04

Natural England considers that the construction of the project will cause a range of disturbance effects to the bird features of the Thames Estuary and Marshes SPA. National Highways has provided a Technical Note to Natural England regarding the mitigation proposed to address disturbance to SPA birds using functionally linked land in the vicinity of the north portal (including the intertidal zone). These works are proposed at Coalhouse Point, to create wetland habitat. Additional works are proposed near the south portal. Whilst we agree that these works are feasible and would provide appropriate mitigation, we continue to review the proposed REAC commitments HR010 & HR011.

Natural England agrees that these works are feasible and form appropriate mitigation (in type and scale). However, we understand that although their creation could cause disturbance, no commitment to seasonal avoidance has been made (see HRA para 7.1.28)

Natural England advise that the creation of the wetland habitat and installation of the regulated tidal exchange structure (if pursued in the absence of water secured via the Coalhouse Fort moat) should commit to avoiding the winter bird season (September – March) via a REAC commitment.

Natural England recommends that seasonal avoidance restrictions should also apply to the wetland habitat creation and tidal exchange structure installation.

LTC response:

With regard to disturbance and potential need for seasonal constraints we have undertaken further assessment of the potential for the habitat creation on a without prejudice basis (see above). Paragraph 7.1.28 of the HRA states that any disturbance from the construction of the water inlet structure, if works were undertaken in the winter or passage seasons, would be inconsequential. The further work (see above) also demonstrates that disturbance from the habitat creation works would also be inconsequential. This demonstrates that there would be no consequential disturbance of birds from the Thames Estuary and Marshes SPA/Ramsar from the works irrespective of whether the works were carried out in the winter or passage seasons.

It is therefore not appropriate to constrain the works seasonally as it is ecologically preferable to create the habitat for all the target features as soon as practicable than to delay the habitat creation to fully avoid inconsequential impacts of the works on just one of the target features.

Emailed advice 9 February 2023

Natural England is satisfied in principle these works are feasible and would provide appropriate mitigation (as per the SoCG). There are matters of detailed design of course to follow (a few headlines are captured below, from our review of the Technical Note by our specialist). The SoCG on this notes that NE is reviewing the REAC commitments HR010 & HR011.

Looking at these draft commitments, I cannot see any reference to seasonal timing restrictions for installation works for the regulated tidal exchange structure. As these works are estimated at 3 months, and are close to significant aggregations of wintering birds, seasonal avoidance seems appropriate. The same applies (but I suggest to a lesser degree) for the wetland creation itself. I note para 7.1.28 within the HRA / AA touches on this, but the Project does not seem to have translated that aspiration into a REAC commitment. We would like to understand the rationale for this, if that is the intention.

HEADLINE FEEDBACK FROM TECHNICAL NOTE

- What volume of water is needed to achieve required habitats? This informs the workings out behind the proposed use of the 600mm pipe. The available tidal window is also relevant here.
- The TN draws off a September tidal cycle. This is one of the biggest Spring tide cycles of the year, so it would be good to confirm you can achieve sufficient water supply off the tide on a smaller Spring cycle. We suggest also modelling using June (for breeding birds) and a winter month with reference to SPA concerns.
- As above, for the installation a summer window is recommended not just for avoidance reasons, but also daylight and less pronounced tidal range, probably focussing on neaps. We think the works could be achieved in less than the 12 weeks identified.
- With respect to eels, is there an internal connection to a freshwater system for this to work?
- We agree silting up should not be a worry, but checks for debris jamming should still be carried out.
- Can you confirm that temporary closure of the footpath is possible (presumably via Thurrock Council) to enable works to be undertaken?
- Further advice can be provided at a later point to maximise efficiency via on site design as a mitigation site.

LTC response:

With regard to REAC commitments HR010 & HR011, please see above response to the SoCG item.

With regard to seasonal timing restrictions for installation works for the regulated tidal exchange structure, please see above response to the Relevant Representation.

