highways england

Lower Thames Crossing

Environmental Impacts Update

Supplementary consultation 2020

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1. Introduction

As part of our statutory consultation in 2018, we produced a Preliminary Environmental Information Report (PEIR). This provided the public, statutory consultees and other stakeholders with preliminary information about the project's likely significant environmental effects, and the measures being considered to avoid or minimise them. A copy of the PEIR can be found online at https://highwaysengland.citizenspace.com/ltc/consultation/

We are now proposing a number of changes to the project, as outlined in the Changes to the Route in chapter 3 in our Guide to Supplementary Consultation and the Utilities Update. This includes proposed alterations to the design of the route and its junctions, and to the diversion of utilities. We are also proposing related changes to the development boundary.

In this document we have set out our current understanding of how these changes affect the preliminary environmental information that was presented in our 2018 PEIR.

Further assessments and the development of detailed measures to reduce environmental effects are ongoing as part of our Environmental Impact Assessment (EIA). These will be reported in the Environmental Statement (ES), which will also be informed by the project's consideration of consultation responses, and further survey and design work. The ES will be submitted as part of the Development Consent Order (DCO) application later this year.

We are continuing to work with stakeholders and statutory consultees to develop our design, so we can maximise the benefits and minimise environmental impacts wherever possible.

Update on the environmental effects associated with the proposed changes

The following tables provide an update on the environmental effects associated with the proposed changes, compared with those considered in the PEIR. The PEIR, undertaken in 2018, contains an assessment of the project as a whole at that time. As this document identifies how the previous assessment is affected as a result of the proposed changes, they are more location specific, as compared to the PEIR.

The assessment here follows the methodology presented in the PEIR. Where a section is not discussed, the environmental effects should be considered similar to those reported within the PEIR. Anyone who wishes to find out more about our preliminary environmental assessment of the effects of the Lower Thames Crossing should read the PEIR in conjunction with this document.

Note: In this document we refer to receptors, A receptor is a component of the environment which would potentially be impacted directly by the proposed project. Examples include water bodies, sensitive sites, schools and soils.

Have your say

To comment on the environmental impacts of the changes and how we plan to reduce them, answer question four in the response form

2. Changes to the route

1. Narrowing of the M2/A2 corridor through the Kent Downs Area of Outstanding Natural Beauty (AONB) and Shorne Woods Country Park

At statutory consultation our project required a greater amount of land to be taken on either side of the existing road. Where possible, we have reduced the width of lane four on both M2 carriageways, as well as the central reservation, to minimise the footprint of the road through the Kent Downs AONB. The hard shoulder has also been removed from the eastbound link road along the A2. This table reports on the narrowing of the road footprint but not the space required for utilities, which is described in subsequent tables.

Expected effects	What we are doing and why
Air quality **Construction:** Section 6.6.3 – 6.6.7 of the PEIR is unaffected by this change. The construction phase of the project has the potential to affect air quality because of dust emissions and the emissions from non-road mobile machinery, and construction vehicle movements by road, river and rail. With mitigation in place, there should be no significant adverse impacts arising from dust emissions or associated with non-road mobile machinery. **Operation:** Based on the size of this change and the distance between receptors and the road, this is not expected to change the adverse air quality effects reported in the PEIR.	Mitigation measures would be incorporated as set out in the PEIR. Construction vehicle modelling is being undertaken to identify whether there would be any adverse effects associated with construction vehicle movements. This will be reported in the ES and any further mitigation measures will be identified.

Expected effects	What we are doing and why
Noise and vibration **Construction:** We do not expect there to be material differences to the potential construction works noise effects as described in the PEIR. **Operation:** We do not expect there to be material differences to the potential road traffic noise effects as described in the PEIR.	Construction effects would be controlled through the code of construction practice (CoCP) and a Construction Environmental Management Plan (CEMP). As set out in the PEIR, best practical means would be followed (detailed in Table 13.15). Potential operational mitigation measures described in the PEIR would remain appropriate and would be incorporated into the design where necessary. With regard to both construction and operational effects associated with the project, noise and vibration continues to be assessed and considered. These will be reported in full in the ES.
Cultural heritage **Construction:** As a result of this change there would be removal of all vegetation from the central reservation and construction activity, which would cause additional adverse effects, compared with those in the PEIR, to grade II* registered Cobham Hall park and garden due to the change to setting affecting the asset's significance. This is because the increase in vegetation removal would be likely to increase visibility of the HS1/A2 corridor and construction activity from the park, and in views from the north (Shorne Ridge) looking south towards the park (without the screen of central reserve trees). **Operation:** As a result of this change there would be an increase in tree removal, which would increase visibility of the HS1/A2 corridor from the park and in views from the north (Shorne Ridge) looking south towards the park (without the screen of central reserve trees). This would be a marginal worsening of the effect reported in the PEIR.	The mitigation for cultural heritage is described in the Landscape and visual row of this table.

Expected effects	What we are doing and why
Landscape and visual **Construction:** The nature of the effects would be similar to those reported in the PEIR; a major negative landscape change and moderate to major negative change in the view for a range of visual receptors. Construction activities would continue to encroach into the treed landscape of the A2/HS1 transport corridor, both within the AONB and within its setting. The tree removal, in combination with construction activities, would result in a clearly evident widening of the infrastructure corridor, greater physical and visual severance and further isolating Shorne Woods Country Park to the north from Cobham Hall parkland/Ashenbank Woods to the south. The vegetation removal would increase visibility of HS1 and the widened A2 corridor, with construction activity a prominent feature of views within and immediately adjacent to the corridor for users crossing the A2 at Thong Lane, Brewers Road and at Park Pale. This would also include views from vantage points within the immediate landscape, particularly from the south at the north edges of Ashenbank Woods and Cobham Hall Park.	Mitigation proposals continue to reflect those outlined in the PEIR. This includes development of woodland mitigation planting to replace trees and screening. A full assessment will be included in the ES supported by representative photo realistic visualisations (photomontages).

Expected effects	What we are doing and why
Operation: The nature of the effects would be similar to those reported in the PEIR; a major negative change for landscape and moderate to major change in the view for a range of visual receptors. The associated loss of important established mature trees and HS1 mitigation planting, would result in a major alteration in the scale and rural appearance of the A2 corridor through the AONB. The loss of the important trees and the HS1 mitigation planting would also result in greater physical severance between the landscapes on either side of the A2, as well as a reduction in the containment of the road infrastructure, such as gantries, signs and street lighting, resulting in the A2 and HS1 corridor having a greater presence in the adjacent rural landscape. Visual receptors crossing the A2 corridor at Thong Lane, Brewers Road and Park Pale would experience a completely different scale of road corridor, where the loss of the established vegetation would be noticed most.	

Expected effects	What we are doing and why
Biodiversity (terrestrial and marine) **Construction:** There would be a reduction in the adverse effects caused by the loss of area of designated ancient woodland, Shorne and Ashenbank Woods Site of Special Scientific Interest (SSSI), and habitat supporting the dormouse and great crested newt. Overall, we do not expect the assessment conclusion in the PEIR for these receptors to alter as a result of this change. **Operation:** We do not expect the change to alter the assessment of effects for project operation reported in the PEIR.	As detailed in the PEIR, mitigation to translocate and/or encourage the dispersal of animals from the construction zone would be required. New ponds would be created to offset any loss and strengthen retained habitat quality. Dormouse boxes would be erected in Shorne Wood to increase the availability of nest sites. Extensive woodland planting north of the A2 would help offset the loss of ancient woodland.
Road drainage and the water environment **Construction:** During disturbance of the ground linked to removal of the central reservation, perched groundwater may be encountered. Groundwater would require management during construction to avoid opening a pollution pathway to the underlying groundwater resource. Otherwise, similar minor adverse effects to those described in the PEIR would be expected as a result of the revised project proposal. **Operation:** Similar minor adverse effects to those described in the PEIR would be expected as a result of the revised project proposal.	A hydrogeological risk assessment will continue to be informed by ongoing ground investigation and will be reported in the ES. Pollution risks would be controlled through the application of a CEMP. Dewatering and subsequent discharge of groundwater would be subject to consent from the Environment Agency, with conditions attached that safeguard the water environment.

Expected effects	What we are doing and why
Geology and soils **Construction:** There would be no significant changes to the assessment and effects reported in the PEIR, which were assessed as unlikely to be significant. **Operation:** This change would have a negligible effect on the assessment presented in the PEIR, which reported that it was unlikely there would be significant effects.	Construction effects would be controlled through the CoCP and CEMP. Should ground investigation encounter any contamination, appropriate assessment would be undertaken and, if required, a remediation strategy would be developed and agreed with our stakeholders.
Materials and waste **Construction:** The change would be expected to have a negligible effect on the assessment on materials and waste presented in the PEIR, which reported that the project would be unlikely to have a significant impact on the UK supply of construction materials. The PEIR also reported that the project would be expected to potentially generate large quantities of waste and therefore the change would be unlikely to alter this conclusion. **Operation:** This change would have a negligible effect on the assessment presented in the PEIR.	Mitigation for materials and waste remains as described in the PEIR. We will continue to refine our approach to balancing the earthworks across the project to maximise the re-use of excavated materials on-site and within the design proposals. This would reduce the requirement for off-site haulage and reliance on third-party waste infrastructure. Measures to manage construction material storage, including excavated materials and soils, and wastes on-site would be detailed in the ES, CoCP and CEMP.
People and communities **Construction:** The narrower road corridor would mean that less land would be required within the AONB and Shorne Woods Country Park, including land used for agricultural and recreational purposes. At this stage our understanding of the effect remains adverse but represents a material improvement on the effects reported in the PEIR. **Operation:** The operation effects would be the same as described in the 'Construction' section above.	We are minimising land take through the AONB and Shorne Woods Country Park to lessen the effect on agricultural businesses and recreational users.

Expected effects	What we are doing and why
Climate **Construction:** The change would be unlikely to lead to a significant worsening of the effects on climate, relating to the contribution of greenhouse gas emissions that were reported in the PEIR. **Operation:** There would be no significant change to the assessment reported in the PEIR relating to both the contribution of the project to climate and the vulnerability of the project to climate change.	We will continue to understand the project's contribution to climate through greenhouse gas emissions via the outputs of carbon modelling. We will also continue to refine our approach to balancing the earthworks across the project to maximise the re-use of excavated materials on-site, and within the design proposals, to reduce the requirement for off-site haulage and associated emissions. Measures to manage construction phase carbon, which the contractors would be required to employ, would be detailed within the CoCP and CEMP.

2. LTC M2/A2 junction

Since statutory consultation the M2/A2 junction has been altered significantly to provide a more compact layout, reduce land take and enable the tunnel to be extended south. The junction now encroaches into the Claylane Ancient Woodland as a result of the southern tunnel entrance move and the new connection from Valley Drive. The main route of the LTC is located further away from Thong, Thong Lane and the Shorne Woods Country Park.

Expected effects	What we are doing and why
Air quality **Construction:** Section 6.6.3 – 6.6.7 of the PEIR is unaffected by this change. The construction phase of the project has the potential to affect air quality because of dust emissions and the emissions from non-road mobile machinery, and construction vehicle movements by road, river and rail. With mitigation in place, there should be no significant adverse impacts arising from dust emissions or associated with non-road mobile machinery. **Operation:** This would have the potential to change the distance between road traffic emissions and receptors. However, based on the distance between the junction and receptors, this is not expected to change the adverse air quality effects reported in the PEIR.	Mitigation measures would be incorporated as set out in the PEIR. Construction vehicle modelling is being undertaken to identify whether there would be any adverse effects associated with construction vehicle movements. This will be reported in the ES and any further mitigation measures will be identified.

Expected effects	What we are doing and why
Noise and vibration **Construction:** As a result of the proximity to noise sensitive receptors (e.g. local residents of Thong, Thong Lane and Shorne Woods Country Park) and the scale of the construction works, there still remains the potential for temporary significant adverse effects despite the movement of the project away from these receptors. **Operation:** The extension of the tunnel, and the movement of the southern entrance to the south, would mitigate additional lengths of road and therefore be slightly beneficial in the area relative to the changes reported in the PEIR. However, we do not expect there to be material differences to the potential for road traffic noise effects as described in the PEIR.	Construction effects would be controlled through the CoCP and a CEMP. As set out in the PEIR, best practical means would be followed (detailed in Table 13.15). Potential operational mitigation measures described in the PEIR would remain appropriate and would be incorporated into the design where necessary. With regard to both construction and operational effects associated with the project, noise and vibration continues to be assessed and considered; these will be reported in full in the ES.
Cultural heritage **Construction:** There is no significant change to the assessment reported in the PEIR. There is a possible slight improvement as major construction activity would be located further away from Thong Conservation Area. There would be no change to the impact on archaeological remains. **Operation:** As a result of the change there would be a marginal worsening of the adverse effects reported in the PEIR. This would arise from an increase in the height of structures, particularly the LTC southbound to A2 eastbound and the LTC southbound to A2 westbound. Although the activity would be further away from Thong Conservation Area, the increase in height would make them more intrusive in the current open setting and would be likely to cause an increase in impact through a change to the setting.	Mitigation in the form of landscape earthworks and appropriate planting to reduce visual intrusion would be included within the project. Mitigation to archaeological remains is as described in the PEIR. Detailed assessment in the ES would include assessment of viewpoints and photomontages.

Expected effects	What we are doing and why
Landscape and visual **Construction:** The nature of the effects would be similar to those reported in the PEIR; a major negative landscape change and a moderate to major negative change in the view for a range of visual receptors. **Operation:** There would be a worsening of the nature of effects reported in the PEIR; a major negative change for landscape and moderate to major change in views for a range of visual receptors. This is as a result of increased impacts on landscape features and receptors including Claylane Wood and Gravelhill Wood, which form part of the wooded ridgeline on the western edge of the AONB. These losses would be seen in context with more visually prominent structures (with the increased height of the LTC southbound to A2 eastbound, and the LTC southbound to A2 westbound).	There are mitigation proposals that are no longer being taken forward (false cuttings on the western slips are no longer feasible due to engineering, environmental and utility constraints). Otherwise, they continue to reflect those outlined in the PEIR. The latest mitigation proposals, including some changes to proposed layout of woodland areas, are shown in Map Book 1: General Arrangements. A full assessment will be included in the ES supported by photomontages.
Biodiversity (terrestrial and marine) **Construction:** An increased area of designated ancient woodland would be lost within Claylane Wood when compared to the PEIR. Although the area of woodland loss would increase, the assessment already concludes a significant adverse effect and this change would not alter that. **Operation:** A significantly smaller area of retained woodland would be subject to increased exposure to changes in air quality, which could adversely affect habitat quality. Although the retained woodland habitat quality may deteriorate as a result of this change, the assessment already concludes a significant adverse effect and this change would not alter that.	As described in the PEIR, extensive woodland planting north of the A2 would help offset the loss of ancient woodland. However, ancient woodland is an irreplaceable resource so a significant residual adverse effect would remain.

Expected effects	What we are doing and why
Road drainage and the water environment **Construction:** There would be no significant change from the PEIR assessment, however, the reduced land take/built footprint would reduce the overall minor adverse effects on the local drainage regime. **Operation:** There would be no significant change from the PEIR assessment, however, the reduced land take/built footprint would reduce the overall minor adverse effects on the local drainage regime.	Potential mitigation measures described in the PEIR would remain appropriate.
Geology and soils **Construction:** There would be no significant changes to the assessment and effects reported in the PEIR, which were assessed as unlikely to be significant. **Operation:** This change would have a negligible effect on the assessment presented in the PEIR, which reported that it was unlikely there would be significant effects.	Construction effects would be controlled through the CoCP and a CEMP. Should ground investigation encounter any contamination (for example at the existing A2 service station), appropriate assessment would be undertaken and, if required, a remediation strategy would be developed and agreed with our stakeholders.
Materials and waste **Construction:** The change would be expected to have a negligible effect on the assessment on materials and waste presented in the PEIR, which reported that the project would be unlikely to have a significant impact on the UK supply of construction materials. The PEIR also reported that the project would be expected to potentially generate large quantities of waste and therefore the change is unlikely to alter this conclusion. **Operation:** This change would have a negligible effect on the assessment presented in the PEIR.	Mitigation for materials and waste remains as described in the PEIR. We will continue to refine our approach to balancing the earthworks across the project to maximise the re-use of excavated materials on-site and within the design proposals. This would reduce the requirement for off-site haulage and reliance on third-party waste infrastructure. Measures to manage construction material storage, including excavated materials and soils, and wastes on-site would be detailed in the ES, CoCP and CEMP.

Expected effects	What we are doing and why
People and communities **Construction:** Potential impacts related to the revised junction layout would include impacts on Claylane Ancient Woodland, which is used locally for recreation purposes and access to residential properties along Valley Drive. The more compact layout would result in reduced land take overall at this location. There would be an adverse impact on people and communities at this location, with a worsening of the effects reported in the PEIR in respect of Claylane Ancient Woodland. However, the location of the route further from Thong may represent an improvement of the effects reported in the PEIR in respect of this community. **Operation:** Similar effects to those described for the construction phase would be expected.	We are continuing to assess the impact of the project to develop mitigation measures that reduce negative impacts, for example, screening.
Climate **Construction:** The change would be unlikely to lead to a significant worsening of the effects to climate, relating to the contribution of greenhouse gas emissions, that were reported in the PEIR. **Operation:** There would be no significant change to the assessment reported in the PEIR relating to both the contribution of the project to climate and the vulnerability of the project to climate change.	We will continue to understand the project's overall contribution to climate through greenhouse gas emissions via the outputs of carbon modelling. We will also continue to refine our approach to balancing the earthworks across the project to maximise the re-use of excavated materials on-site and within the design proposals to reduce the requirement for off-site haulage and associated emissions. Measures to manage construction phase carbon, which the contractors would be required to employ, would be detailed within the CoCP and CEMP.

3. A2 and local connections to Gravesend east

We have modified the Gravesend East junction, roundabouts and local link roads to reduce congestion and provide better connections with the existing Marling Cross bridge and Henhurst Road.