With regard to volumes of water required, the refined assumptions above demonstrate that the inlet structure will provide more than adequate supply to maintain levels and salinities in all months of the year. The refined assumptions also include an analysis of monthly water demand and supply.

With regard to eels, there are no specific design assumptions with respect of eels. Eels would be able to use pass through the inlet when open at high tide, and although this is a one-way flap valve to allow inflow of water, the system is not closed and eels could be able to exit the system, as per the existing arrangement, at Bowater sluice. There is no connection to any other catchments in this system currently and this would remain the case with the proposed scrape and ditch system at the Coalhouse Point mitigation area.

With regard to silting and checks for jamming, the Outline Landscape and Ecology Management Plan ([APP-490](#)) management and monitoring prescriptions for the habitat at Coalhouse Point includes monitoring visits to check habitat suitability against the measures of success. Whilst these outline measures are not specifically related to the water inlet, the need to confirm that the water table is at or near the surface throughout the year will mean that the water inlet structure would also be monitored as standard best practice to ensure that this would occur.

With regard to the temporary closure of the footpath, the construction of the self-regulating tidal gate or equivalent will be completed with a temporary footpath closure (The Two Forts Way) for the duration of the works.

With regard to further advice at a later point, the stakeholder landscape and ecology working group and the oLEMP environmental Advisory Group will be suitable forums to consider further advice during and after award of the DCO.

Emailed advice 24 May 2023

In the eventuality of the RTE structure being used, the effect on the hydrological system needs to be considered carefully. NE has reported evidence of saline lagoon species in this system which require a delicate balance of salinity gradients in order to create optimal conditions. Whilst an RTE could helpfully create an inlet for creating and maintaining wet conditions using river water, there is a risk that the RTE could also form an outlet, thus starving the system of its brackish through-put. Assurances that the system adopted can maintain the routing of river water through the ditch system here (as illustrated on slide 21) would be welcome to maintain the integrity of the conditions.

Drawdown of the proposed scrapes over the summer months when the tides are not big enough to reach the RTE is to be expected. Being able to keep at least some of the scrapes topped up until late-June would be ideal for breeding birds (this is also relevant in the context of the 'open water and its margins' pSSSI breeding bird assemblage discussed recently). Drying scrapes over the rest of the Summer until the September tides may be beneficial for the scrape bed to become colonised by species such as sea spurrey, whose seeds become useful duck food when the scrape re-hydrates in the Autumn. The scrapes are likely to have plenty of invertebrates for both surface feeding and shallow probing waders.

As a rule of thumb, the more water in the scrapes the better, aiming for half the site with standing water after a topping tide. Therefore, a few more extensive waterbodies than the plan suggests would be beneficial to ensure sufficient retained water, however generally the plan looks good. The diameter of the RTE pipe(s) and the energy of the water flow in and out will be one constraint needed to model in. For this reason, the use of two pipes for maximum flow over the top of the tide period could be considered.

In terms of site preparation, disturbance of the ground could usefully activate the seed-bed to generate useful plant cover.

LTC response:

The water inlet with self-regulating valve or equivalent structure would not act as an outlet as the structure would only allow flow into the area and not out from it.

REAC commitment HR010 states "the water required to maintain a range of depths within the habitat consistent with the guidance in "Manage lowland wet grassland for birds" (DEFRA 2021) will be secured" and the water inlet will allow regulated tidal exchange. These elements of the REAC commitment secure the design of the inlet to be functional to maintain

required levels and regulated, and not act as a drain on the system.