Expected effects	What we are doing and why
Air quality **Construction:** Section 6.6.3 – 6.6.7 of the PEIR is unaffected by this change. The construction phase of the project has the potential to affect air quality because of dust emissions and the emissions from non-road mobile machinery, and construction vehicle movements by road, river and rail. With mitigation in place, there should be no significant adverse impacts arising from dust emissions or associated with non-road mobile machinery. **Operation:** This would have the potential to change the distance between road traffic emissions and receptors. However, based on the distance between the junction and receptors, this is not expected to change the adverse air quality effects reported in the PEIR.	Mitigation measures would be incorporated as set out in the PEIR. Construction vehicle modelling is being undertaken to identify whether there would be any adverse effects associated with construction vehicle movements. This will be reported in the ES and any further mitigation measures will be identified.
Noise and vibration **Construction:** As a result of the proximity to noise sensitive receptors (e.g. local residents in Marling Cross and along Henhurst Road), there is the potential for temporary significant adverse effects. **Operation:** We do not expect there to be material differences to the potential road traffic noise effects as described in the PEIR.	Construction effects would be controlled through the CoCP and a CEMP. As set out in the PEIR, best practical means would be followed (detailed in Table 13.15). Potential operational mitigation measures described in the PEIR would remain appropriate and would be incorporated into the design where necessary. With regard to both construction and operational effects associated with the project, noise and vibration continues to be assessed and considered; these will be reported in full in the ES.

Expected effects	What we are doing and why
Cultural heritage **Construction:** There would be no significant change to the assessment reported in the PEIR. There would be a slight increase in construction working area but this is an area with low potential for archaeological remains due to previous development. **Operation:** There would be no significant change to the assessment reported in the PEIR.	This would be confirmed through a detailed assessment in the ES.
Landscape and visual **Construction:** The nature of the landscape effects would be slightly worsened compared with those reported in the PEIR, i.e. a minor negative change. Construction activity would increase, resulting in a slight worsening of effects on the landscape and new adverse effects on the visual amenity, due to vegetation removal. **Operation:**These would be new adverse effects on the visual amenity due to vegetation removal. It is likely there would be a minor to negligible change in the view from residential properties on the southern urban edge of Gravesend.	There will be new mitigation proposals to replace lost vegetation features in this location. A full assessment will be included in the ES supported by photomontages.
Biodiversity (terrestrial and marine) **Construction:** We do not expect this to change the assessment of effects on terrestrial or marine ecology. **Operation:** We do not expect this to change the assessment of effects on biodiversity from the project's operation.	This does not change the mitigation described in the PEIR.

Expected effects	What we are doing and why
Road drainage and the water environment **Construction:** The effects would be the same as those described in the PEIR. **Operation:** The effects would be the same as those described in the PEIR.	Potential mitigation measures described in the PEIR would remain appropriate.
Geology and soils **Construction:** There would be no significant changes to the assessment and effects reported in the PEIR, which were assessed as unlikely to be significant. **Operation:** This change would have a negligible effect on the assessment presented in the PEIR, which reported that it was unlikely there would be significant effects.	Construction effects would be controlled through the CoCP and a CEMP. Should ground investigation encounter any contamination, appropriate assessment would be undertaken and, if required, a remediation strategy would be developed and agreed with our stakeholders.
Materials and waste **Construction:** The change is expected to have a negligible effect on the assessment on materials and waste presented in the PEIR, which reported that the project would be unlikely to have a significant impact on the UK supply of construction materials. The PEIR also reported that the project would be expected to potentially generate large quantities of waste and therefore the change is unlikely to alter this conclusion. **Operation:** This change would have a negligible effect on the assessment presented in the PEIR.	Mitigation for materials and waste remains as described in the PEIR. We will continue to refine our approach to balancing the earthworks across the project to maximise the re-use of excavated materials on-site and within the design proposals. This would reduce the requirement for off-site haulage and reliance on third-party waste infrastructure. Measures to manage construction material storage, including excavated materials and soils, and wastes on-site would be detailed in the ES, CoCP and CEMP.

Expected effects	What we are doing and why
People and communities **Construction:** Construction activities would have an adverse effect on residents and businesses in south east Gravesend in respect of access and residential amenity. This would not represent a change in the effects reported in the PEIR. **Operation:** Modifications would reduce congestion and provide better connections with the existing Marling Cross bridge and Henhurst Road. This would represent a material improvement on the effects reported in the PEIR.	We would provide better local connections at this location. We are continuing to assess the impact of the project on nearby communities.
Climate **Construction:** The change would be unlikely to lead to a significant worsening of the effects on climate, relating to the contribution of greenhouse gas emissions, that were reported in the PEIR. **Operation:** There would be no significant change to the assessment reported in the PEIR relating to both the contribution of the project to climate and the vulnerability of the project to climate change.	We will continue to understand the project's overall contribution to climate through greenhouse gas emissions via the outputs of carbon modelling. We will also continue to refine our approach to balancing the earthworks across the project to maximise the re-use of excavated materials on-site and within the design proposals to reduce the requirement for off-site haulage and associated emissions. Measures to manage construction phase carbon, which the contractors would be required to employ, would be detailed within the CoCP and CEMP.

4. Creation of Chalk Park

We have introduced additional landscaping as replacement open space to the east of Gravesend and surrounding the southern tunnel entrance. This has also resulted in the opportunity for beneficial re-use of excavated material from the southern entrance approach ramp.

Expected effects	What we are doing and why
Air quality **Construction:** Section 6.6.3 – 6.6.7 of the PEIR is unaffected by this change. The construction phase of the project has the potential to affect air quality because of dust emissions and the emissions from non-road mobile machinery, and construction vehicle movements by road, river and rail. With mitigation in place, there should be no significant adverse impacts arising from dust emissions or associated with non-road mobile machinery. **Operation:** Not expected to change road traffic flows or road alignment and so not anticipated to change any of the operational air quality effects reported in the PEIR.	Mitigation measures would be incorporated as set out in the PEIR. Construction vehicle modelling is being undertaken to identify whether there would be any adverse effects associated with construction vehicle movements. This will be reported in the ES and any further mitigation measures will be identified.
Noise and vibration **Construction:** There remains a potential for temporary significant adverse effects while the feature is constructed, although longer term mitigatory effects on construction noise may be realised once the structure is in place. **Operation:** We do not expect there to be significant material differences to the potential road traffic noise effects described in the PEIR. However, slight mitigatory effects may be realised in Chalk due to increased screening.	Construction effects would be controlled through the CoCP and a CEMP. As set out in the PEIR, best practical means would be followed (detailed in Table 13.15). Potential operational mitigation measures described in the PEIR would remain appropriate and would be incorporated into the design where necessary. Regarding both construction and operational effects associated with the project, noise and vibration continues to be assessed and considered. This would be reported in full in the ES.

Expected effects	What we are doing and why
Cultural heritage **Construction:** Due to an increase in the construction working area there would be an adverse effect on any archaeological remains within the footprint described by this change. **Operation:** There would be no significant change to the assessment reported in the PEIR.	Mitigation of impacts to archaeological remains would follow the approach outlined in the PEIR. A detailed assessment would be included in the ES.
Landscape and visual **Construction:** The nature of the effects would be similar to those reported in the PEIR, i.e. a major negative landscape change and a moderate to major negative change in the view for a range of visual receptors. This considers the extent of construction activity and disruption to a range of landscape features in this locality which, due to the open and gently rolling nature of this area, would be widely visible. **Operation:** There would be new effects, however these would not result in any worsening of the effects reported in the PEIR at this location, i.e. a major negative change for landscape and a minor to major change in the view for a range of visual receptors. From visual receptors within the urban edge of Gravesend, potential visibility across the tunnel cutting would be restricted by this new landform.	In this location there are mitigation proposals that are no longer being taken forward (hedgerow improvement strategy to reflect the historic field pattern). Otherwise, mitigation proposals in the wider landscape continue to reflect those outlined in the PEIR. The latest mitigation proposals also include a new public open space (Chalk Park) as shown in Map Book 1: General Arrangements. A full assessment will be included in the ES supported by representative photomontages.

Expected effects	What we are doing and why
Biodiversity (terrestrial and marine) **Construction:** We do not expect the change to alter the assessment of effects for project construction in the PEIR. **Operation:** The change in topography may make this area less suitable for agricultural use. The underlying substrate (chalk) presents opportunity for the creation of more biodiversity valuable habitat, which would be a beneficial effect. This would represent an improvement on the effects reported in the PEIR.	Consideration of habitat creation on this area will continue to be progressed to maximise opportunities to increase the area's biodiversity value.
Water environment **Construction:** This change is considered neutral from a water environment perspective. **Operation:** This change is considered neutral from a water environment perspective.	The potential mitigation measures described in the PEIR would remain appropriate.
Geology and soils **Construction:** This change is considered neutral from a geology and soils perspective. **Operation:** This change is considered neutral from a geology and soils perspective.	We will continue to assess the existing ground conditions as part of the programme for ground investigation to understand the chemical and geotechnical suitability of the excavated materials and surrounding area.

Expected effects	What we are doing and why
Materials and waste **Construction:** This new feature would be considered positive from a materials and waste perspective as it will provide a beneficial re-use of large quantities of excavated materials within the design proposals, reducing the reliance on road haulage and third-party waste infrastructure. **Operation:** Operational effects are considered to be neutral from a materials and waste perspective.	We will continue to refine our approach to balancing the earthworks across the project to maximise the re-use of excavated materials on-site and within the design proposals. This would reduce the requirement for off-site haulage and reliance on third-party waste infrastructure. Measures to manage construction material storage, including excavated materials and soils, and wastes on-site would be detailed in the ES, CoCP and CEMP.
People and communities **Construction:** Works would result in additional construction activities. These works would have an adverse effect on residents and businesses in respect of access and residential amenity. This would represent a change from effects as reported in the PEIR. **Operation:** There would be new impacts as those reported in the PEIR, but these would not be worse than those originally reported. Additional landscaping and screening and open space would be available for the local community. This effect would represent a material improvement of the effects reported in the PEIR.	We are currently assessing the effects of construction activities at this location; mitigation measures relating to other environmental topics such as landscape are reported within the relevant section of this table.

Expected effects	What we are doing and why
Climate **Construction:** This change is considered positive from a climate perspective as the re-use of excavated materials would be likely to reduce the number of construction traffic movements. The assessment reported in the PEIR would not significantly change. **Operation:** There would be no significant change to the assessment reported in the PEIR relating to both the contribution of the project to climate and the vulnerability of the project to climate change.	We will continue to understand the project's overall contribution to climate through greenhouse gas emissions via the outputs of carbon modelling. We will also continue to refine our approach to balancing the earthworks across the project to maximise the re-use of excavated materials on-site and within the design proposals to reduce the requirement for off-site haulage and associated emissions. Measures to manage construction phase carbon, which the contractors would be required to employ, would be detailed in the CoCP and CEMP.

5. Relocation of the southern tunnel entrance approximately 350 metres south

At statutory consultation the southern tunnel entrance was closer to the A226, which placed it in the water table (aquifer). This would mean that while the tunnel is built, and possibly once the LTC is operational, water may need to be pumped from the underlying Chalk aquifer. Due to the sensitivity of the internationally designated wetland site to the north of the tunnel (which in part relies on groundwater to maintain the habitat), we have moved the proposed tunnel entrance to the south.

Expected effects	What we are doing and why
Air quality **Construction:** Section 6.6.3 – 6.6.7 of the PEIR is unaffected by this change. The construction phase of the project has the potential to affect air quality because of dust emissions and the emissions from non-road mobile machinery, and construction vehicle movements by road, river and rail. With mitigation in place, there should be no significant adverse impacts arising from dust emissions or associated with non-road mobile machinery. **Operation:** The tunnel entrance would be located further from receptors on Rochester Road, which would reduce the adverse air quality effects, compared with those reported in the PEIR.	Mitigation measures would be incorporated as set out in the PEIR. Construction vehicle modelling is being undertaken to identify whether there would be any adverse effects associated with construction vehicle movements. This will be reported in the ES and any further mitigation measures will be identified.

Expected effects	What we are doing and why
Noise and vibration **Construction:** As a result of the proximity to noise sensitive receptors and the scale of the construction works, there still remains the potential for temporary significant adverse effects. **Operation:** The extension of the tunnel, and the movement of the southern entrance to the south, would mitigate additional lengths of road and therefore be slightly beneficial in the area relative to the changes reported in the PEIR. However, we do not expect there to be material differences to the potential for road traffic noise effects as described in the PEIR.	Construction effects would be controlled through the CoCP and a CEMP. As set out in the PEIR, best practical means would be followed (detailed in Table 13.15). Potential operational mitigation measures described in the PEIR would remain appropriate and would be incorporated into the design where necessary. With regard to both construction and operational effects associated with the project, noise and vibration continues to be assessed and considered; these will be reported in full in the ES.
Cultural heritage **Construction:** Major construction activity, as a result of this change, would be moved further from St Mary's grade II* church and area of high archaeological potential. There would be an improvement to the adverse effects reported in the PEIR in relation to the setting of the church. **Operation:** There would be a reduction in adverse effects reported in the PEIR. This would be due to a change to the setting of the church because of the greater distance between the church and tunnel entrance.	There would be mitigation in the form of landscape earthworks and the design of the portal building to respect existing topography and historic land boundaries. Mitigation to archaeological remains is as described in the PEIR. Detailed assessment will be included in the ES, including cross-referencing with the vibration assessment.

Expected effects	What we are doing and why
Landscape and visual **Construction:** The nature of effects would be similar to those reported in the PEIR, i.e. a major negative landscape change and moderate to major negative change in the view for a range of visual receptors. This considers the extent of construction activity and the disruption to a range of landscape features in this area that, due to its open and gently rolling nature, would be widely visible. **Operation:** There would be a slight benefit to the reported nature of effects in the PEIR, i.e. a moderate negative change for landscape and a minor to major change in the view for a range of visual receptors. This is as a result of the new tunnel entrance location reducing the visible scar on the landform, and removal of the ancillary footbridge structure.	There are mitigation proposals which are no longer being taken forward (hedgerow improvement strategy to reflect the historic field pattern). Otherwise, they continue to reflect those outlined in the PEIR. The latest mitigation proposals also include a new public open space (Chalk Park) as shown in Map Book 1: General Arrangements. A full assessment will be included in the ES supported by representative photomontages.
Biodiversity (terrestrial and marine) **Construction:** This change would reduce adverse effects on the qualifying features of the Thames Estuary and Marshes SSSI, Ramsar and Special Protection Area (SPA) through visual and noise disturbance, as reported in the PEIR. It has been introduced to mitigate the adverse effects on these wetland sites from the tunnel's interaction with the chalk aquifer. **Operation:** Compared with the PEIR, the change also mitigates adverse effects of operational hydrological effects on the Thames Estuary and Marshes SSSI, Ramsar and SPA.	This change has been driven principally by the objective of mitigating adverse effects on the Thames Estuary and Marshes SSSI, Ramsar, and SPA. A hydrogeological risk assessment will continue to be informed by ongoing ground investigation and would be reported in the ES.

Expected effects	What we are doing and why
Road drainage and the water environment **Construction:** The design change would reduce the likelihood and magnitude of groundwater control (dewatering) being required. Subsequently, it would reduce the risk of saline intrusion, groundwater pollution and changes to the groundwater component of the water balance that supports the designated interests of the wetland site. This represents a reduction in the adverse effects reported in the PEIR. **Operation:** The design change would reduce the need for an operational drainage solution for managing groundwater seepages. This represents a reduction in the adverse effects reported in the PEIR.	The design change reduces the need for the mitigation measures described in the PEIR. A hydrogeological risk assessment will continue to be informed by ongoing ground investigation and will be reported in the ES. Any groundwater control activities that are required would be subject to consent from the Environment Agency, with conditions attached that safeguard the water environment. Pollution risks would be controlled through the application of a CEMP.
Geology and soils **Construction:** There would be no significant changes to the assessment and effects reported in the PEIR, which were assessed as unlikely to be significant. **Operation:** This change would have a negligible effect on the assessment presented in the PEIR, which reported that it was unlikely there would be significant effects.	Construction effects would be controlled through the CoCP and a CEMP. Should ground investigation encounter any contamination, appropriate assessment would be undertaken and, if required, a remediation strategy would be developed and agreed with our stakeholders.
Materials and waste **Construction:** The change would be considered a slight improvement on the scenario presented in the PEIR from a materials and waste perspective. The extension of the bored tunnel would be likely to lead to a slight reduction in the amount of excavated materials generated and therefore required to be managed on-site. **Operation:** Operational effects would be considered neutral from a materials and waste perspective.	We will continue to maximise the re-use of materials generated by the tunnelling activities on-site and within the design proposals. This would reduce the requirement for off-site haulage and reliance on third-party waste infrastructure. Measures to manage the storage and treatment of excavated materials generated by the tunnelling activities would be detailed in the ES, CoCP and CEMP.

Expected effects	What we are doing and why
People and communities **Construction:** Moving the tunnel entrance further south would reduce construction impacts on the local community of Chalk and reduces required land-take in this location. This would represent an improvement of the adverse effects reported in the PEIR for people and communities. **Operation:** Moving the tunnel entrance further south reduces the impacts of the project on the local community of Chalk and reduces required land-take in this location. This would represent an improvement of the adverse effects reported in the PEIR for people and communities.	We would reduce the potential impacts on the community of Chalk during both construction and operation. The design change reduces the need for the mitigation measures described in the PEIR.
Climate **Construction:** This change would have a negligible effect on the climate assessment described in the PEIR. **Operation:** This change would have a negligible effect on the climate assessment presented in the PEIR.	We will continue to understand the project's overall contribution to climate through greenhouse gas emissions via the outputs of carbon modelling. We will also continue to refine our approach to balancing the earthworks across the project to maximise the re-use of excavated materials on-site and within the design proposals to reduce the requirement for off-site haulage and associated emissions. Measures to manage construction phase carbon, which the contractors would be required to employ, would be detailed within the CoCP and CEMP.