The refinement of the design assumptions, water demand and capacity of supply from the inlet (as described above) demonstrate that the secured inlet will provide an adequate supply of suitable river water to maintain a range of depths across the site at different times of the year and maintain a range of salinities. The capacity of the water inlet would be far in excess of the water demand to keep the entire site fully 'topped up' with water all year, including when there would be a deficit without the inlet in the summer months. The water demand and inlet capacity calculations show that the amount of water to maintain all scrapes and ditches at full depth is relatively small and only in the summer months. This small demand for water volume would be greatly exceeded by the capacity of the water inlet and so there would be sufficient river water available to 'flush' the system if the freshwater source from rainwater were to reduce salinities. There is certainty therefore that the management of required volumes and salinity gradients would both be feasible.

The refined design assumptions demonstrate that the hydrological system will be capable of maintaining water volumes and salinity gradients at different times of the year in different areas. The assumptions show that a series of water level control structures (e.g. weirs or sluices) could maintain at least four hydrological sub units (with both scrapes and ditches) within the site that could be filled, drained, or flushed independently at different times of the year. This means that it is certain that management could maintain a range of water depths in different scrapes to support the range of species for which the mitigation is targeted.

The management prescriptions will be developed as part of detailed design and in consultation with Natural England. Those prescriptions can target specific areas and specific times of the year for specific water depths and/or salinities. The design assumptions and water demand calculations have demonstrated that any water management prescriptions likely to emerge from the detailed design, including Natural England's advice, could be accommodated with the flexibility of water supply and management structures.

The design assumptions and water demand calculations have demonstrated that the proposed outline design would provide a suitable range of conditions for birds from the Thames Estuary and Marshes SPA/Ramsar and invertebrates. The range of conditions would also benefit the other features of the pSSSI (e.g. the breeding bird assemblage). During detailed design, it will be possible to consider the relative cover of different target habitats as part of finalising the establishment and management prescriptions. It may be that a greater area of scrape may be the final agreed design, but equally it may be that a greater length of ditches may be agreed for the final design. The final design will need to balance the needs of the range of target features as well as views of stakeholders on priorities. For consenting purposes however, the DCO application provides certainty that the necessary conditions and management capabilities to achieve whatever specific targets are agreed in the detailed design stage can be achieved.

Site preparation prescriptions would also be a matter for detailed design, including the potential use of natural regeneration from existing seed sources.

Lower Thames Crossing Acid grassland compensation proposals

Author: Nick Clark

Purpose

The purpose of this technical note is to address an issue raised by Natural England in their Relevant Representations for Lower Thames Crossing. Key Issue Ref. NE23, in Table 2.7, details questions around the assessment of, and compensation for, impacts to acid grassland as a result of the Project. These are addressed below.

Assessment of Project impacts on acid grassland

No acid grassland has been recorded within the Project zone of influence south of the River Thames. North of the River Thames, in Essex, this ecological receptor was valued at a County level of importance. Although this habitat is listed as 'lowland dry acid grassland' habitat of principal importance in line with the requirements of section 41 of the NERC Act 2006, the total area within the Project zone of influence (2.34ha) was considered in relation to the wider resource within Essex which Natural England reports as being "between 100 and 500ha, possibly more"⁴⁶. This represented between 0.5 – 2.0% of the county resource of acid grassland being within the zone of influence of the Project. It is therefore considered that the habitat is likely to appreciably enrich the habitat resource at a county level and provide habitat features that are of importance for migration, dispersal and genetic exchange of species and therefore meets the DMRB (Highways England, 2020a) criteria for being of County importance, as outlined in 6.1 Environmental Statement Chapter 8: Terrestrial Biodiversity [Application Document [APP-146](#)], Table 8.5.