6. Thong Lane over the LTC green bridge

At statutory consultation we had a green bridge at Thong Lane to provide some connectivity of woodland planting and a footpath for pedestrians. We have now included in our design a wider green bridge at Thong Lane. This feature would help walkers, cyclists and horse riders to cross the newly constructed LTC and access Shorne Wood and the AONB. It would also provide more substantial tree planting to benefit wildlife.

Expected effects	What we are doing and why
Air quality **Construction:** Section 6.6.3 – 6.6.7 of the PEIR is unaffected by this change. The construction phase of the project has the potential to affect air quality because of dust emissions and the emissions from non-road mobile machinery, and construction vehicle movements by road, river and rail. With mitigation in place, there should be no significant adverse impacts arising from dust emissions or associated with non-road mobile machinery. **Operation:** It is not expected that this would change the adverse operational air quality effects reported along Thong Lane in the PEIR.	Mitigation measures would be incorporated as set out in the PEIR. Construction vehicle modelling is being undertaken to identify whether there would be any adverse effects associated with construction vehicle movements. This will be reported in the ES and any further mitigation measures will be identified.
Noise and vibration **Construction:** As a result of the proximity to noise sensitive receptors, there is the potential for temporary significant adverse effects locally within the vicinity of the bridge works. **Operation:** We do not expect there to be material differences to the potential road traffic noise effects as described in the PEIR.	Construction effects would be controlled through the CoCP and a CEMP. As set out in the PEIR, best practical means would be followed (detailed in Table 13.15). Potential operational mitigation measures described in the PEIR would remain appropriate and would be incorporated into the design where necessary. With regard to both construction and operational effects associated with the project, noise and vibration continues to be assessed and considered; these will be reported in full in the ES.

Expected effects	What we are doing and why
Cultural heritage **Construction:** A larger construction area would increase adverse effects reported in the PEIR through a change to setting of Thong Conservation Area. There would be no significant change to the assessment of archaeological remains reported in the PEIR. **Operation:** Increased landscape planting would be likely to provide better screening of the LTC from the northern end of Thong Conservation Area, potentially providing a small reduction in the adverse effects reported in the PEIR.	A detailed assessment would be included in the ES. Mitigation measures are unchanged as compared to the PEIR.
Landscape and visual **Construction:** The nature of the effects would be similar to those reported in the PEIR, i.e. a major negative landscape change and a moderate to major negative change in the view for a range of visual receptors. **Operation:** There would be a slight benefit to the nature of the effects reported in the PEIR, i.e. a major negative landscape change and a moderate to major negative change in the view for a range of visual receptors. This is as a result of the widened structure with more substantial planting on the local ridgeline.	A full assessment will be included in the ES supported by representative photomontages. Mitigation measures are unchanged as compared to the PEIR.

Expected effects	What we are doing and why
Biodiversity (terrestrial and marine) **Construction:** It is not anticipated that the widening of the green bridge at this location would alter the assessment of the effects presented in the PEIR. **Operation:** The widened green bridge and its increased habitat provision would increase its value for a range of species and therefore strengthen this mitigation effect for species mortality during operation, when compared to the design assessed in the PEIR.	The strengthening of this design would increase the likelihood of use and would provide greater mitigation of habitat fragmentation as a result of the project's construction and reduce the risk of species mortality during road operation. Otherwise mitigation measures remain as set out in the PEIR.
Road drainage and the water environment **Construction:** The effects would be the same as those described in the PEIR. **Operation:** The effects would be the same as those described in the PEIR.	Potential mitigation measures described in the PEIR would remain appropriate.
Geology and soils **Construction:** There would be no significant changes to the assessment and effects reported in the PEIR, which were assessed as unlikely to be significant. **Operation:** This change would have a negligible effect on the assessment presented in the PEIR, which reported that it was unlikely there would be significant effects.	Construction effects would be controlled through the CoCP and a CEMP. Should ground investigation encounter any contamination (for example at Southern Valley Golf Course), appropriate assessment would be undertaken and, if required, a remediation strategy would be developed and agreed with our stakeholders.

Expected effects	What we are doing and why
Materials and waste **Construction:** This change would have a negligible effect on the assessment described in the PEIR. **Operation:** This change would have a negligible effect on the assessment presented in the PEIR.	Mitigation for materials and waste remains as described in the PEIR. We will continue to refine our approach to balancing the earthworks across the project to maximise the re-use of excavated materials onsite and within the design proposals. This would reduce the requirement for off-site haulage and reliance on third-party waste infrastructure. Measures to manage construction material storage, including excavated materials and soils, and wastes on-site would be detailed in the ES, CoCP and CEMP.
People and communities **Construction:** During construction it is likely that there would be some disruption to the existing use of routes for walking, cycling and horse-riding in the vicinity of the project, resulting in an adverse effect. We do not expect any change in the nature of the effect from that reported in the PEIR. **Operation:** The wider green bridge would create a more pleasant environment for pedestrians, cyclists and equestrians, potentially encouraging recreation activities for local communities. The change would result in a beneficial effect and would represent a material improvement to the effects reported in the PEIR.	Widening of the bridge would improve the local recreation environment; ongoing assessment will consider how to maximise benefits for local users and link existing open spaces for recreational purposes.
Climate **Construction:** This change would have a negligible effect on the climate assessment described in the PEIR. **Operation:** This change would have a negligible effect on the climate assessment presented in the PEIR.	We will continue to understand the project's overall contribution to climate through greenhouse gas emissions via the outputs of carbon modelling. Measures to manage the construction phase carbon, which the contractors would be required to employ, would be detailed within the CoCP and CEMP.

7. Ground preparation tunnel

To help treat the ground beneath the Thames Estuary and Marshes Ramsar site and SPA, we are proposing to build a temporary ground preparation tunnel, located above and in between the northbound and southbound tunnels. See 'Ground preparation works' in the Building the LTC chapter of our Guide to Supplementary Consultation for more details.

Expected effects	What we are doing and why
Air quality **Construction:** The construction phase of the project has the potential to affect air quality because of dust emissions and the emissions from non-road mobile machinery, and construction vehicle movements by road, river and rail. With mitigation in place, there should be no significant adverse impacts arising from dust emissions or associated with non-road mobile machinery. **Operation:** It is not expected that this would change road traffic flows or the road alignment, so we do not expect a change to any of the operational air quality effects reported in the PEIR.	Mitigation measures would be incorporated as set out in the PEIR. Construction vehicle modelling is being undertaken to identify whether there would be any adverse effects associated with construction vehicle movements. This will be reported in the ES and any further mitigation measures will be identified.

Expected effects	What we are doing and why
Noise and vibration **Construction:** As a result of the proximity of the new temporary ground preparation tunnel compound to the residential area of Chalk, and the duration of these works (approximately 74 weeks in total), there is likely to be temporarily significant adverse effects. In addition, the new compound would be required to operate 24/7 for 26 weeks of the period, and ground-level support infrastructure associated with underground tunnel boring machine (TBM) activities would be necessary. **Operation:** We do not expect there to be material differences to the potential for road traffic noise effects as described in the PEIR.	Construction effects would be controlled through the CoCP and a CEMP. As set out in the PEIR, best practical means would be followed (detailed in Table 13.15). There would be no associated operational effects as the structure is only temporary in nature and will be backfilled before the project opens.
Cultural heritage **Construction:** This change was not included in the PEIR. It introduces the potential for significant new adverse archaeological effects due to the impacts on archaeological and paleoenvironmental remains on the surface of, and within, the river terrace deposits. **Operation:** There would be no effect during operation.	We are undertaking a geoarchaeological and palaeolithic assessment, which will inform further detailed assessment and mitigation that would be agreed with stakeholders.

Expected effects	What we are doing and why
Landscape and visual **Construction:** The nature of the effects would be worsened compared with those reported in the PEIR, i.e. a moderate negative landscape change and a moderate to slight negative change in the view for a range of visual receptors. This is as a result of the temporary operations and increased activities within the low-lying flat marshes. **Operation:** The nature of the effects would be similar to those reported in the PEIR, i.e. a negligible negative landscape change and a minor to negligible negative change in the view for a range of visual receptors.	There will be new mitigation proposals to replace lost vegetation features in this location. A full assessment will be included in the ES supported by representative photomontages.
Biodiversity (terrestrial and marine) **Construction:** The assessment is being progressed, supported by the hydrogeological assessment and will be reported in the ES. We do not expect the introduction of this feature to result in new adverse significant effects. **Operation:** We do not expect the change to alter the assessment of effects for project operation reported in the PEIR.	If required, mitigation would be designed appropriately and proportionately.

Expected effects	What we are doing and why
Road drainage and the water environment **Construction:** This design change would introduce potential new adverse effects to those reported in the PEIR. Effects are linked to the potential for groundwater control (dewatering) during construction, the risk of saline intrusion and changes to the groundwater component of the water balance that supports the designated interests of the wetland site. There is also an increase in the risk of a pollution incident affecting surface and/or groundwater quality. Initial hydrogeological modelling indicates that these effects would not be significant. **Operation:** This design change would introduce new adverse effects to those reported in the PEIR. The effects are linked to the tunnel acting as a permanent preferential drainage route for groundwater flows, or a cause of groundwater mounding by blocking groundwater flow paths, changing the groundwater component of the water balance that supports the designated interests of the wetland site. However, initial hydrogeological modelling indicates that these effects would not be significant.	Groundwater modelling has been undertaken to quantify induced changes in groundwater levels and saline intrusion during both construction and operation. Modelling data is informing a hydrogeological risk assessment and the design of any necessary mitigation measures. The findings of the hydrogeological risk assessment will be reported in the ES.
Geology and soils **Construction:** No specific adverse effects, in addition to those reported in the PEIR, would be expected as a result of this change. **Operation:** This change would have a negligible effect on the assessment presented in the PEIR.	Construction effects would be controlled through the CoCP and a CEMP. Specific mitigation would be developed to ensure grouting is adequately controlled and included within the CoCP. Should ground investigation encounter any contamination, appropriate assessment would be undertaken and, if required, a remediation strategy would be developed and agreed with our stakeholders.

Expected effects	What we are doing and why
Materials and waste **Construction:** The change would be expected to lead to an increase in demand for construction materials and generation of waste. However, it would be expected to have a negligible effect on the assessment on materials and waste presented in the PEIR, which reported that the project would be unlikely to have a significant impact on the UK supply of construction materials. The PEIR also reported that the project would be expected to potentially generate large quantities of waste and therefore the change would be unlikely to alter this conclusion. **Operation:** This change would have a negligible effect on the assessment presented in the PEIR.	We will continue to maximise the re-use of materials generated by the tunnelling activities on-site and within the design proposals. This would reduce the requirement for off-site haulage and reliance on third-party waste infrastructure. Measures to manage the storage and treatment of excavated materials generated by the tunnelling activities would be detailed in the ES, CoCP and CEMP.
People and communities **Construction:** There would be new temporary adverse effects on residential properties in the vicinity of Chalk as a result of construction activities. These are reported in the landscape, noise and air quality sections of this table. **Operation:** We would not expect any operational impacts associated with this proposed change on people and communities.	We are currently assessing the effects of construction activities at this location. Mitigation measures would include dust suppression and noise barriers to minimise the effects on local residents in Chalk. These measures are reported in the air quality and noise sections of this table.

Expected effects	What we are doing and why
Climate **Construction:** This change is likely to result in a worsening with respect to the project's greenhouse gas emissions through increases in embodied carbon from construction materials, as well as emissions associated with the construction activities. **Operation:** There would be no significant change to the assessment reported in the PEIR relating to both the contribution of the project to climate and the vulnerability of the project to climate change.	We will continue to understand the project's overall contribution to climate through greenhouse gas emissions via the outputs of carbon modelling. Measures to manage construction phase carbon, which the contractors will be required to employ, would be detailed in the CoCP and CEMP.

8. Removal of Tilbury junction, the rest and service area and maintenance depot

After further investigation and consideration of the feedback from statutory consultation and environmental considerations, we have decided not to progress with the rest and service area or the maintenance depot.

Expected effects	What we are doing and why
Air quality **Construction:** Section 6.6.3 – 6.6.7 of the PEIR is unaffected by this change. The construction phase of the project has the potential to affect air quality because of dust emissions and the emissions from non-road mobile machinery, and construction vehicle movements by road, river and rail. With mitigation in place, there should be no significant adverse impacts arising from dust emissions or associated with non-road mobile machinery. **Operation:** We would not expect this to change the adverse operational air quality effects reported along the route alignment in the PEIR.	Mitigation measures would be incorporated as set out in the PEIR. Construction vehicle modelling is being undertaken to identify whether there would be any adverse effects associated with construction vehicle movements. This will be reported in the ES and any further mitigation measures will be identified.
Noise and vibration **Construction:** As a result of the reduction in land take associated with the removal of the rest and service area, there is the potential that construction works would be both further from receptors and more transient through this section. However, there is still the potential for temporary significant adverse effects associated with the construction of the main alignment through this area. **Operation:** We do not expect there to be material differences to the potential road traffic noise effects as described in the PEIR.	Construction effects would be controlled through the CoCP and a CEMP. As set out in the PEIR, best practical means would be followed (detailed in Table 13.15). Potential operational mitigation measures described in the PEIR would remain appropriate and would be incorporated into the design where necessary. With regard to both construction and operational effects associated with the project, noise and vibration continues to be assessed and considered. These will be reported in full in the ES.

Expected effects	What we are doing and why
Cultural heritage **Construction:** There would be no significant change to the assessment reported in the PEIR, as the area would still be used during construction. **Operation:** This change would move development further from East Tilbury Conservation Area so there would be a marginal reduction in the adverse effects reported in the PEIR.	Mitigation of impacts to archaeological remains would follow the approach outlined in the PEIR. A detailed assessment would be included in the ES.
Landscape and visual **Construction:** The nature of the effects would be similar to those reported in the PEIR, i.e. a major negative landscape change and a moderate to major negative change in the view for a range of visual receptors. The widespread nature of the significant construction activity within this low-lying arable rural landscape would continue. **Operation:** The nature of the effects would be slightly improved compared with those reported in the PEIR, i.e. a major negative landscape change and a moderate to major negative change in the view for a range of visual receptors. The project would continue to form a major linear intervention, however its reduced footprint would provide further visual separation from adjacent visual receptors, including those within the urban area of East Tilbury.	Mitigation proposals continue to reflect those outlined in the PEIR. This includes development of fen landscape and habitat creation, and false cuttings. A full assessment will be included in the ES supported by photomontages.

Expected effects	What we are doing and why
Biodiversity (terrestrial and marine) **Construction:** Removing this feature would reduce the overall extent of habitat loss reported in the PEIR. However, it is considered unlikely that this would lead to a reduction in the significance level of the assessment conclusion. **Operation:** Removing this feature would reduce the extent of air quality change and noise/visual disturbance reported in the PEIR. However, it is considered unlikely that this would lead to a reduction in the significance level of the assessment conclusion.	The design change would reduce the need for the mitigation measures described in the PEIR.
Road drainage and the water environment **Construction:** The benefits of this design change would be a reduction in the construction footprint within the defended floodplain (Flood Zone 3) and, overall, a reduction in impermeable land take. Compensatory floodplain storage in mitigation of flood risk impacts would not be required and minor adverse effects on the rainfall runoff/land drainage regime locally would be prevented. **Operation:** This design change would prevent minor adverse effects on the rainfall runoff/land drainage regime locally and would remove land use activity with a pollution risk.	The design change would reduce the need for the mitigation measures described in the PEIR.
Geology and soils **Construction:** There would be no significant changes to the assessment and effects reported in the PEIR, which were assessed as unlikely to be significant. **Operation:** This change would have a negligible effect on the assessment presented in the PEIR, which reported that it was unlikely there would be significant effects.	Construction effects would be controlled through the CoCP and a CEMP. Should ground investigation encounter any contamination, appropriate assessment would be undertaken and, if required, a remediation strategy would be developed and agreed with our stakeholders.

Expected effects	What we are doing and why
Materials and waste **Construction:** This change would be expected to provide a slight improvement from the scenario presented in the PEIR from a materials and waste perspective. The change would result in a reduction in the demand for construction materials and wastes generated on-site. It is considered that the effects on materials and waste would remain as described in the PEIR. **Operation:** This change would provide a slight improvement from the scenario assessed in the PEIR as it would reduce the materials used and waste generated as part of the maintenance. However, it is likely this change would have a negligible effect on the assessment presented in the PEIR.	Mitigation for materials and waste remains as described in the PEIR. We will continue to refine our approach to balancing the earthworks across the project to maximise the re-use of excavated materials onsite and within the design proposals. This would reduce the requirement for off-site haulage and reliance on third-party waste infrastructure. Measures to manage construction material storage, including excavated materials and soils, and wastes on-site would be detailed in the ES, CoCP and CEMP.
People and communities **Construction:** Land take would be reduced due to the removal of Tilbury junction and the associated rest and service area. Impacts on amenity for local businesses and residents at this location arising from construction activities would be lessened. Overall, there would be a beneficial effect and an improvement to those effects reported in the PEIR at this location. **Operation:** Land take would be reduced due to the removal of Tilbury junction and the associated rest and service area. Removal of the rest and service area would reduce local concerns about community safety. Overall, there would be a beneficial effect and an improvement to those effects reported in the PEIR at this location.	The mitigation at this location would be modified from that presented in the PEIR to take account of the removal of Tilbury junction and the associated rest and service area.

Expected effects	What we are doing and why
Climate **Construction:** This change would provide an improvement on construction-related greenhouse gas emissions as it would result in a reduction in the volume of construction materials used, and construction activities. There would be a negligible change to the climate resilience assessment in the PEIR. **Operation:** This change would have a negligible effect on the assessment presented in the PEIR.	We will continue to understand the project's overall contribution to climate through greenhouse gas emissions via the outputs of carbon modelling. Measures to manage construction phase carbon, which the contractors would be required to employ, would be detailed in the CoCP and CEMP.

9. Tilbury viaduct length reduced

Reduction in the height and length of the viaduct that crosses over the railway line to the north of the tunnel entrance.