Adverse effects on acid grassland are reported in 6.1 Environmental Statement Chapter 8: Terrestrial Biodiversity [Application Document [APP-146](#)], specifically Table 8.35 Habitat losses and gains associated with the Project to the north of the River Thames, and in paragraph 8.6.267. These show a combined total loss of acid grassland of 0.53ha from Low Street Pit Local Wildlife Site (LWS) and Blackshots Nature Area LWS. However, this has been identified as inconsistent with the figures presented within 6.3 Environmental Statement - Appendix 8.21 - Biodiversity Metric Calculations [Application Document [APP-417](#)], and is therefore an error which will be picked up in the errata log. The accurate figures for loss of acid grassland as a result of the Project are presented in Table 1 below:

Table 1: Location and area of acid grassland lost as a result of the Project

Location of acid grassland loss	Area of acid grassland loss
Low Street Pit LWS	0.61 ha
Blackshots Nature Area LWS	0.17 ha
Mucking Heath LWS	0.36 ha
TOTAL	1.14 ha

Compensation for Project impacts

Table 8.35 and paragraph 8.6.267 in 6.1 Environmental Statement Chapter 8: Terrestrial Biodiversity [Application Document [APP-146](#)], report the extent of acid grassland habitat

⁴⁶ Natural England publications. 13: Essex. <https://publications.naturalengland.org.uk/file/73005>. Accessed 17/05/23.

creation proposed to compensate for this loss: 5.03ha of habitat provision located in the south of a 42ha ecological mitigation area north of Coalhouse Fort which includes the creation of open mosaic habitat. The location of this habitat creation is reported in 6.2 Environmental Statement - Figure 2.4 - Environmental Masterplan Section9 (5 of 10) [Application Documents [APP-163](#)], sheets 18, 21, and 22. For ease of reference these are reproduced below in Plates 1 and 2. The creation and long-term management of this area is reported in 6.7 Outline Landscape and Ecology Management Plan [**Application Document [APP-490](#)**], section 6.4, with section 8.22 covering open mosaic habitats, and 8.27 covering acid grassland creation. Acid grassland creation includes the proposal to salvage viable soils from those areas of habitat loss and use them to inoculate the proposed acid grassland habitat creation area.

Natural England Relevant Representation on acid grassland

Natural England, in their Relevant Representation Key Issue Ref. NE23, highlight a concern around the potential success of the proposed acid grassland creation within the area shown in Plate 2. The importance of the underlying “Thames Terrace Gravel” is also in relation to Low Street Pit LWS. As a result, further consideration of the location and extent of this proposal has been undertaken.

A key consideration of the viability of a site to create acid grassland is soil pH. As detailed in 6.2 Environmental Statement - Figure 10.2 - Soil Scape Mapping [**Application Document [APP-300](#)**], page 4 of 6 shows soil pH within the area north of Coalhouse Fort. This is reproduced below in Plate 3. The information shows that the area identified for acid grassland creation has a mix of free draining slightly acidic soils, and loamy/clayey soils of coastal and floodplain environments. This is similar to the Low Street Pit site which is the principal area of acid grassland affected by the Project and therefore the main source of soil salvaged for the area of acid grassland creation north of Coalhouse Fort. However, the predominant soil type at Low Street Pit LWS is free draining slightly acidic soils whereas at the proposed acid grassland creation site, the predominant soil type is loamy and clayey soils of coastal flats.

With respect to the underlying superficial deposits within this area, 6.2 Environmental Statement - Figure 10.6 - Superficial Deposits [**Application Document [APP-304](#)**], reports this information. This is reproduced below in Plate 4. This shows Low Street Pit LWS as having superficial deposits of Taplow gravel member, HEAD deposits, and alluvium. All three of these deposits are present within the acid grassland creation area and, within the wider ecological mitigation area, there is the additional Lynch Hill gravel member.

Regarding the suitability of the ecological mitigation area to support acid grassland creation, the area's underlying superficial deposits and the existing soil pH is a close match to the main site of acid grassland impact at Low Street Pit LWS. This is understandable given the proximity of the two areas, being within 1km at their closest point. The underlying superficial deposits across the ecological mitigation area should support similar free draining grassland to those found at Low Street Pit LWS. In terms of the location for acid grassland creation within the wider ecological mitigation area, the north appears a closer match in terms of soil pH than the south; the north being predominantly free draining slightly acid loamy soils rather than the mix of soil types found further south.