Expected effects	What we are doing and why
Air quality **Construction:** Section 6.6.3 – 6.6.7 of the PEIR is unaffected by this change. The construction phase of the project has the potential to affect air quality because of dust emissions and the emissions from non-road mobile machinery, and construction vehicle movements by road, river and rail. With mitigation in place, there should be no significant adverse impacts arising from dust emissions or associated with non-road mobile machinery. **Operation:** We would not expect this to change the operational air quality effects reported in the PEIR, as vertical alignments are not included in the dispersion model.	Mitigation measures would be incorporated as set out in the PEIR. Construction vehicle modelling is being undertaken to identify whether there would be any adverse effects associated with construction vehicle movements. This will be reported in the ES and any further mitigation measures will be identified.
Noise and vibration **Construction:** As a result of the proximity to noise sensitive receptors and the scale of the construction works, there remains the potential for temporary significant adverse effects, as set out in the PEIR. **Operation:** We do not expect there to be material differences to the potential road traffic noise effects as described in the PEIR.	Construction effects would be controlled through the CoCP and a CEMP. As set out in the PEIR, best practical means would be followed (detailed in Table 13.15). Potential operational mitigation measures described in the PEIR would remain appropriate and would be incorporated into the design where necessary. With regard to both construction and operational effects associated with the project, noise and vibration continues to be assessed and considered. These will be reported in full in the ES.

Expected effects	What we are doing and why
Cultural heritage **Construction:** There would be no significant change to the assessment reported in the PEIR. **Operation:** The reduction in the height of the structure would marginally reduce the adverse effects reported in the PEIR, as it would be less prominent in the setting of East Tilbury and West Tilbury conservation areas.	The mitigations measures would be as set out in the PEIR.
Landscape and visual **Construction:** The nature of the effects would be similar to those reported in the PEIR, i.e. a major negative landscape change and a moderate to major negative change in the view for a range of visual receptors. The widespread nature of the significant construction activity within this low-lying arable rural landscape would continue. **Operation:** The nature of the effects would be slightly improved compared with those reported in the PEIR, i.e. a major negative landscape change and a moderate to major negative change in the view for a range of visual receptors. The project would continue to form a major linear intervention, however its reduced elevation would decrease its prominence on the skyline, from within the landscape and for visual receptors.	Mitigation proposals continue to reflect those outlined in the PEIR. This includes development of fen landscape and habitat creation, and false cuttings. A full assessment will be included in the ES supported by representative photomontages.
Biodiversity (terrestrial and marine) **Construction:** We do not expect the change to alter the assessment of effects for project construction in the PEIR. **Operation:** We do not expect the change to alter the assessment of effects for project operation in the PEIR.	The potential mitigation measures described in the PEIR would remain appropriate.

Expected effects	What we are doing and why
Road drainage and the water environment **Construction:** The effects would be the same as those described in the PEIR. **Operation:** The effects would be the same as those described in the PEIR.	Potential mitigation measures described in the PEIR would remain appropriate.
Geology and soils **Construction:** There would be no significant changes to the assessment and effects reported in the PEIR, which were assessed as unlikely to be significant. **Operation:** This change would have a negligible effect on the assessment presented in the PEIR, which reported that it was unlikely there would be significant effects.	Construction effects would be controlled through the CoCP and a CEMP. Should ground investigation encounter any contamination, appropriate assessment would be undertaken and, if required, a remediation strategy would be developed and agreed with our stakeholders.
Materials and waste **Construction:** The change would be expected to have a negligible effect on the assessment on materials and waste presented in the PEIR, which reported that the project would be unlikely to have a significant impact on the UK supply of construction materials. The PEIR also reported that the project would be expected to potentially generate large quantities of waste and therefore the change would be unlikely to alter this conclusion. **Operation:** This change would have a negligible effect on the assessment presented in the PEIR.	Mitigation for materials and waste remains as described in the PEIR. Best practicable measures for the management of construction materials to be implemented by the contractor, such as the use of secondary and recycled aggregates where possible, would be detailed in the ES, CoCP and CEMP.

Expected effects	What we are doing and why
People and communities **Construction:** The reduction in height and length of Tilbury viaduct would reduce the land take required and lessen the temporary adverse construction impacts on local communities, such as East Tilbury and West Tilbury. This change would result in a beneficial effect and would represent an improvement to those effects reported in the PEIR **Operation:** The change reduces amenity impacts on local communities, for example East Tilbury and West Tilbury. It would result in a beneficial effect and would represent an improvement to those effects reported in the PEIR	We would minimise land take required for the project, which would lessen the effects on local communities and businesses, and lessen the requirement for mitigations measures for people and communities as compared with the PEIR.
Climate **Construction:** This change would have a negligible effect on the climate assessment described in the PEIR. **Operation:** This change would have a negligible effect on the climate assessment presented in the PEIR.	We will continue to understand the project's overall contribution to climate through greenhouse gas emissions via the outputs of carbon modelling. Measures to manage construction phase carbon, which the contractors would be required to employ, would be detailed in the CoCP and CEMP.

10. Muckingford Road realignment and green bridge

Muckingford Road has been moved slightly south to reduce the overall height, while providing the required structural headroom as it crosses over the LTC. It has also been upgraded to a green bridge with provision for walkers, cyclists and horse riders.

Expected effects	What we are doing and why
Air quality **Construction:** Section 6.6.3 – 6.6.7 of the PEIR is unaffected by this change. The construction phase of the project has the potential to affect air quality because of dust emissions and the emissions from non-road mobile machinery, and construction vehicle movements by road, river and rail. With mitigation in place, there should be no significant adverse impacts arising from dust emissions or associated with non-road mobile machinery. **Operation:** We would not expect this to change the adverse operational air quality effects reported at Muckingford Road receptors in the PEIR.	Mitigation measures would be incorporated as set out in the PEIR. Construction vehicle modelling is being undertaken to identify whether there would be any adverse effects associated with construction vehicle movements. This will be reported in the ES and any further mitigation measures will be identified.
Noise and vibration **Construction:** As a result of the proximity to noise sensitive receptors, there is the potential for temporary significant adverse effects locally within the vicinity of the bridge works. **Operation:** We do not expect there to be material differences to the potential road traffic noise effects as described in the PEIR.	Construction effects would be controlled through the CoCP and a CEMP. As set out in the PEIR, best practical means would be followed (detailed in Table 13.15). Potential operational mitigation measures described in the PEIR would remain appropriate and would be incorporated into the design where necessary. With regard to both construction and operational effects associated with the project, noise and vibration continues to be assessed and considered. These will be reported in full in the ES.

Expected effects	What we are doing and why
Cultural heritage **Construction:** There would be no significant change to the assessment reported in the PEIR. **Operation:** There would be no significant change to the assessment reported in the PEIR.	Mitigation of impacts to archaeological remains would follow the approach outlined in the PEIR. A detailed assessment would be included in the ES.
Landscape and visual **Construction:** The nature of the effects would be similar to those reported in the PEIR, i.e. a major negative landscape change and a moderate to major negative change in the view for a range of visual receptors. The widespread nature of the significant construction activity within this low-lying arable rural landscape would continue. **Operation:** The nature of the effects would be similar to those reported in the PEIR, i.e. a major negative landscape change and a moderate to major negative change in the view for a range of visual receptors. The project would continue to form a major linear intervention as it runs, more or less at ground level, through the centre of this area. The associated overbridges and their approach embankments would form locally prominent features. The continuation of vegetation (hedgerow) over the green bridge would help to integrate the structure into the landscape.	There are mitigation proposals that are no longer being taken forward (false cuttings with slackened slopes due to engineering constraints). Otherwise, mitigation proposals continue to reflect those outlined in the PEIR. A full assessment will be included in the ES supported by representative photo photomontages.

Expected effects	What we are doing and why
Biodiversity (terrestrial and marine) **Construction:** It is not anticipated that the proposed changes at this location would alter the assessment of the effects presented in the PEIR. **Operation:** The upgrade to a green bridge and its increased habitat provision, from that reported in the PEIR, would increase its value for a range of species and therefore strengthen this mitigation measure for species mortality during operation.	The upgrade of this design from that reported in the PEIR would increase the mitigation of habitat fragmentation as a result of the project construction, and species mortality during project operation.
Road drainage and the water environment **Construction:** The effects would be the same as those described in the PEIR. **Operation:** The effects would be the same as those described in the PEIR.	Potential mitigation measures described in the PEIR would remain appropriate.
Geology and soils **Construction:** There would be no significant changes to the assessment and effects reported in the PEIR, which were assessed as unlikely to be significant. **Operation:** This change would have a negligible effect on the assessment presented in the PEIR, which reported that it was unlikely there would be significant effects.	Construction effects would be controlled through the CoCP and a CEMP. Should ground investigation encounter any contamination, appropriate assessment would be undertaken and, if required, a remediation strategy would be developed and agreed with our stakeholders.

Expected effects	What we are doing and why
Materials and waste **Construction:** The change would be expected to have a negligible effect on the assessment on materials and waste presented in the PEIR, which reported that the project would be unlikely to have a significant impact on the UK supply of construction materials. The PEIR also reported that the project would be expected to potentially generate large quantities of waste and therefore the change is unlikely to alter this conclusion. **Operation:** This change would have a negligible effect on the assessment presented in the PEIR.	Mitigation for materials and waste remains as described in the PEIR. We will continue to refine our approach to balancing the earthworks across the project to maximise the re-use of excavated materials on-site and within the design proposals. This would reduce the requirement for off-site haulage and reliance on third-party waste infrastructure. Measures to manage construction material storage, including excavated materials and soils, and wastes on-site would be detailed in the ES, CoCP and CEMP.
People and communities **Construction:** Temporary adverse construction effects would continue at this location, although the impacts on local communities, such as Linford and East Tilbury, would be lessened as a result of the change. The effect would represent an improvement to effects reported in the PEIR. **Operation:** This would reduce adverse effects on local communities adjacent to Muckingford Road, for example Linford and East Tilbury, as reported in the PEIR. The green bridge would improve the environment for pedestrians, cyclists and equestrians, improving connectivity of the local footpath network and wider recreational network. This would also increase opportunities for local residents to use these walking and cycling networks for commuting purposes. This change would result in a beneficial effect and would represent an improvement to those effects reported in the PEIR.	Widening the bridge would improve the local recreation environment; ongoing assessment will consider how to maximise benefits for local users and link existing open spaces for recreational purposes. Otherwise mitigation measures would remain as set out in the PEIR.

Expected effects	What we are doing and why
Climate **Construction:** This change would have a negligible effect on the climate assessment described in the PEIR. **Operation:** This change would have a negligible effect on the climate assessment presented in the PEIR.	We will continue to understand the project's overall contribution to climate through greenhouse gas emissions via the outputs of carbon modelling. Measures to manage construction phase carbon, which the contractors would be required to employ, would be detailed in the CoCP and CEMP.

11. LTC route realignment near Chadwell St. Mary and Linford

We have moved the route south of the A13 and east of Chadwell St. Mary. The route would be approximately 60 metres closer to Linford. This would avoid having to move some overhead cables and pylons.

Expected effects	What we are doing and why
Air quality **Construction:** Section 6.6.3 – 6.6.7 of the PEIR is unaffected by this change. The construction phase of the project has the potential to affect air quality because of dust emissions and the emissions from non-road mobile machinery, and construction vehicle movements by road, river and rail. With mitigation in place, there should be no significant adverse impacts arising from dust emissions or associated with non-road mobile machinery. **Operation:** We would not expect this to change any of the operational air quality effects reported in the PEIR as there are no receptors within 200 metres of this alignment change.	Mitigation measures would be incorporated as set out in the PEIR. Construction vehicle modelling is being undertaken to identify whether there would be any adverse effects associated with construction vehicle movements. This will be reported in the ES and any further mitigation measures will be identified.
Noise and vibration **Construction:** As a result of the proximity to noise sensitive receptors (e.g. local residents in Linford) and the scale of the construction works, there is the potential for temporary significant adverse effects. **Operation:** We do not expect there to be material differences to the potential adverse road traffic noise effects described in the PEIR as a result of the movement toward Linford.	Construction effects would be controlled through the CoCP and a CEMP. As set out in the PEIR, best practical means would be followed (detailed in Table 13.15). Potential operational mitigation measures described in the PEIR would remain appropriate and would be incorporated into the design where necessary. With regard to both construction and operational effects associated with the project, noise and vibration continues to be assessed and considered. These will be reported in full in the ES.

Expected effects	What we are doing and why
Cultural heritage **Construction:** There would be no significant change to the assessment reported in the PEIR. **Operation:** There would be no significant change to the assessment reported in the PEIR.	Mitigation of impacts to archaeological remains would follow the approach outlined in the PEIR. A detailed assessment would be included in the ES.
Landscape and visual **Construction:** The nature of the effects would be slightly worsened compared with those reported in the PEIR, i.e. a major negative landscape change and a moderate to major negative change in the view for a range of visual receptors. The widespread nature of the significant construction activity within this relatively compact, intimate and small-scale landscape would continue to be experienced in relatively close proximity to the visual receptors. **Operation:** The nature of the effects would be similar to those reported in the PEIR, i.e. a major negative landscape change and a moderate to major negative change in the view for a range of visual receptors. The project would continue to form a major linear intervention as it runs, more or less at ground level, through the centre of this area. The associated overbridges and their approach embankments would form locally prominent features.	There are mitigation proposals that are no longer being taken forward (false cuttings with slackened slopes due to engineering constraints). Otherwise, mitigation proposals continue to reflect those outlined in the PEIR. A full assessment will be included in the ES supported by representative photomontages.
Biodiversity (terrestrial and marine) **Construction:** Avoiding utilities works in this area would reduce the extent of habitat loss compared with that reported in the PEIR. Although beneficial, it is considered unlikely it would lead to a reduction in the significance level of the assessment conclusion. **Operation:** We do not expect the change to alter the assessment of effects for project operation in the PEIR.	The mitigation measures would be as described in the PEIR.

Expected effects	What we are doing and why
Road drainage and the water environment **Construction:** The effects would be the same as those described in the PEIR. **Operation:** The realignment would allow for an open waterbody that would have been infilled to be partially retained. This lessens the impact on the water environment locally, reducing the minor adverse effect reported in the PEIR.	Potential mitigation measures described in the PEIR would remain appropriate.
Geology and soils **Construction:** There would be no significant changes to the assessment and effects reported in the PEIR, which were assessed as unlikely to be significant. **Operation:** This change would have a negligible effect on the assessment presented in the PEIR, which reported that it was unlikely there would be significant effects.	Construction effects would be controlled through the CoCP and a CEMP. Should ground investigation encounter any contamination, appropriate assessment would be undertaken and, if required, a remediation strategy would be developed and agreed with our stakeholders.
Materials and waste **Construction:** The change would be expected to have a negligible effect on the assessment on materials and waste presented in the PEIR, which reported that the project would be unlikely to have a significant impact on the UK supply of construction materials. The PEIR also reported that the project would be expected to potentially generate large quantities of waste and therefore the change is unlikely to alter this conclusion. **Operation:** This change would have a negligible effect on the assessment presented in the PEIR.	Mitigation for materials and waste remains as described in the PEIR. Measures to manage the storage of construction materials and wastes on-site would be detailed in the ES, CoCP and CEMP.

Expected effects	What we are doing and why
People and communities **Construction:** Moving the route to the east would potentially reduce temporary adverse construction effects on local residents of Chadwell St Mary; however, adverse effects experienced by residents of Linford may increase as a result of the increased proximity of the project. Overall, this would result in an improvement to those effects reported in the PEIR. **Operation:** Moving the route to the east would reduce the operational impacts of the project on local residents of Chadwell St Mary; however, potential impacts experienced by residents of Linford may increase as a result of the increased proximity of the project. Overall, this would represent an improvement to those effects reported in the PEIR.	We are continuing to assess the impact of the project in relation to the proposed change to develop mitigation measures and lessen negative impacts. Mitigation at this location, to improve residential amenity during both the construction and operational phases, is described elsewhere in this table, notably landscape and noise. The mitigation measures would be as set out in the PEIR.
Climate **Construction:** This change would have a negligible effect on the climate assessment described in the PEIR. **Operation:** This change would have a negligible effect on the climate assessment presented in the PEIR.	We will continue to understand the project's overall contribution to climate through greenhouse gas emissions via the outputs of carbon modelling. Measures to manage construction phase carbon, which the contractors would be required to employ, would be detailed in the CoCP and CEMP.

12. A13/A1089 junction changes

We have made changes to the layout of the A13 junction and modified a number of connections at the junction between the LTC, A13, A1089 and A1013, for various reasons. These include moving roads away from nearby properties and improving safety at the junctions.

Expected effects	What we are doing and why
Air quality **Construction:** Section 6.6.3 – 6.6.7 of the PEIR is unaffected by this change. The construction phase of the project has the potential to affect air quality because of dust emissions and the emissions from non-road mobile machinery, and construction vehicle movements by road, river and rail. With mitigation in place, there should be no significant adverse impacts arising from dust emissions or associated with non-road mobile machinery. **Operation:** Due to the complexity of the junction, the impacts are difficult to predict in the absence of detailed air quality modelling, which is currently ongoing. However, these changes would have the potential to change the adverse air quality effects reported in the PEIR due to the distance between road traffic emissions and receptors, and also the distribution of traffic around the junction. In general, a closer proximity to a road would increase the adverse effects on a receptor and, similarly, greater traffic numbers would also adversely affect air quality.	Mitigation measures would be incorporated as set out in the PEIR. Construction vehicle modelling is being undertaken to identify whether there would be any adverse effects associated with construction vehicle movements. This will be reported in the ES and any further mitigation measures will be identified.