The southern area is separated from the wider ecological mitigation area by the presence of a mature hedgerow running west - east across the site, which has the potential to constrain the nature spread of acid grassland species. Such a constrain is not present at the northern end of the ecological mitigation area which could then allow the natural colonisation of a larger proportion of this area by acid grassland species. Although, in theory, the area of open mosaic habitat would decrease should the area of acid grassland increase, it is considered

that the two habitats are complementary, both having the potential to support important assemblages of vascular plant and terrestrial invertebrate species. Any slight shift in the proportion of acid grassland to open mosaic habitat in this ecological mitigation area, or across the Project as a whole, is considered inconsequential.

It is therefore proposed that the acid grassland creation site which is currently located to the south of the ecological mitigation area be moved to the northern area (see Plate 5 for indicative location / extent), with open mosaic habitat replacing the acid grassland creation in the south. Overall there would be no significant change in the provision of these habitats as detailed within 6.1 Environmental Statement Chapter 8: Terrestrial Biodiversity [**Application Document APP-146**], although the provisions of 6.7 Outline Landscape and Ecology Management Plan [**Application Document APP-490**], would allow for changes in management of these two habitat typologies within this area to maximise its biodiversity value.

Hydrogeological conditions

Recent discussions during the fortnightly meetings held between the Project and Natural England have included a concern raised by Natural England regarding the hydrogeological conditions of the ecological mitigation area, specifically whether ground water levels may be too high to support the acid grassland and open mosaic habitats proposed for this site. The Project's hydrogeology team has considered this concern and their conclusions are presented below.

There is no available Project-specific ground investigation data available to assess groundwater levels. However, limited historical boreholes and British Geological Survey mapping, supported by a review of historical aerial imagery (Google Earth) show no widespread evidence of shallow groundwater levels such as would be evidenced by numerous small ponds or an extensive network of ditches within the area. Extensive dark patches of vegetation within the area, which would indicate shallow groundwater levels, are also absent from historic aerial imagery.

Available topographical elevation information comprises Ordnance Survey maps which show approximately half of the study area, on the western side as above 5mAOD, rising to a maximum of 13mOAD. Here the British Geological Survey published geology comprises river terrace gravels and the ground would be expected to be well drained. The remainder of the study area is mapped as between less than 5mAOD but there is no ground shown at 0mAOD or less within the ecological mitigation area. Here the British Geological Survey published geology comprises alluvium over sands and gravels. The limited historical water level records include confirmation that the sands and gravels that lie beneath the Alluvium are confined by the Alluvium. Combined with the lack of evidence for presence of water logging shown by the aerial imagery, it is a fair assessment, based on the available information, that wet ground conditions due to shallow groundwater would not be expected within the ecological mitigation area, and that groundwater levels would therefore not be a constraint in terms of creating the target acid grassland and open mosaic habitats.

Plate 1: Ecological mitigation area north of Coalhouse Fort (shaded grey).

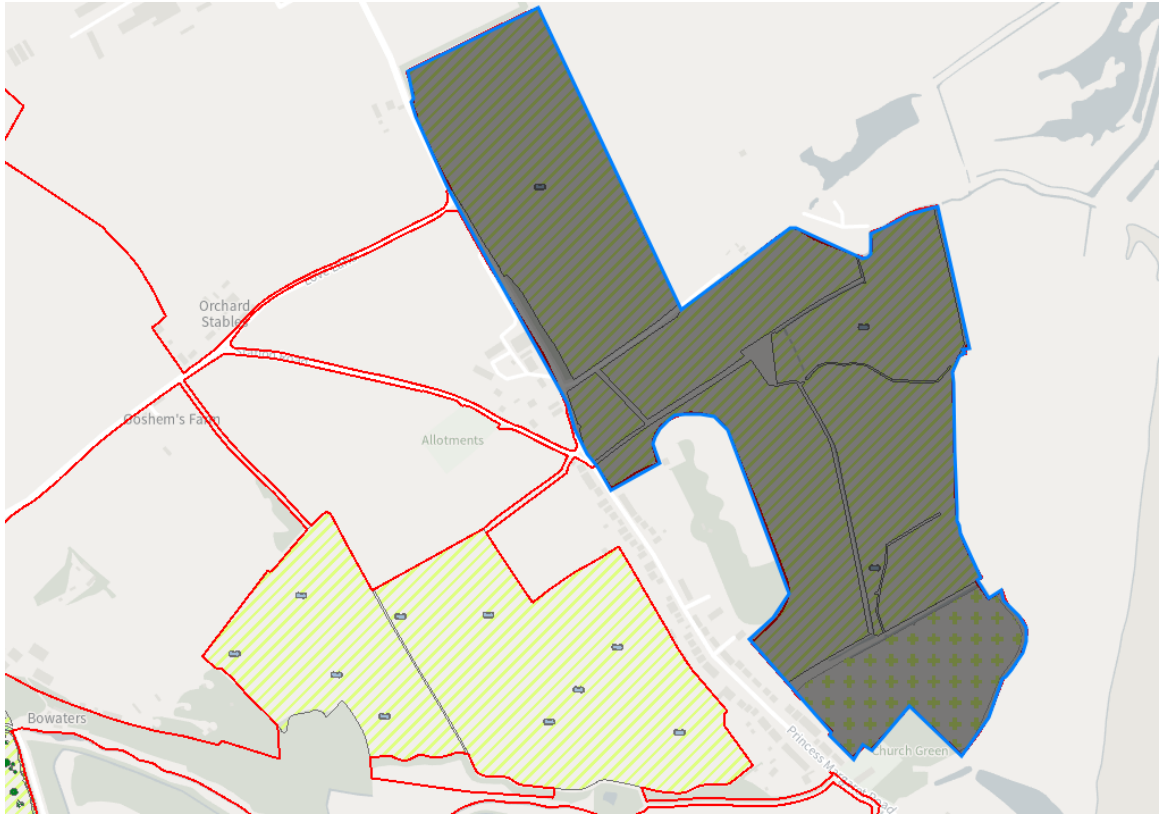


Plate 2: Area of acid grassland habitat creation north of Coalhouse Fort (shaded grey). The rest of the ecological mitigation area is proposed for open mosaic habitat creation.