Expected effects	What we are doing and why
Noise and vibration **Construction:** As a result of the proximity to noise sensitive receptors and the extent of construction works associated with the large-scale junction, there remains the potential for temporary significant adverse effects. **Operation:** We do not expect there to be significant material differences to the potential road traffic noise effects described in the PEIR.	Construction effects would be controlled through the CoCP and a CEMP. As set out in the PEIR, best practical means would be followed (detailed in Table 13.15). Potential operational mitigation measures described in the PEIR would remain appropriate and would be incorporated into the design where necessary. With regard to both construction and operational effects associated with the project, noise and vibration continues to be assessed and considered. These will be reported in full in the ES.
Cultural heritage **Construction:** There would be no significant change to the assessment reported in the PEIR. **Operation:** There would be no significant change to the assessment reported in the PEIR.	Mitigation of impacts to archaeological remains would follow the approach outlined in the PEIR. A detailed assessment would be included in the ES.

Expected effects	What we are doing and why
Landscape and visual **Construction:** The nature of the effects would be similar to those reported in the PEIR, i.e. a major negative landscape change and a moderate to major negative change in the view for a range of visual receptors. The widespread nature of the significant construction activity within this relatively compact, intimate and small-scale landscape would continue to be experienced in relatively close proximity to the visual receptors. **Operation:** The nature of the effects would be similar to those reported in the PEIR, i.e. a major negative landscape change and a moderate to major negative change in the view for a range of visual receptors. The junction would continue to result in the encroachment of road infrastructure, including structures, embankments, signs, gantries and street lighting into the local landscape as a result of the intertwined string of new link roads connecting the A13 with the LTC. These large-scale features, along with the sprawling extent of the junction to the north and south of the existing A13, would result in further urban encroachment into the landscape both during the day and at night-time between Baker Street and the West Thurrock and Grays Quarry Townscape urban edge.	There are mitigation proposals that are no longer being taken forward (landscape earthworks strategy at the A13 junction, and false cutting earthworks to the perimeter of the junction). Otherwise, mitigation proposals continue to reflect those outlined in the PEIR. A full assessment will be included in the ES supported by representative photomontages.
Biodiversity (terrestrial and marine) **Construction:** We do not expect the change to alter the assessment of effects for project construction in the PEIR. **Operation:** We do not expect the change to alter the assessment of effects for project operation in the PEIR.	Potential mitigation measures described in the PEIR would remain appropriate.

Expected effects	What we are doing and why
Road drainage and the water environment **Construction:** The effects would be the same as those described in the PEIR. **Operation:** The effects would be the same as those described in the PEIR.	Potential mitigation measures described in the PEIR would remain appropriate.
Geology and soils **Construction:** There would be no significant changes to the assessment and effects reported in the PEIR, which were assessed as unlikely to be significant. **Operation:** This change would have a negligible effect on the assessment presented in the PEIR, which reported that it was unlikely there would be significant effects.	Construction effects would be controlled through the CoCP and a CEMP. Should ground investigation encounter any contamination, appropriate assessment would be undertaken and, if required, a remediation strategy would be developed and agreed with our stakeholders.
Materials and waste **Construction:** The change would be expected to have a negligible effect on the assessment on materials and waste presented in the PEIR, which reported that the project would be unlikely to have a significant impact on the UK supply of construction materials. The PEIR also reported that the project would be expected to potentially generate large quantities of waste and therefore the change would be unlikely to alter this conclusion. **Operation:** This change would have a negligible effect on the assessment presented in the PEIR.	Mitigation for materials and waste remains as described in the PEIR. We will continue to refine our approach to balancing the earthworks across the project to maximise the re-use of excavated materials on-site and within the design proposals. This would reduce the requirement for off-site haulage and reliance on third-party waste infrastructure. Measures to manage construction material storage, including excavated materials and soils, and wastes on-site would be detailed in the ES, CoCP and CEMP.

Expected effects	What we are doing and why
People and communities **Construction:** This would reduce potential impacts on nearby properties in terms of land take, access and construction impacts. The change would result in a beneficial effect and would represent an improvement to those effects reported in the PEIR. **Operation:** This would reduce impacts on nearby properties in terms of land take and access. The change would result in a beneficial effect and would represent an improvement to those effects reported in the PEIR.	We are continuing to assess the impact of the project in relation to the proposed change to develop mitigation measures and lessen negative impacts. Mitigation at this location to improve residential amenity during both the construction and operational phases is described elsewhere in this table, notably landscape and noise.
Climate **Construction:** This change would have a negligible effect on the climate assessment described in the PEIR. **Operation:** This change would have a negligible effect on the climate assessment presented in the PEIR.	We will continue to understand the project's overall contribution to climate through greenhouse gas emissions via the outputs of carbon modelling. Measures to manage construction phase carbon, which the contractors would be required to employ, would be detailed in the CoCP and CEMP.

13. Rectory Road realignment

The Rectory Road diversion shown at statutory consultation has been removed so the alignment follows the existing Rectory Road.

Expected effects	What we are doing and why
Air quality **Construction:** Section 6.6.3 – 6.6.7 of the PEIR is unaffected by this change. The construction phase of the project has the potential to affect air quality because of dust emissions and the emissions from non-road mobile machinery, and construction vehicle movements by road, river and rail. With mitigation in place, there should be no significant adverse impacts arising from dust emissions or associated with non-road mobile machinery. **Operation:** We would not expect this to change the adverse operational air quality effects reported in the PEIR, based on the distance between this road and receptors on Stanford Road.	Mitigation measures would be incorporated as set out in the PEIR. Construction vehicle modelling is being undertaken to identify whether there would be any adverse effects associated with construction vehicle movements. This will be reported in the ES and any further mitigation measures will be identified.
Noise and vibration **Construction:** As a result of the proximity of noise sensitive receptors to Rectory Road, there is a potential for temporary significant adverse effects. **Operation:** We do not expect there to be material differences to the potential road traffic noise effects described in the PEIR.	Construction effects would be controlled through the CoCP and a CEMP. As set out in the PEIR, best practical means would be followed (detailed in Table 13.15). Potential operational mitigation measures described in the PEIR would remain appropriate and would be incorporated into the design where necessary. With regard to both construction and operational effects associated with the project, noise and vibration continues to be assessed and considered. These will be reported in full in the ES.

Expected effects	What we are doing and why
Cultural heritage **Construction:** There would be a reduction in the area of land required and, therefore, a minor beneficial improvement in the adverse effects to archaeological remains reported in the PEIR. **Operation:** There would be no significant change to the assessment reported in the PEIR.	Mitigation of impacts to archaeological remains would follow the approach outlined in the PEIR. A detailed assessment would be included in the ES.
Landscape and visual **Construction:** The nature of the effects would be similar to those reported in the PEIR, i.e. a major negative landscape change and a moderate to major negative change in the view for a range of visual receptors. The altered structure's location would still require the same level of construction activity. **Operation:** The nature of the effects would be similar to those reported in the PEIR, i.e. a major negative landscape change and a moderate to major negative change in the view for a range of visual receptors.	There are mitigation proposals that are no longer being taken forward (landscape earthworks strategy at the A13 junction, and slackened slope false cutting earthworks). Otherwise, mitigation proposals continue to reflect those outlined in the PEIR. A full assessment will be included in the ES supported by photomontages.
Biodiversity (terrestrial and marine) **Construction:** Removing this diversion would reduce the extent of habitat loss compared with that reported in the PEIR. Although beneficial, it is considered unlikely this would lead to a reduction in the significance level of the assessment conclusion. **Operation:** We do not expect the change to alter the assessment of effects for project operation in the PEIR.	Mitigation measures would be as set out in the PEIR.

Expected effects	What we are doing and why
Road drainage and the water environment **Construction:** The effects would be the same as those described in the PEIR. **Operation:** The effects would be the same as those described in the PEIR.	Potential mitigation measures described in the PEIR would remain appropriate.
Geology and soils **Construction:** There would be no significant changes to the assessment and effects reported in the PEIR, which were assessed as unlikely to be significant. **Operation:** This change would have a negligible effect on the assessment presented in the PEIR, which reported that it was unlikely there would be significant effects.	Construction effects would be controlled through the CoCP and a CEMP. Should ground investigation encounter any contamination, appropriate assessment would be undertaken and, if required, a remediation strategy would be developed and agreed with our stakeholders.
Materials and waste **Construction:** The change would be expected to have a negligible effect on the assessment on materials and waste presented in the PEIR. **Operation:** This change would have a negligible effect on the assessment presented in the PEIR.	Mitigation for materials and waste remains as described in the PEIR. We will continue to refine our approach to balancing the earthworks across the project to maximise the re-use of excavated materials onsite and within the design proposals. This would reduce the requirement for off-site haulage and reliance on third-party waste infrastructure. Measures to manage construction material storage, including excavated materials and soils, and wastes on-site would be detailed in the ES, CoCP and CEMP.

Expected effects	What we are doing and why
People and communities **Construction:** For this proposed change, there would be a reduction in construction land take, which would represent an improvement compared to what was reported in the PEIR. However, there is the potential for utility works to occur in this area; the effects of which are discussed in chapter 3. **Operation:** The route realignment would lessen the quantity of permanent land-take required for the project and means it would no longer pass directly through Orsett Showground. This would represent a material improvement to those effects reported in the PEIR.	This change would remove the impact on Orsett Showground, and no mitigation is required as a result of this change. However, utility works would be undertaken in this area and mitigation would be required for affects associated with these. See chapter 3, table 4 'People and communities' for further details.
Climate **Construction:** This change would have a negligible effect on the climate assessment described in the PEIR. **Operation:** This change would have a negligible effect on the climate assessment presented in the PEIR.	We will continue to understand the project's overall contribution to climate through greenhouse gas emissions via the outputs of carbon modelling. Measures to manage construction phase carbon, which the contractors would be required to employ, would be detailed in the CoCP and CEMP.

14. Hornsby Lane closure

Part of Hornsby Lane would be permanently closed, with areas provided for turning either side of the LTC. This closure would avoid disruption caused by having to move overhead lines.

Expected effects	What we are doing and why
Air quality **Construction:** Section 6.6.3 – 6.6.7 of the PEIR is unaffected by this change. The construction phase of the project has the potential to affect air quality because of dust emissions and the emissions from non-road mobile machinery, and construction vehicle movements by road, river and rail. With mitigation in place, there should be no significant adverse impacts arising from dust emissions or associated with non-road mobile machinery. **Operation:** We would not expect this to change the operational air quality effects reported in the PEIR, as there were no air quality receptors included along Hornsby Lane and impacts are likely to be imperceptible along this road.	Mitigation measures would be incorporated as set out in the PEIR. Construction vehicle modelling is being undertaken to identify whether there would be any adverse effects associated with construction vehicle movements. This will be reported in the ES and any further mitigation measures will be identified.
Noise and vibration **Construction:** There is the potential for temporary significant adverse effects in the vicinity of the works. **Operation:** We do not expect there to be material differences to the potential road traffic noise effects described in the PEIR.	Construction effects would be controlled through the CoCP and a CEMP. As set out in the PEIR, best practical means would be followed (detailed in Table 13.15). Potential operational mitigation measures described in the PEIR would remain appropriate and would be incorporated into the design where necessary. With regard to both construction and operational effects associated with the project, noise and vibration continues to be assessed and considered. These will be reported in full in the ES.

Expected effects	What we are doing and why
Cultural heritage **Construction:** There would be a reduction in the works area and, therefore, a minor beneficial improvement in the adverse effects to archaeological remains reported in the PEIR. **Operation:** The removal of the overbridge from the proposed development would be a marginal improvement to the adverse effects to the grade II listed Heath Place reported in the PEIR, resulting from the change to setting. The closure of this route would be a change to the historic landscape resulting in a marginal worsening of the adverse effects reported in the PEIR.	Mitigation of impacts to archaeological remains would follow the approach outlined in the PEIR. A detailed assessment would be included in the ES.
Landscape and visual **Construction:** The nature of the effects would be similar to those reported in the PEIR, i.e. a major negative landscape change and a moderate to major negative change in the view for a range of visual receptors. A removed structure would not change the presence of construction activities in this rural landscape. **Operation:** There would be a slight benefit to the reported nature of effects reported in the PEIR, i.e. a major negative landscape change and a moderate to major negative change in the view for a range of visual receptors. The associated overbridges and their approach embankments, located in relatively close proximity to each other, would form locally prominent features. The removal of the Hornsby Lane structure would reduce the overall prominence of this series of structures. Furthermore, this would reduce direct impacts on the setting to the grade II listed Heath Place within this intimate rural landscape, and the continuation of false cutting earthworks would provide further visual screening of the project at this location.	There are mitigation proposals that are no longer being taken forward (false cuttings with slackened slopes due to engineering constraints). Otherwise, mitigation proposals continue to reflect those outlined in the PEIR. A full assessment will be included in the ES supported by representative photomontages.

Expected effects	What we are doing and why
Biodiversity (terrestrial and marine) **Construction:** Avoiding utilities works in this area would reduce the extent of habitat loss compared with that reported in the PEIR. Although beneficial, it is considered unlikely this would lead to a reduction in the significance level of the assessment conclusion. **Operation:** We do not expect the change to alter the assessment of effects for project operation in the PEIR.	Potential mitigation measures described in the PEIR would remain appropriate.
Road drainage and the water environment **Construction:** The effects would be the same as those described in the PEIR. **Operation:** The effects would be the same as those described in the PEIR.	Potential mitigation measures described in the PEIR would remain appropriate.
Geology and soils **Construction:** There would be no significant changes to the assessment and effects reported in the PEIR, which were assessed as unlikely to be significant. **Operation:** This change would have a negligible effect on the assessment presented in the PEIR, which reported that it was unlikely there would be significant effects.	Construction effects would be controlled through the CoCP and a CEMP. Should ground investigation encounter any contamination, appropriate assessment would be undertaken and, if required, a remediation strategy would be developed and agreed with our stakeholders.

Expected effects	What we are doing and why
Materials and waste **Construction:** The change would be expected to result in a slight improvement on the scenario presented in the PEIR due to a reduction in the demand for construction materials. However, overall it would be likely to have a negligible effect on the assessment reported in the PEIR for materials and waste. **Operation:** This change would have a negligible effect on the assessment presented in the PEIR.	Mitigation for materials and waste remains as described in the PEIR. We will continue to refine our approach to balancing the earthworks across the project to maximise the re-use of excavated materials onsite and within the design proposals. This would reduce the requirement for off-site haulage and reliance on third-party waste infrastructure. Measures to manage construction material storage, including excavated materials and soils, and wastes on-site would be detailed in the ES, CoCP and CEMP.
People and communities **Construction:** Residential properties, local businesses and community facilities in Orsett Heath would no longer be accessible via Hornsby Lane from the north. However, alternative means of access would remain available and no additional adverse effect is considered likely as a result of the closure. **Operation:** Residential properties, local businesses and community facilities in Orsett Heath would no longer be accessible via Hornsby Lane from the north. However, alternative means of access would remain available and no additional adverse effect is considered likely as a result of the closure.	We are continuing to work with local stakeholders to fully understand the implications of the closure of Hornsby Lane at this location and develop appropriate mitigation accordingly.
Climate **Construction:** This change would have a negligible effect on the climate assessment described in the PEIR. **Operation:** This change would have a negligible effect on the climate assessment presented in the PEIR.	We will continue to understand the project's overall contribution to climate through greenhouse gas emissions via the outputs of carbon modelling. Measures to manage construction phase carbon, which the contractors would be required to employ, would be detailed in the CoCP and CEMP.

15. M25 to A13 southbound lane removal

One lane has been removed southbound between the M25 and A13 junctions, reducing the number of lanes from three to two.

Expected effects	What we are doing and why
Air quality **Construction:** Section 6.6.3 – 6.6.7 of the PEIR is unaffected by this change. The construction phase of the project has the potential to affect air quality because of dust emissions and the emissions from non-road mobile machinery, and construction vehicle movements by road, river and rail. With mitigation in place, there should be no significant adverse impacts arising from dust emissions or associated with non-road mobile machinery. **Operation:** We would not expect this to change the adverse operational air quality effects reported along this section of the alignment in the PEIR.	Mitigation measures would be incorporated as set out in the PEIR. Construction vehicle modelling is being undertaken to identify whether there would be any adverse effects associated with construction vehicle movements. This will be reported in the ES and any further mitigation measures will be identified.
Noise and vibration **Construction:** There remains the potential for temporary significant adverse effects associated with transient works through this section. **Operation:** We do not expect there to be material differences to the potential road traffic noise effects described in the PEIR.	Construction effects would be controlled through the CoCP and a CEMP. As set out in the PEIR, best practical means would be followed (detailed in Table 13.15). Potential operational mitigation measures described in the PEIR would remain appropriate and would be incorporated into the design where necessary. With regard to both construction and operational effects associated with the project, noise and vibration continues to be assessed and considered. These will be reported in full in the ES.
Cultural heritage **Construction:** There would be no significant change to the assessment reported in the PEIR. **Operation:** There would be no significant change to the assessment reported in the PEIR.	Mitigation of impacts to archaeological remains would follow the approach outlined in the PEIR. A detailed assessment would be included in the ES.

Expected effects	What we are doing and why
Landscape and visual **Construction:** The nature of the effects would be similar to those reported in the PEIR, i.e. a major to moderate negative landscape change and a typically minor to major negative change in views for a range of visual receptors. A reduced footprint would not change the presence of construction activity in this rural landscape and would still result in impacts within the relatively remote and tranquil landscape of the former low-lying, flat Orsett Fen. Here, construction activities associated with the viaduct and embankments as it crosses the extensive floodplain of this area would be prominent. This would impact a number of rural receptors within this area including public rights of way and isolated residential properties. **Operation:** The nature of the effects would be similar to those reported in the PEIR, i.e. a moderate to major negative landscape change and a minor to major negative change in the view for a range of visual receptors. This is due to the elevated nature of the project, which would continue to be a prominent feature.	Mitigation proposals continue to reflect those outlined in the PEIR. This includes development of fen landscape and habitat creation, and false cuttings. A full assessment will be included in the ES supported by representative photomontages.
Biodiversity (terrestrial and marine) **Construction:** Reducing the extent of habitat loss in this area compared with that reported in the PEIR, although beneficial, is considered unlikely to lead to a reduction in the significance level of the assessment conclusion. **Operation:** We do not expect the change to alter the assessment of effects for project operation in the PEIR.	Potential mitigation measures described in the PEIR would remain appropriate.

Expected effects	What we are doing and why
Road drainage and the water environment **Construction:** The minor to moderate adverse effects assessed in the PEIR would likely be reduced (but not altogether prevented) by this design change. The benefits would be linked to a smaller land take/ built footprint that would reduce effects on the local drainage regime. Also, at watercourse crossings, culverts would be shorter in length and open span crossings would be narrower, reducing the potential effects on the water quality and hydromorphology of these watercourses. **Operation:** The minor to moderate adverse effects assessed in the PEIR would likely be reduced by this design change, as described for construction above.	Potential mitigation measures described in the PEIR that are relevant to watercourse crossing design and the management of construction and operational drainage would remain appropriate.
Geology and soils **Construction:** There would be no significant changes to the assessment and effects reported in the PEIR, which were assessed as unlikely to be significant. **Operation:** This change would have a negligible effect on the assessment presented in the PEIR, which reported that it was unlikely there would be significant effects.	Construction effects would be controlled through the CoCP and a CEMP. Should ground investigation encounter any contamination, appropriate assessment would be undertaken and, if required, a remediation strategy would be developed and agreed with our stakeholders.

Expected effects	What we are doing and why
Materials and waste **Construction:** The change would be expected to result in a slight improvement on the scenario presented in the PEIR due to a reduction in the demand for construction materials. **Operation:** This change would have a negligible effect on the assessment presented in the PEIR.	Mitigation for materials and waste remains as described in the PEIR. We will continue to refine our approach to balancing the earthworks across the project to maximise the re-use of excavated materials on-site and within the design proposals. This would reduce the requirement for off-site haulage and reliance on third-party waste infrastructure. Measures to manage construction material storage, including excavated materials and soils, and wastes on-site would be detailed in the ES, CoCP and CEMP.
People and communities **Construction:** Less land take would be required as a result of the proposed change, reducing likely effects on agricultural land and businesses. This change would represent an improvement to those effects reported in the PEIR. **Operation:** Less land take would be required as a result of the proposed change, reducing likely effects on agricultural land and businesses. The change would represent an improvement to those effects reported in the PEIR.	We are minimising land take required for the project, which would lessen effects on agricultural businesses at this location, and lessen the requirement for mitigation measures as set out in the PEIR.
Climate **Construction:** This change would have a negligible effect on the climate assessment described in the PEIR. **Operation:** This change would have a negligible effect on the climate assessment presented in the PEIR.	We will continue to understand the project's overall contribution to climate through greenhouse gas emissions via the outputs of carbon modelling. Measures to manage construction phase carbon, which the contractors would be required to employ, would be detailed in the CoCP and CEMP.

16. Routing through the Mardyke

The route has moved approximately 200 metres south-west to reduce the diversion work required to move an existing gas main. We have also further developed the design in this area and are proposing changes to the structures over the Mardyke River, Golden Bridge Sewer and the Orsett Fen Sewer.

Expected effects	What we are doing and why
Air quality **Construction:** Section 6.6.3 – 6.6.7 of the PEIR is unaffected by this change. The construction phase of the project has the potential to affect air quality because of dust emissions and the emissions from non-road mobile machinery, and construction vehicle movements by road, river and rail. With mitigation in place, there should be no significant adverse impacts arising from dust emissions or associated with non-road mobile machinery. **Operation:** We would not expect this to change any of the operational air quality effects reported in the PEIR as there are no receptors within 200 metres of this alignment change.	Mitigation measures would be incorporated as set out in the PEIR. Construction vehicle modelling is being undertaken to identify whether there would be any adverse effects associated with construction vehicle movements. This will be reported in the ES and any further mitigation measures will be identified.

Expected effects	What we are doing and why
Noise and vibration **Construction:** There remains the potential for temporary significant adverse effects, pronounced at receptors to the south-west and reduced slightly at those in the north-east. **Operation:** We do not expect there to be significant material differences to the potential road traffic noise effects described in the PEIR. However, receptors to the south-west of the route would be expected to present a slightly larger magnitude of change in road traffic noise. Receptors to the north-east could potentially see a lower magnitude of change relative to outputs presented in the PEIR. This would be a direct result of the significant movement of the route through this section.	Construction effects would be controlled through the CoCP and a CEMP. As set out in the PEIR, best practical means would be followed (detailed in Table 13.15). Potential operational mitigation measures described in the PEIR would remain appropriate and would be incorporated into the design where necessary. With regard to both construction and operational effects associated with the project, noise and vibration continues to be assessed and considered. These will be reported in full in the ES.
Cultural heritage **Construction:** There would be no significant change to the assessment reported in the PEIR. **Operation:** There would be no significant change to the assessment reported in the PEIR.	Mitigation of impacts to archaeological remains would follow the approach outlined in the PEIR. Detailed assessment in the ES.

Expected effects	What we are doing and why
Landscape and visual **Construction:** The nature of the effects would be similar to those reported in the PEIR, i.e. a major negative landscape change and typically a moderate to major negative change in views for a range of visual receptors. The main impact would occur within the relatively remote and tranquil landscape of the former low-lying, flat Orsett Fen, where construction activities associated with the viaduct and embankments as it crosses the extensive floodplain of this area would be prominent. This would impact a number of rural receptors within this area including public rights of way and isolated residential properties. **Operation:** The nature of the effects would be similar to those reported in the PEIR, i.e. a major negative landscape change and a moderate to major negative change in the view for a range of visual receptors. This is due to the elevated nature of the project, which would continue to be a prominent feature.	Mitigation proposals continue to reflect those outlined in the PEIR. This includes development of fen landscape and habitat creation, and false cuttings. A full assessment will be included in the ES supported by representative photomontages.
Biodiversity (terrestrial and marine) **Construction:** Reducing the extent of habitat loss in this area compared with that reported in the PEIR, although beneficial, is considered unlikely to lead to a reduction in the significance level of the assessment conclusion. However, the structures over the Mardyke would provide some flood storage, which would support greater botanical diversity in this area. This, in turn, would support a greater diversity of fauna. **Operation:** We do not expect the change to alter the assessment of effects for project operation in the PEIR.	The landscape design would incorporate a more diverse habitat proposal in this area as opposed to its return to agricultural use. This would be beneficial to the overall Environmental Masterplan design and the project's biodiversity value, otherwise mitigation measures remain as set out in the PEIR.

Expected effects	What we are doing and why
Road drainage and the water environment **Construction:** The moderate adverse effects assessed in the PEIR would be reduced by these design changes. Realignment to minimise impacts on the nearby landfill reduces pollution risks to ground and surface water resources. Through an iterative process, informed by hydraulic modelling, design changes to the proposed crossings of the Mardyke River and its tributaries would reduce the effects on flood risk and hydromorphology so they are negligible. **Operation:** The moderate adverse effects assessed in the PEIR would be reduced by these design changes, as reported for construction above.	These design changes would reduce the need for, or spatial extent of, the mitigation measures described in the PEIR. For example, the land take required for provision of compensatory floodplain storage to mitigate flood risk affects would be reduced. Detailed hydraulic modelling of the Mardyke River, Golden Bridge Sewer and the Orsett Fen Sewer have been undertaken to inform crossing design. The results will be reported in the ES and its accompanying Flood Risk Assessment.
Geology and soils **Construction:** There would be no significant changes to the assessment and effects reported in the PEIR, which were assessed as unlikely to be significant. **Operation:** This change would have a negligible effect on the assessment presented in the PEIR, which reported that it was unlikely there would be significant effects.	Construction effects would be controlled through the CoCP and a CEMP. Should ground investigation encounter any contamination (for example due to the proximity of the Ockendon landfill), appropriate assessment would be undertaken and, if required, a remediation strategy would be developed and agreed with our stakeholders.
Materials and waste **Construction:** The change could lead to an increased demand for construction materials within this section of the route, which would result in a slight worsening of the scenario presented in the PEIR. However, overall it is likely to have a negligible effect on the assessment reported in the PEIR for materials and waste. **Operation:** This change would have a negligible effect on the assessment presented in the PEIR.	Mitigation for materials and waste remains as described in the PEIR. We will continue to refine our approach to balancing the earthworks across the project to maximise the re-use of excavated materials on-site and within the design proposals. This would reduce the requirement for off-site haulage and reliance on third-party waste infrastructure. Measures to manage the storage of excavated materials and soils for re-use on-site would be detailed in the ES, CoCP and CEMP.

Expected effects	What we are doing and why
People and communities **Construction:** The proposed changes would reduce the impact on an area of woodland known as 'the wilderness' and would move the route further from local footpaths. The change, therefore, would reduce the impact on local recreation users in this location and would represent an improvement to those effects reported in the PEIR at this location. **Operation:** The proposed changes would reduce the impact on an area of woodland known as 'the wilderness' and would move the route further from local footpaths. The change, therefore, would reduce the impact on local recreation users in this location and would represent an improvement to those effects reported in the PEIR at this location.	We are minimising the impact of the project on recreational users in this area. Mitigation would be as reported in the PEIR.
Climate **Construction:** This change would have a negligible effect on the climate assessment described in the PEIR. **Operation:** This change would have a negligible effect on the climate assessment presented in the PEIR.	We will continue to understand the project's overall contribution to climate through greenhouse gas emissions via the outputs of carbon modelling. Measures to manage construction phase carbon, which the contractors would be required to employ, would be detailed in the CoCP and CEMP.

17. The height of the LTC and North Road

The LTC has been lowered by two metres and, as a result, North Road has also been lowered by two metres.

Expected effects	What we are doing and why
Air quality **Construction:** Section 6.6.3 – 6.6.7 of the PEIR is unaffected by this change. The construction phase of the project has the potential to affect air quality because of dust emissions and the emissions from non-road mobile machinery, and construction vehicle movements by road, river and rail. With mitigation in place, there should be no significant adverse impacts arising from dust emissions or associated with non-road mobile machinery. **Operation:** We would not expect this to change any of the operational air quality effects reported in the PEIR, as vertical alignments are not included in the dispersion model.	Mitigation measures would be incorporated as set out in the PEIR. Construction vehicle modelling is being undertaken to identify whether there would be any adverse effects associated with construction vehicle movements. This will be reported in the ES and any further mitigation measures will be identified.
Noise and vibration **Construction:** There remains the potential for temporary significant adverse effects. **Operation:** We do not expect there to be material differences to the potential road traffic noise effects described in the PEIR.	Construction effects would be controlled through the CoCP and a CEMP. As set out in the PEIR, best practical means would be followed (detailed in Table 13.15). Potential operational mitigation measures described in the PEIR would remain appropriate and would be incorporated into the design where necessary. With regard to both construction and operational effects associated with the project, noise and vibration continues to be assessed and considered. These will be reported in full in the ES.

Expected effects	What we are doing and why
Cultural heritage **Construction:** There would be no significant change to the assessment reported in the PEIR. **Operation:** There would be no significant change to the assessment reported in the PEIR.	Mitigation of impacts to archaeological remains would follow the approach outlined in the PEIR. A detailed assessment would be included in the ES.
Landscape and visual **Construction:** The nature of the effects would be similar to those reported in the PEIR, i.e. a major negative landscape change and a moderate to major negative change in the view for a range of visual receptors. **Operation:** There would be a slight benefit to the nature of effects reported in the PEIR, i.e. a moderate negative landscape change and a moderate to minor negative change in the view for a range of visual receptors. This is a result of moving the alignment in the shallow cutting, which would reduce the visual influence of the highway and North Road structure within this flat landscape.	There are mitigation proposals that are no longer being taken forward (false cuttings with slackened slopes due to engineering constraints). Otherwise, mitigation proposals continue to reflect those outlined in the PEIR. A full assessment will be included in the ES supported by representative photomontages.
Biodiversity (terrestrial and marine) **Construction:** We do not expect the change to alter the assessment of effects for project construction in the PEIR. **Operation:** We do not expect the change to alter the assessment of effects for project operation in the PEIR.	Potential mitigation measures described in the PEIR would remain appropriate.

Expected effects	What we are doing and why
Road drainage and the water environment **Construction:** The lowered alignment would result in potential for more seepage of groundwater into excavations and drawdown effects impacting on locally groundwater dependent features, due to the necessary groundwater control. However, initial assessments indicate a negligible change to the effects reported in the PEIR. **Operation:** As with the construction phase, initial assessments indicate a negligible change to the effects reported in the PEIR.	A hydrogeological risk assessment will continue to be informed by ongoing ground investigation and will be reported in the ES. Pollution risks would be controlled through the application of a CEMP. Dewatering and subsequent discharge of groundwater would also be subject to consent from the Environment Agency, with conditions attached that safeguard the water environment.
Geology and soils **Construction:** There would be no significant changes to the assessment and effects reported in the PEIR, which were assessed as unlikely to be significant. **Operation:** This change would have a negligible effect on the assessment presented in the PEIR, which reported that it was unlikely there would be significant effects.	Construction effects would be controlled through the CoCP and a CEMP. Should ground investigation encounter any contamination, appropriate assessment would be undertaken and, if required, a remediation strategy would be developed and agreed with our stakeholders.
Materials and waste **Construction:** The change would be expected to have a negligible effect on the assessment on materials and waste presented in the PEIR, which reported that the project would be unlikely to have a significant impact on the UK supply of construction materials. The PEIR also reported that the project would be expected to potentially generate large quantities of waste and therefore the change would be unlikely to alter this conclusion. **Operation:** This change would have a negligible effect on the assessment presented in the PEIR.	Mitigation for materials and waste remains as described in the PEIR. We will continue to refine our approach to balancing the earthworks across the project to maximise the re-use of excavated materials on-site and within the design proposals. This would reduce the requirement for off-site haulage and reliance on third-party waste infrastructure. Measures to manage construction material storage, including excavated materials and soils, and wastes on-site would be detailed in the ES, CoCP and CEMP.

Expected effects	What we are doing and why
People and communities **Construction:** Temporary adverse construction effects on local residents and communities in this area, including North and South Ockendon, would remain as reported in the PEIR in respect of residential amenity. **Operation:** A reduction in the height of the route at this location would be likely to result in improved residential amenity for local communities of North and South Ockendon, compared with that reported in the PEIR.	We are continuing to assess the impact of the project in relation to the proposed change to develop mitigation measures and lessen negative impacts. Mitigation at this location to improve residential amenity during both the construction and operational phases is described elsewhere in this table, notably landscape and noise.
Climate **Construction:** This change would have a negligible effect on the climate assessment described in the PEIR. **Operation:** This change would have a negligible effect on the climate assessment presented in the PEIR.	We will continue to understand the project's overall contribution to climate through greenhouse gas emissions via the outputs of carbon modelling. Measures to manage construction phase carbon, which the contractors would be required to employ, would be detailed in the CoCP and CEMP.

18. Thames Chase Community Forest – new bridge

A new bridge suitable for walkers, cyclists and horse riders, is proposed to connect the east and west side of Thames Chase Forest.

Expected effects	What we are doing and why
Air quality **Construction:** Section 6.6.3 – 6.6.7 of the PEIR is unaffected by this change. The construction phase of the project has the potential to affect air quality because of dust emissions and the emissions from non-road mobile machinery, and construction vehicle movements by road, river and rail. With mitigation in place, there should be no significant adverse impacts arising from dust emissions or associated with non-road mobile machinery. **Operation:** As this would not change road traffic flows or road alignment, we do not expect it to change any of the operational air quality effects reported in the PEIR.	Mitigation measures would be incorporated as set out in the PEIR. Construction vehicle modelling is being undertaken to identify whether there would be any adverse effects associated with construction vehicle movements. This will be reported in the ES and any further mitigation measures will be identified.
Noise and vibration **Construction:** There remains the potential for temporary significant adverse effects. **Operation:** We do not expect there to be material differences to the potential road traffic noise effects as described in the PEIR.	Construction effects would be controlled through the CoCP and a CEMP. As set out in the PEIR, best practical means would be followed (detailed in Table 13.15). Potential operational mitigation measures described in the PEIR would remain appropriate and would be incorporated into the design where necessary. With regard to both construction and operational effects associated with the project, noise and vibration continues to be assessed and considered. These will be reported in full in the ES.

Expected effects	What we are doing and why
Cultural heritage **Construction:** There would be no significant change to the assessment reported in the PEIR. **Operation:** There would be no significant change to the assessment reported in the PEIR.	Mitigation of impacts to archaeological remains would follow the approach outlined in the PEIR. A detailed assessment would be included in the ES.
Landscape and visual **Construction:** The nature of the effects would be similar to those reported in the PEIR, i.e. a moderate negative landscape change and a typically moderate to minor negative change in views for a range of visual receptors. This is a result of loss of vegetation along the M25 and within Thames Chase Community Forest. **Operation:** The nature of the effects would be similar to those reported in the PEIR, i.e. a moderate negative landscape change and a moderate to minor negative change in the view for a range of visual receptors.	Mitigation would be similar to that reported in the PEIR.
Biodiversity (terrestrial and marine) **Construction:** We do not expect the change to alter the assessment of effects for project construction in the PEIR. **Operation:** We do not expect the change to alter the assessment of effects for project operation in the PEIR.	Potential mitigation measures described in the PEIR would remain appropriate.
Road drainage and the water environment **Construction:** The effects would be the same as those described in the PEIR. **Operation:** The effects would be the same as those described in the PEIR.	Potential mitigation measures described in the PEIR would remain appropriate.

Expected effects	What we are doing and why
Geology and soils **Construction:** There would be no significant changes to the assessment and effects reported in the PEIR, which were assessed as unlikely to be significant. **Operation:** This change would have a negligible effect on the assessment presented in the PEIR, which reported that it was unlikely there would be significant effects.	Construction effects would be controlled through the CoCP and a CEMP. Should ground investigation encounter any contamination, appropriate assessment would be undertaken and, if required, a remediation strategy would be developed and agreed with our stakeholders.
Materials and waste **Construction:** Although this would increase project demand for materials, the change would be expected to have a negligible effect on the assessment on materials and waste presented in the PEIR, which reported that the project would be unlikely to have a significant impact on the UK supply of construction materials. The PEIR also reported that the project would be expected to potentially generate large quantities of waste and therefore the change would be unlikely to alter this conclusion. **Operation:** This change would have a negligible effect on the assessment presented in the PEIR.	Mitigation for materials and waste remains as described in the PEIR. We will continue to refine our approach to balancing the earthworks across the project to maximise the re-use of excavated materials on-site and within the design proposals. This would reduce the requirement for off-site haulage and reliance on third-party waste infrastructure. Measures to manage construction material storage, including excavated materials and soils, and wastes on-site would be detailed in the ES, CoCP and CEMP.