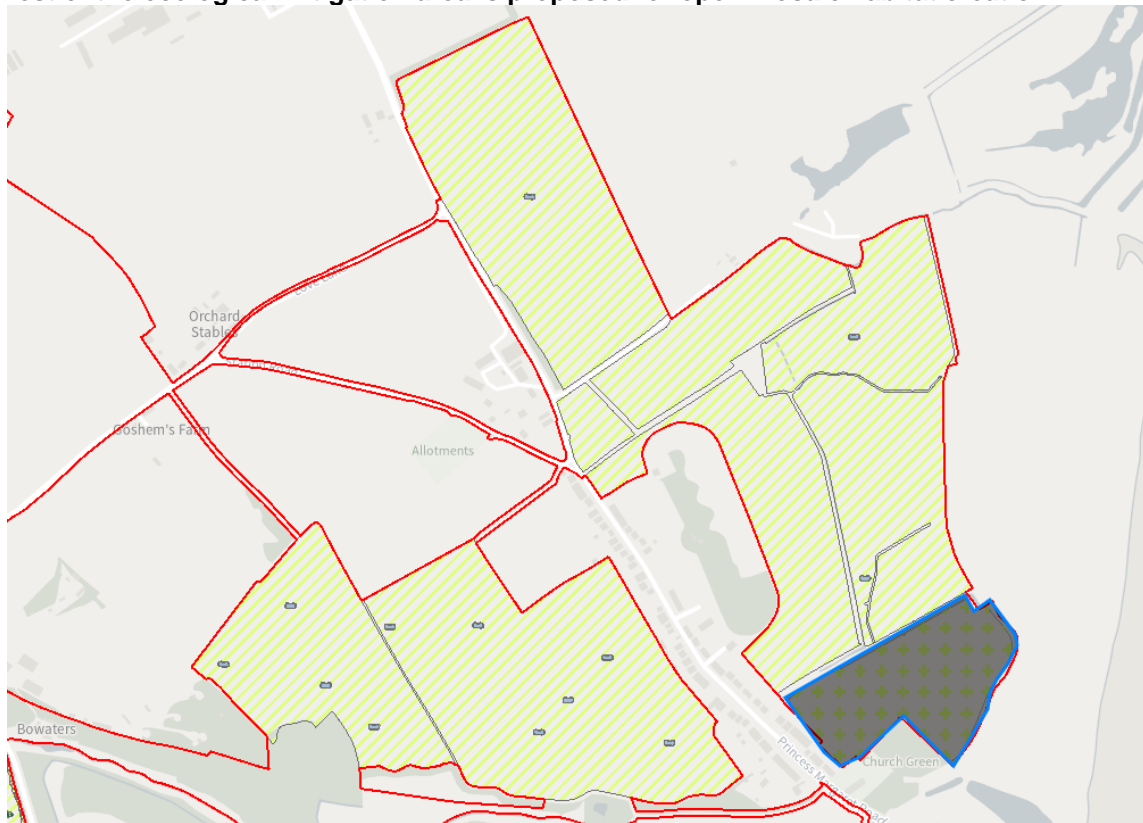
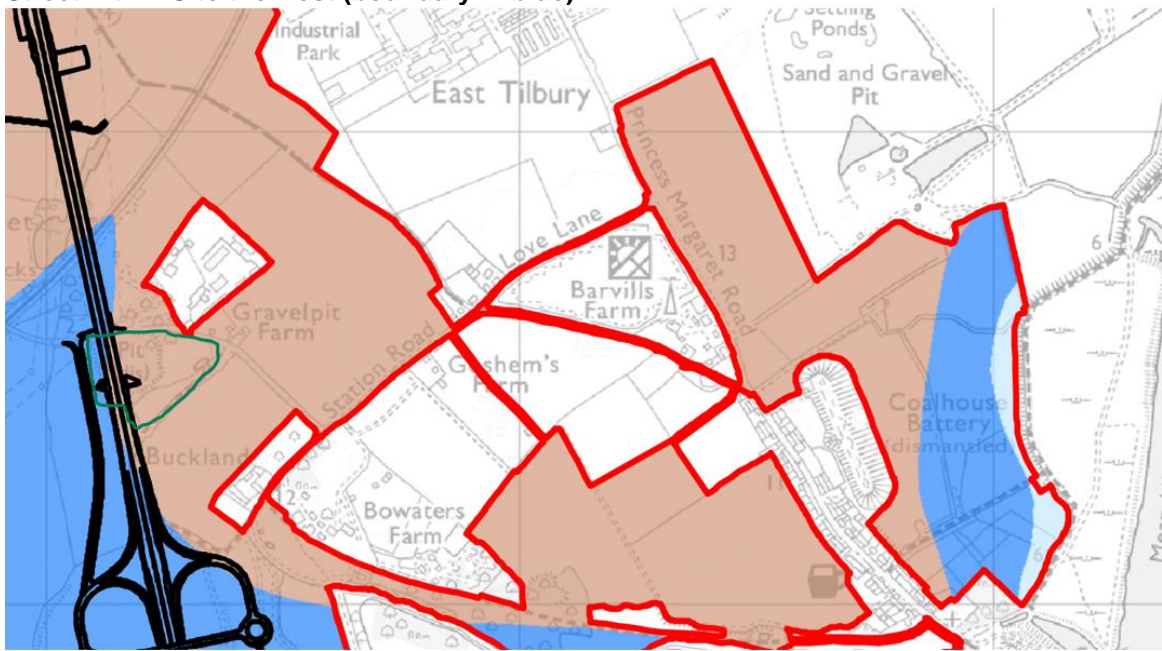


Plate 3: Soil scape mapping of ecological mitigation land north of Coalhouse Fort and Low Street Pit LWS to the west (boundary in blue).