Expected effects	What we are doing and why
People and communities **Construction:** During construction it is likely there would be some disruption to the existing use of routes for walking, cycling and horse-riding in the vicinity of the project, resulting in an adverse impact. We do not expect any change in the nature of the effect from that reported in the PEIR. **Operation:** A new bridge would potentially improve east-west connections in Thames Chase Forest and would encourage use by walkers, cyclists and equestrians. This effect would represent a material improvement of the effects reported in the PEIR.	The creation of a new bridge suitable for walkers, cyclists and equestrians would benefit the local recreation environment; ongoing assessment will consider how to maximise benefits for local users and link existing open spaces for recreational purposes.
Climate **Construction:** This change would have a negligible effect on the climate assessment described in the PEIR. **Operation:** This change would have a negligible effect on the climate assessment presented in the PEIR.	We will continue to understand the project's overall contribution to climate through greenhouse gas emissions via the outputs of carbon modelling. Measures to manage construction phase carbon, which the contractors would be required to employ, would be detailed in the CoCP and CEMP.

19. M25 junction 29 changes

Some minor alterations to the layout of junction 29 of the M25 are being proposed to reduce the amount of overhead cable diversion works.

Expected effects	What we are doing and why
Air quality **Construction:** Section 6.6.3 – 6.6.7 of the PEIR is unaffected by this change. The construction phase of the project has the potential to affect air quality because of dust emissions and the emissions from non-road mobile machinery, and construction vehicle movements by road, river and rail. With mitigation in place, there should be no significant adverse impacts arising from dust emissions or associated with non-road mobile machinery. **Operation:** We would not expect this to change any of the operational air quality effects reported in the PEIR as there are no receptors located within 200m of this junction.	Mitigation measures would be incorporated as set out in the PEIR. Construction vehicle modelling is being undertaken to identify whether there would be any adverse effects associated with construction vehicle movements. This will be reported in the ES and any further mitigation measures will be identified.
Noise and vibration **Construction:** There remains the potential for temporary significant adverse effects. **Operation:** We do not expect there to be material differences to the potential road traffic noise effects described in the PEIR.	Construction effects would be controlled through the CoCP and a CEMP. As set out in the PEIR, best practical means would be followed (detailed in Table 13.15). Potential operational mitigation measures described in the PEIR would remain appropriate and would be incorporated into the design where necessary. With regard to both construction and operational effects associated with the project, noise and vibration continues to be assessed and considered. These will be reported in full in the ES.

Expected effects	What we are doing and why
Cultural heritage **Construction:** There would be no significant change to the assessment reported in the PEIR. **Operation:** There would be no significant change to the assessment reported in the PEIR.	Mitigation of impacts to archaeological remains would follow the approach outlined in the PEIR. A detailed assessment would be included in the ES.
Landscape and visual **Construction:** The nature of the effects would be slightly worsened compared with those reported in the PEIR, i.e. a minor negative landscape change and a major negative change to isolated visual receptors. This considers the increase in extent of vegetation removal at this junction. **Operation:** There would be new adverse effects that would lead to a worsening of effects compared with those reported in the PEIR, i.e. a negligible negative change for landscape and a moderate change in the view for a range of visual receptors. This is as a result of direct impacts and permanent vegetation loss allowing for the required clearance zones for the protection of, and access to, utility corridors through the junction.	There will be new mitigation proposals to replace lost vegetation features in this location, where possible. In certain corridors, required clearance zones for the protection of, and access to, utility corridors will remain. A full assessment will be included in the ES supported by representative photomontages.
Biodiversity (terrestrial and marine) **Construction:** Avoiding utilities works in this area would reduce the extent of habitat loss. Although beneficial, it is considered unlikely to lead to a reduction in the significance level of the assessment conclusion. **Operation:** We do not expect the change to alter the assessment of effects for project operation in the PEIR.	Potential mitigation measures described in the PEIR would remain appropriate.

Expected effects	What we are doing and why
Road drainage and the water environment **Construction:** The effects would be the same as those described in the PEIR. **Operation:** The effects would be the same as those described in the PEIR.	Potential mitigation measures described in the PEIR would remain appropriate.
Geology and soils **Construction:** There would be no significant changes to the assessment and effects reported in the PEIR, which were assessed as unlikely to be significant. **Operation:** This change would have a negligible effect on the assessment presented in the PEIR, which reported that it was unlikely there would be significant effects.	Construction effects would be controlled through the CoCP and a CEMP. Should ground investigation encounter any contamination, appropriate assessment would be undertaken and, if required, a remediation strategy would be developed and agreed with our stakeholders.
Materials and waste **Construction:** The change would be expected to have a negligible effect on the assessment on materials and waste presented in the PEIR, which reported that the project would be unlikely to have a significant impact on the UK supply of construction materials. The PEIR also reported that the project would be expected to potentially generate large quantities of waste and therefore the change would be unlikely to alter this conclusion. **Operation:** This change would have a negligible effect on the assessment presented in the PEIR.	Mitigation for materials and waste remains as described in the PEIR. We will continue to refine our approach to balancing the earthworks across the project to maximise the re-use of excavated materials on-site and within the design proposals. This would reduce the requirement for off-site haulage and reliance on third-party waste infrastructure. Measures to manage construction material storage, including excavated materials and soils, and wastes on-site would be detailed in the ES, CoCP and CEMP.

Expected effects	What we are doing and why
People and communities **Construction:** We do not expect any change in the nature of the effect reported in the PEIR. **Operation:** We do not expect any change in the nature of the effect reported in the PEIR.	We are continuing to assess the impact of the project in relation to the proposed change to develop mitigation measures and lessen negative impacts.
Climate **Construction:** This change would have a negligible effect on the climate assessment described in the PEIR. **Operation:** This change would have a negligible effect on the climate assessment presented in the PEIR.	We will continue to understand the project's overall contribution to climate through greenhouse gas emissions via the outputs of carbon modelling. Measures to manage construction phase carbon, which the contractors would be required to employ, would be detailed in the CoCP and CEMP.

3. Utilities

We have been working with our stakeholders who own and operate these important utilities to understand in greater detail what would need to be relocated, diverted or, in some cases, protected as a result of our project. We are continuing to work with stakeholders to refine our design (and to seek to reduce the physical scale of our works). At present, there are several complex pieces of utility assets that would need diverting. These would require temporary land access to construct the diversion, and the acquisition of some land (or rights over land) permanently.

The following tables provide an update on the environmental effects associated with the utility proposals, compared with those considered in the PEIR.

1. Utility proposals at the A2 junction and corridor

Please see the Utilities Update document for details on the utility proposals in this area.

There are a number of factors in this area that need to be carefully considered to minimise impacts and ensure safety for the public and our contractors. These include working in proximity to a live railway (High Speed 1) and the sufficient safety clearance; works near major roads such as the A2 and M2; the impacts on the Kent Downs AONB, SSSI, ancient woodland and public open space areas; and the multitude of existing services that run parallel to the A2.

Expected effects	What we are doing and why
Air quality **Construction:** Section 6.6.3 – 6.6.7 of the PEIR is unaffected by this change. The construction phase of the project has the potential to affect air quality because of dust emissions and the emissions from non-road mobile machinery, and construction vehicle movements by road, river and rail. With mitigation in place, there should be no significant adverse impacts arising from dust emissions or associated with non-road mobile machinery. **Operation:** It is not expected that this would change road traffic flows or the road alignment, so we do not expect a change to any of the operational air quality effects reported in the PEIR.	Construction and operational air quality effects will be considered as part of the ES. Mitigation measures as set out in the PEIR are unchanged.
Noise and vibration **Construction:** As a result of the proximity of the utility diversions to noise sensitive receptors, there is the potential for temporary significant adverse effects. **Operation:** We do not expect there to be material differences to the potential for road traffic noise effects as described in the PEIR. There would be no operational noise effects associated with any of the utility diversions.	Construction effects would be controlled through the CoCP and a CEMP. As set out in the PEIR, best practical means would be followed (detailed in Table 13.15).

Expected effects	What we are doing and why
Cultural heritage **Construction:** As a result of this change there would be an increased adverse effect as reported in the PEIR to grade II* registered Cobham Hall park and garden, and the scheduled bowl barrow in Ashenbank Wood due to an increase in the construction working area within the designated park. There would also be an adverse effect to Cobham Conservation Area, and listed buildings within the conservation area, due to a change to their setting. In addition, there would be an adverse effect on any archaeological remains within the footprint described by this change. **Operation:** As a result of this change there would be maintenance of vegetation clearing, which would increase adverse effects on the setting of Cobham Hall park and the bowl barrow in Ashenbank Wood.	Mitigation of impacts to archaeological remains would follow the approach outlined in the PEIR. Details of any landscape mitigation measures are covered in the Landscape and visual row of this table. A detailed assessment would be included in the ES.
Landscape and visual **Construction:** These would be new adverse effects that would lead to a worsening of the major adverse effects reported in the PEIR, i.e. a major negative landscape change and a moderate to major negative change in the view for a range of visual receptors. This is as a result of direct effects upon the designated Kent Downs AONB and the perceived qualitative change to special landscape and scenic characteristics and qualities, alongside impacts to the setting within Cobham Hall Grade II* registered park and garden and Shorne Woods Country Park, and Ashenbank Wood within the AONB and Jeskyns Community Woodland in the setting of the AONB.	There will be new mitigation proposals to replace lost vegetation features in this location, where possible. In certain corridors, required clearance zones for the protection of and access to utility corridors will remain. Detailed assessment will be included in the ES including photomontages. Woodland mitigation planting would be developed to replace trees and screening.

Expected effects	What we are doing and why
The scale and nature of change as a result of construction activity and significant vegetation loss associated with the utility corridor would create a series of dominating visual focuses that increase visibility of HS1 and the widened A2 corridor. Construction activity would also be a prominent feature of views from visual receptors within and immediately adjacent to the corridor, including users crossing the A2 at Thong Lane, Brewers Road and at Park Pale. This would also include views from vantage points within the immediate landscape, particularly from the south at the north edges of Ashenbank Woods and Cobham Hall Park. **Operation:** There would be new adverse effects and this would lead to a worsening of effects reported in the PEIR, i.e. a major negative change for landscape and a moderate to major change in the view for a range of visual receptors. This would be as a result of direct impacts and permanent vegetation loss allowing for the required clearance zones for the protection of, and access to, utility corridors.	

Expected effects	What we are doing and why
Biodiversity (terrestrial and marine) **Construction:** Additional habitat loss would occur as a result of utilities diversions, including some designated areas (ancient woodland within Shorne and Ashenbank Woods SSSI), and habitat that supports protected and/or notable species, e.g. dormouse and great crested newt. The additional loss of habitat, and potential restrictions on what planting can be reinstated over buried utilities assets, would lead to worsening of the adverse effect reported in the PEIR for certain receptors, such as Shorne and Ashenbank Woods SSSI. Although the area of ancient woodland loss would increase, the PEIR assessment already concludes a significant adverse effect so this change would not alter that. **Operation:** We do not expect the change to alter the assessment of effects for project operation reported in the PEIR.	As reported in the PEIR, extensive woodland planting north of the A2 would help offset the loss of ancient woodland within the SSSI designation. Receptor sites for protected species, such as dormouse and great crested newt, have been identified.
Road drainage and the water environment **Construction:** This design change would introduce potential new minor adverse effects to those reported in the PEIR. The effects are linked to the potential for works that break ground to open a pollution pathway to the underlying groundwater resource, or disturbing existing ground contamination. Trenches could also act as a preferential flow path for groundwater, affecting local groundwater dependent features. **Operation:** It is not expected that this would change the assessment of the operational effects of the proposed development on the water environment.	This design change would be subject to detailed assessment in the ES and relevant works would be included in the scope of the hydrogeological risk assessment. Pollution risks would be managed through the implementation of measures detailed in the CEMP.

Expected effects	What we are doing and why
Geology and soils **Construction:** There would be no significant changes to the assessment and effects reported in the PEIR which were assessed as unlikely to be significant. **Operation:** This change would have a negligible effect on the assessment presented in the PEIR, which reported that it was unlikely there would be significant effects.	Construction effects would be controlled through the CoCP and a CEMP. Should ground investigation encounter any contamination, appropriate assessment would be undertaken and, if required, a remediation strategy would be developed and agreed with our stakeholders.
Materials and waste **Construction:** The change would be expected to have a negligible effect on the assessment on materials and waste presented in the PEIR, which reported that the project would be unlikely to have a significant impact on the UK supply of construction materials. The PEIR also reported that the project would be expected to potentially generate large quantities of waste and therefore the change would be unlikely to alter this conclusion. **Operation:** This change would have a negligible effect on the assessment presented in the PEIR.	Mitigation for materials and waste remains as described in the PEIR. We will continue to refine our approach to balancing the earthworks across the project to maximise the re-use of excavated materials on-site and within the design proposals. This would reduce the requirement for off-site haulage and reliance on third-party waste infrastructure. Measures to manage construction material storage, including excavated materials and soils, and wastes on-site would be detailed in the ES, CoCP and CEMP.

Expected effects	What we are doing and why
People and communities **Construction:** Adverse effects would relate to permanent and temporary land take and access to land and properties. This would result in a worsening of adverse effects in some locations, for example communities in the south east of Gravesend and Thong. This would represent a worsening of the impacts reported in the PEIR. **Operation:** Impacts on people and communities would relate to permanent land take where utilities have been diverted. There may also be impacts in relation to visual amenity as a result of new utility infrastructure. This may lead to an adverse effect in some locations, for example communities in the south east of Gravesend and Thong, and would represent a worsening of the impacts reported in the PEIR.	We are continuing to work with utility providers to reduce the land required for utility diversions and to develop appropriate mitigation measures, such as screening. We are also further discussing requirements to compensate for the loss of open space, where relevant, with our stakeholders.
Climate **Construction:** This change would have a negligible effect on the climate assessment described in the PEIR. **Operation:** This change would have a negligible effect on the climate assessment presented in the PEIR.	We will continue to understand the project's overall contribution to climate through greenhouse gas emissions via the outputs of carbon modelling. Measures to manage construction phase carbon, which the contractors would be required to employ, would be detailed in the CoCP and CEMP.

2. Utility proposals around the southern tunnels entrance

Please see the Utilities Update document for details on the utility proposals in this area.

The works in this area include installing utilities to supply power and services to the construction site on a temporary basis and the tunnels on a permanent basis. The working area includes open fields, which are away from residential properties. We would also carefully consider the impact on environmentally sensitive areas to the south and the Thames Estuary and Marshes Ramsar site to the north.

Expected effects	What we are doing and why
Air quality **Construction:** The enabling works that facilitate the diversion of utilities require temporary earthworks and general construction-type activities. These activities have the potential to release dust emissions. However, dust impacts are generally negligible if more than 200 metres from the source. **Operation:** There will be no operational impact in terms of air quality resulting from the diversion of utilities.	Construction effects would be controlled through the CoCP and a CEMP. The mitigation measures relevant to air quality were summarised in paragraph 6.6.4-6.6.7 of the PEIR.
Noise and vibration **Construction:** As the baseline noise climate is relatively low there is a potential for temporary significant adverse effects; albeit these may be mitigated by separation distance as the works are away from residential properties. **Operation:** It is not anticipated that there would be any material differences to the potential for noise effects following project opening as described in the PEIR.	Construction effects would be controlled through the CoCP and CEMP. As set out in the PEIR best practical means would be followed (Table 13.15). No operational noise effects associated with any of the utility works would be expected.

Expected effects	What we are doing and why
Cultural heritage **Construction:** There is no change to the assessment in the PEIR of physical impact to any archaeological remains in the area of these changes. The location of the substation may increase the adverse effect assessed in the PEIR to St. Mary's Church due to change to the setting of the listed building that affect its significance, depending on which option is selected. **Operation:** The location of the substation may increase the adverse effect assessed in the PEIR to St. Mary's Church, depending on which option is selected.	Mitigation to archaeological remains is as described within the PEIR. A full assessment would be included in the ES.
Landscape and visual **Construction:** The nature of effects would be similar to those reported in the PEIR i.e. major negative landscape change and moderate to major negative change in the view for a range of visual receptors. This considers the extent of construction activity within the construction site in that area which, due to the open and gently rolling nature of this area, would be widely visible. **Operation:** There will be a slight worsening to reported nature of effects in the PEIR i.e. moderate negative change for landscape and minor to major change in the view for a range of visual receptors (dependent on the option taken forward). This is as a result of new built form within this gently rolling landform which could be widely visible.	There are mitigation proposals which are no longer being taken forward (hedgerow improvement strategy to reflect the historic field pattern). Otherwise mitigation proposals continue to reflect those outlined in the PEIR. The latest mitigation proposals also include a new public open space (Chalk Park) as shown in the Map Book 1: General Arrangements. A full assessment would be included in the ES supported by representative photo realistic visualisations (photomontages).

Expected effects	What we are doing and why
Biodiversity (terrestrial and marine) **Construction:** It is not considered the change will alter the assessment of effects for project construction in the PEIR. **Operation:** It is not considered the change will alter the assessment of effects for project operation in the PEIR.	If required, mitigation would be designed appropriately and proportionately. Appropriate construction techniques would be used.
Road drainage and the water environment **Construction:** This design change introduces potential new minor adverse effects to those reported in the PEIR. Effects are linked to the potential for works that break ground to open a pollution pathway to the underlying groundwater resource or disturb existing ground contamination. Trenches could also act as a preferential flow path for groundwater, effecting local groundwater dependent features down gradient. **Operation:** It is not considered that this change will have any effect on the assessment of the operational effects of the project on the water environment.	This design change will be subject to detailed assessment in the ES and relevant works will be included with the scope of the Hydrogeological Risk Assessment. Pollution risks would be managed by implementation of measures detailed in the CEMP and works would be undertaken in accordance with the conditions of any necessary approvals.
Geology and soils **Construction:** There would be no significant changes to the assessment and effects reported in the PEIR which were assessed as unlikely to be significant. **Operation:** This change would have a negligible effect on the assessment presented in the PEIR, which reported that it was unlikely there would be significant effects.	Construction effects would be controlled through the CoCP and CEMP. Should ground investigation encounter any contamination appropriate assessment would be undertaken and, if required, a remediation strategy would be developed and agreed with our stakeholders.