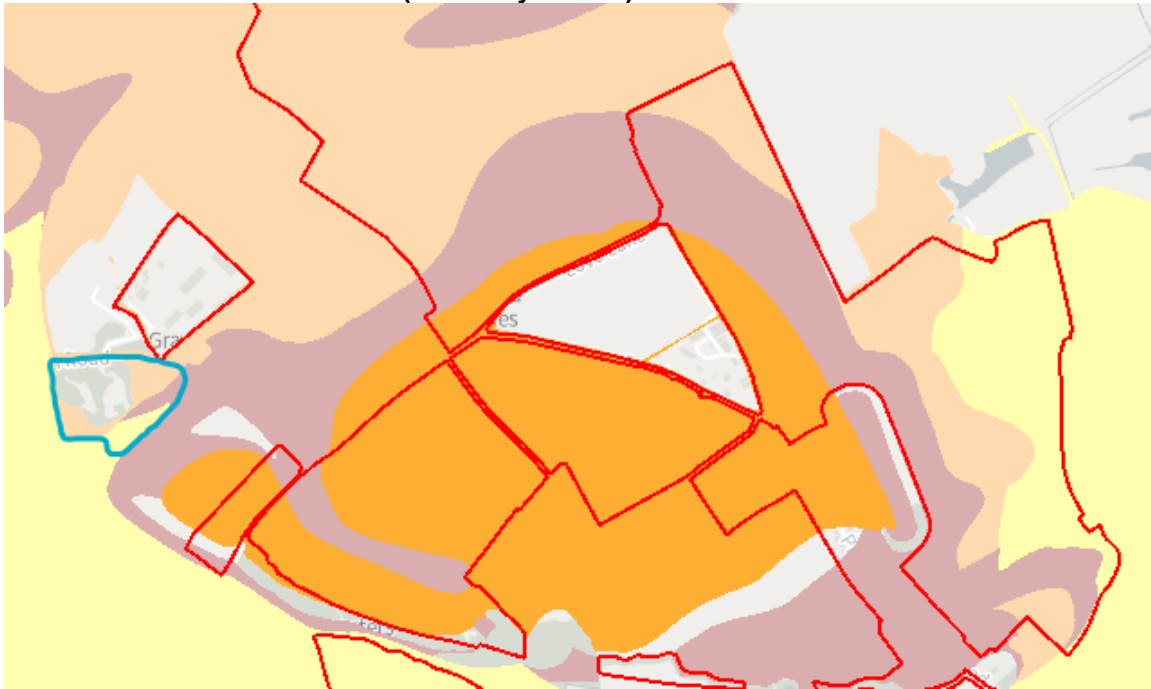


Pink: Free draining slightly acidic loamy soils.

Blue: Loamy and clayey soils of coastal flats with naturally high groundwater.

Light blue: Loamy and clayey floodplain soils with naturally high groundwater.

Plate 4: Superficial deposit mapping of ecological mitigation land north of Coalhouse Fort and Low Street Pit LWS to the west (boundary in blue).



**Peach: Taplow gravel member – sand and gravel.
Purple: HEAD – clay, silt, sand and gravel.
Orange: Lynch Hill gravel member – sand and gravel.
Yellow: Alluvium – clay, silt, sand and peat**

Plate 5: Proposed relocation of acid grassland creation within ecological mitigation area to align more closely to the underlying conditions within Low Street Pit LWS (position indicative within the north of the area)