Expected effects	What we are doing and why
Materials and waste **Construction:** The change described is expected to have a negligible effect to the assessment on materials and waste presented in the PEIR which reported that the project is unlikely to have a significant impact on the UK supply of construction materials. The PEIR also reported that the project is anticipated to potentially generate large quantities of waste and therefore the change described is unlikely to change this conclusion. **Operation:** This change would have a negligible effect to the assessment presented in the PEIR.	Mitigation for materials and waste remains as is described within the PEIR. We will continue to refine our approach to balancing the earthworks across the project to maximise the re-use of excavated materials on-site and within the design proposals. This would reduce the requirement for off-site haulage and reliance on third party waste infrastructure. Measures to manage construction material and waste storage on site and encourage off-site recycling would be detailed within the ES chapter, CoCP and CEMP.
People and communities **Construction:** Temporary adverse effects as described in the PEIR in relation to construction activities are not likely to worsen as a result of the described changes. **Operation:** Impacts are focused around potential adverse visual impacts associated with the construction of a permanent substation for the project; the extent of the impact experienced by local residents will depend on the option selected.	Construction effects would be managed through the CoCP and CEMP.
Climate **Construction:** Although the changes would lead to additional carbon emissions related to the construction activities and material usage, the changes are likely to have a negligible impact on the project's overall contribution to climate during the construction phase. **Operation:** There would be no significant change to the assessment reported in the PEIR relating to both the contribution of the project on climate and the vulnerability of the project to climate change.	We will continue to understand the project's overall contribution to climate through greenhouse gas emissions through the outputs of carbon modelling. Measures to manage construction phase carbon, which the contractors would be required to employ, would be detailed in the CoCP and CEMP.

3. Utility proposals around Tilbury

Please see the Utilities Update document for details on the utility proposals in this area.

Utility works in this area would be needed for diversions and to supply the construction works and the tunnels with communications, gas, power and water. One of the main factors for us to consider in this area would be working around a live railway and ensuring we do not impact local train services.

Expected effects	What we are doing and why
Air quality **Construction:** The enabling works that facilitate the diversion of utilities require temporary earthworks and general construction-type activities. These activities would have the potential to release dust emissions. However, dust impacts are generally negligible beyond 200 metres of the source. **Operation:** There would be no operational impact resulting from the diversion of utilities.	Construction effects would be controlled through the CoCP and a CEMP. The mitigation measures relevant to air quality were summarised in paragraphs 6.6.4-6.6.7 of the PEIR.
Noise and vibration **Construction:** As a result of the proximity of the utility diversions and works to noise sensitive receptors, there would be the potential for temporary significant adverse effects. **Operation:** We do not expect there to be material differences to the potential for noise effects following the project opening, as described in the PEIR.	Construction effects would be controlled through the CoCP and a CEMP. As set out in the PEIR, best practical means would be followed (detailed in Table 13.15). We would not expect operational noise effects associated with any of the utility proposals.

Expected effects	What we are doing and why
Cultural heritage **Construction:** There would be no change to the assessment in the PEIR of physical impact to any archaeological remains in the area. Due to these changes, the utilities works would extend into West Tilbury Conservation Area. This would increase the adverse effect assessed in the PEIR due to the change to the setting of the conservation area affecting its significance. **Operation:** There would be no change to the assessment in the PEIR for operation.	Mitigation to archaeological remains is as described in the PEIR. A full assessment would be included in the ES.
Landscape and visual **Construction:** The nature of the effects would result in a slight worsening to those reported in the PEIR, i.e. a major negative landscape change and a moderate to major negative change in the view for a range of visual receptors. The widespread nature of the significant construction activity would continue, including increased activity associated with utility works and vegetation clearance within this low-lying arable rural landscape. **Operation:** The nature of the effects would be similar to those reported in the PEIR, i.e. a major negative landscape change and a moderate to major negative change in the view for a range of visual receptors.	Mitigation proposals continue to reflect those outlined in the PEIR. A full assessment would be included in the ES supported by representative photomontages.
Biodiversity (terrestrial and marine) **Construction:** We do not expect the change to alter the assessment of effects for project construction in the PEIR. **Operation:** We do not expect the change to alter the assessment of effects for project operation in the PEIR.	If required, mitigation would be designed appropriately and proportionately. Appropriate construction techniques would be used.

Expected effects	What we are doing and why
Road drainage and the water environment **Construction:** This would introduce potential new minor adverse effects to those reported in the PEIR. The Linford public water supply groundwater abstraction is a sensitive receptor and effects are linked to the potential for works that break ground to open a pollution pathway to the underlying groundwater resource or disturb existing ground contamination. Trenches could also act as a preferential flow path for groundwater, affecting local groundwater dependent features down gradient. **Operation:** We do not expect this to change the assessment of the operational effects of the proposed development on the water environment.	This design change would be subject to detailed assessment in the ES and relevant works would be included within the scope of the hydrogeological risk assessment. Pollution risks would be managed by implementing measures detailed in the CEMP. Works would be undertaken in accordance with the conditions of any necessary environmental permits/consents.
Geology and soils **Construction:** There would be no significant changes to the assessment and effects reported in the PEIR, which were assessed as unlikely to be significant. **Operation:** This change would have a negligible effect on the assessment presented in the PEIR, which reported that there would unlikely be significant effects.	Construction effects would be controlled through the CoCP and a CEMP. Should ground investigation encounter any contamination, appropriate assessment would be undertaken and, if required, a remediation strategy would be developed and agreed with our stakeholders.

Expected effects	What we are doing and why
Materials and waste **Construction:** The change would be expected to have a negligible effect on the assessment on materials and waste presented in the PEIR, which reported that the project would be unlikely to have a significant impact on the UK supply of construction materials. The PEIR also reported that the project would be expected to potentially generate large quantities of waste and therefore the change would be unlikely to change this conclusion. **Operation:** This change would have a negligible effect to the assessment presented in the PEIR.	Mitigation for materials and waste remains as described in the PEIR. We will continue to refine our approach to balancing the earthworks across the project to maximise the re-use of excavated materials on-site and within the design proposals. This would reduce the requirement for off-site haulage and reliance on third-party waste infrastructure. Measures to manage construction material storage, including excavated materials and soils, and wastes on-site would be detailed in the ES, CoCP and CEMP.
People and communities **Construction:** The PEIR identifies that there are likely to be temporary adverse effects associated with utility diversions to the north of the River Thames. Overall, there would not appear to be a material change in the nature of effects reported in the PEIR. **Operation:** It is likely that effects associated with the proposed change during operation would be restricted to the visual amenity and these are described in the Landscape and visual section in this table.	Construction effects would be managed through the CoCP and CEMP.
Climate **Construction:** Although the changes would lead to additional carbon emissions related to the construction activities and material use, it is likely the changes would have a negligible impact on the project's overall contribution to climate during the construction phase. **Operation:** There would be no significant change to the assessment reported in the PEIR relating to both the contribution of the project to climate and the vulnerability of the project to climate change.	We will continue to understand the project's overall contribution to climate via greenhouse gas emissions through the outputs of carbon modelling. Measures to manage construction phase carbon, which the contractors would be required to employ, would be detailed in the CoCP and CEMP.

4. Utility proposals around the A13/A1089 junction (east)

Please see the Utilities Update document for details on the utility proposals in this area.

There are a number of factors that need to be carefully considered when carrying out the utility works in this area. These would include minimising impacts on residential communities, local roads and areas of archaeological and ecological significance. Due to the number and location of the existing utilities, trenchless techniques would be used to divert them beneath the A13 and ensure this major route is not significantly impacted. Subject to this consultation, further investigations and stakeholder engagement, we would explore opportunities to reduce the land required for gas and multi-utility works in this area.

Expected effects	What we are doing and why
Air quality **Construction:** The enabling works that facilitate the diversion of utilities require temporary earthworks and general construction-type activities. These activities would have the potential to release dust emissions. However, dust impacts are generally negligible beyond 200 metres of the source. **Operation:** There would be no operational impact resulting from the utility proposals.	Construction effects would be controlled through the CoCP and a CEMP. The mitigation measures relevant to air quality are summarised in paragraph 6.6.4-6.6.7 of the PEIR.
Noise and vibration **Construction:** As a result of the proximity of the utility diversions and works to noise sensitive receptors, there is the potential for temporary significant adverse effects. **Operation:** We do not expect there to be material differences to the noise effects following the project opening, as described in the PEIR.	Construction effects would be controlled through the CoCP and a CEMP. As set out in the PEIR, best practical means would be followed (detailed in Table 13.15). We would not expect operational noise effects associated with any of the utility proposals.

Expected effects	What we are doing and why
Cultural heritage **Construction:** Option 1 of the gas works diversions would significantly increase the adverse effects to the scheduled Springfield-style enclosure and Iron Age enclosures south of Hill House, Baker Street, which is located north of the A13 and west of Orsett. This effect would result from the potential physical impact to the scheduled monument and to associated archaeological remains immediately adjacent to the scheduled area, and through the change to the setting of the archaeological remains. This option would also impact any other archaeological remains within the works area, which would be an increase in adverse effects to those reported in the PEIR. Option 2 of the gas works diversions would increase the adverse effect to the scheduled causewayed enclosure and Anglo-Saxon cemetery 500 metres east-north-east of Heath Place, due to changes to its setting that would affect its significance. There is no significant change to the assessment in the PEIR for the other utilities works in this area. **Operation:** There would be no significant change to the assessment in the PEIR for operation.	Mitigation to archaeological remains is as described in the PEIR. A full assessment would be included in the ES.

Expected effects	What we are doing and why
Landscape and visual **Construction:** The nature of the effects would be similar to those reported in the PEIR, i.e. a major negative landscape change and a moderate to major negative change in the view for a range of visual receptors. The widespread nature of the significant construction activity, including utility works, within this relatively compact, intimate and small-scale landscape would continue to be experienced in relatively close proximity to the visual receptors. **Operation:** The nature of the effects would be similar to those reported in the PEIR, i.e. a major negative landscape change and a moderate to major negative change in the view for a range of visual receptors.	There are mitigation proposals that are no longer being taken forward (landscape earthworks strategy at the A13/A1089 junction, and false cutting earthworks to the perimeter of the junction). Otherwise, mitigation proposals would continue to reflect those outlined in the PEIR. A full assessment would be included in the ES, supported by representative photomontages.
Biodiversity (terrestrial and marine) **Construction:** This would result in new areas of land being affected. However, the areas affected and the construction techniques proposed are not considered likely to alter the assessment of effects for project construction, as reported in the PEIR. **Operation:** We would not expect the change to alter the assessment of effects for project operation reported in the PEIR.	If required, mitigation would be designed appropriately and proportionately. Appropriate construction techniques would be used.

Expected effects	What we are doing and why
Road drainage and the water environment **Construction:** The utilities works would introduce potential new minor adverse effects to those reported in the PEIR. Effects are linked to the potential for works that break ground to open a pollution pathway to the underlying groundwater resource or disturb existing ground contamination. Trenches could also act as a preferential flow path for groundwater, affecting local groundwater dependent features down gradient. **Operation:** We do not expect this to change the assessment of the operational effects of the proposed development on the water environment.	This design change would be subject to detailed assessment in the ES and relevant works would be included within the scope of the hydrogeological risk assessment. Pollution risks would be managed by implementing measures detailed in the CEMP and works would be undertaken in accordance with the conditions of any necessary environmental permits/consents.
Geology and soils **Construction:** There would be no significant changes to the assessment and effects reported in the PEIR, which were assessed as unlikely to be significant. **Operation:** This change would have a negligible effect on the assessment presented in the PEIR, which reported that it was unlikely there would be significant effects.	Construction effects would be controlled through the CoCP and a CEMP. Should ground investigation encounter any contamination, appropriate assessment would be undertaken and, if required, a remediation strategy would be developed and agreed with our stakeholders.
Materials and waste **Construction:** The change is expected to have a negligible effect on the assessment of materials and waste presented in the PEIR, which reported that it is unlikely the project would have a significant impact on the UK supply of construction materials. The PEIR also reported that we expect the project to potentially generate large quantities of waste and therefore it is unlikely the change would alter this conclusion. **Operation:** This change would have a negligible effect on the assessment presented in the PEIR.	Mitigation for materials and waste remains as described in the PEIR. We will continue to refine our approach to balancing the earthworks across the project to maximise the re-use of excavated materials on-site and within the design proposals. This would reduce the requirement for off-site haulage and reliance on third party waste infrastructure. Measures to manage construction material and waste storage on-site, and encourage off-site recycling, would be detailed in the ES, CoCP and CEMP.

Expected effects	What we are doing and why
People and communities **Construction:** The changes would result in additional construction activities and associated temporary adverse effects as reported in the PEIR (for example, diversion works through the southern edge of Orsett Showground). At this stage our understanding of the effects is adverse and represents a material worsening of the effects reported in the PEIR. **Operation:** It is likely that effects associated with the proposed change during operation would include visual amenity, as described in the Landscape and visual section. Activities in the vicinity of the pipeline, for example housing development, parking, picnic areas, open air markets and other outdoor events such as concerts would be constrained due to safety reasons. The exact location of the exclusion zone would depend on the position of the pipeline and would be submitted as part of our DCO application.	We are continuing to assess the impact of the project to develop mitigation measures that reduce negative impacts, for example, screening. We will work with stakeholders and statutory consultees to minimise the extent of the exclusion zone as much as possible.
Climate **Construction:** Although the changes would lead to additional carbon emissions related to the construction activities and material use, it is likely they would have a negligible impact on the project's overall contribution to climate during the construction phase. **Operation:** There would be no significant change to the assessment reported in the PEIR relating to both the contribution of the project to climate and the vulnerability of the project to climate change.	We will continue to understand the project's overall contribution to climate via greenhouse gas emissions through the outputs of carbon modelling. Measures to manage construction phase carbon, which the contractors would be required to employ, would be detailed in the CoCP and CEMP.

5. Utility proposals around the A13/A1089 junction (west)

Please see the Utilities Update document for details on the utility proposals in this area.

The constraints in this area are similar to those in the previous A13/A1089 junction (east) section and include consideration of the A13 and a number of existing services. There are also large sections of farmland and ecologically sensitive areas as well as open space and scheduled monuments that we need to consider. We are working with farmers, landowners and statutory consultees, such as Natural England, to minimise any potential impacts.

Expected effects	What we are doing and why
Air quality **Construction:** The enabling works that facilitate the utilities proposals require temporary earthworks and general construction-type activities. These activities would have the potential to release dust emissions. However, dust impacts are generally negligible beyond 200 metres of the source. **Operation:** There would be no operational impact resulting from the utility proposals.	Construction effects would be controlled through the CoCP and CEMP. The mitigation measures relevant to air quality were summarised in paragraphs 6.6.4-6.6.7 of the PEIR.
Noise and vibration **Construction:** As a result of the proximity of the utility proposals and works to noise sensitive receptors, there would be the potential for temporary significant adverse effects. **Operation:** We would not expect there to be material differences to the noise effects following the project opening, as described in the PEIR.	Construction effects would be controlled through the CoCP and a CEMP. As set out in the PEIR, best practical means would be followed (detailed in Table 13.15). We would not expect operational noise effects associated with any of the utility proposals.

Expected effects	What we are doing and why
Cultural heritage **Construction:** The works west of the A13 would impact any archaeological remains within the works area. Where these proposals increase the area required for the works, this would cause an increase in adverse effects to those reported in the PEIR. Effects to heritage assets east of the A13 would be as outlined in the A13/A1089 junction (east) table. **Operation:** There would be no significant change to the assessment in the PEIR for operation.	Mitigation to archaeological remains is as described in the PEIR. A full assessment would be included in the ES.
Landscape and visual **Construction:** The nature of the effects would be similar to those reported in the PEIR, i.e. a major negative landscape change and a moderate to major negative change in the view for a range of visual receptors. The widespread nature of the significant construction activity, including utility works, within this relatively compact, intimate and small-scale landscape would continue to be experienced in relatively close proximity to the visual receptors. **Operation:** The nature of the effects would be similar to those reported in the PEIR, i.e. a major negative landscape change and a moderate to major negative change in the view for a range of visual receptors.	There are mitigation proposals that are no longer being taken forward (landscape earthworks strategy at the A13/A1089 junction, and false cutting earthworks to the perimeter of the junction). Otherwise, mitigation proposals continue to reflect those outlined in the PEIR. A full assessment would be included in the ES supported by representative photomontages.
Biodiversity (terrestrial and marine) **Construction:** The proposed change would result in new areas of land being affected. However, the areas affected and the construction techniques proposed are not considered likely to alter the assessment of effects for project construction, as reported in the PEIR. **Operation:** We do not expect the change to alter the assessment of effects for project operation in the PEIR.	If required, mitigation would be designed appropriately and proportionately. Appropriate construction techniques would be used.

Expected effects	What we are doing and why
Road drainage and the water environment **Construction:** The utilities works would introduce potential new minor adverse effects to those reported in the PEIR. Effects would be linked to the potential for works that break ground to open a pollution pathway to the underlying groundwater resource or disturb existing ground contamination. Trenches could also act as a preferential flow path for groundwater, affecting local groundwater dependent features down gradient. **Operation:** We do not expect this to change the assessment of the operational effects of the proposed development presented in the PEIR.	This design change would be subject to detailed assessment in the ES and relevant works would be included within the scope of the hydrogeological risk assessment. Pollution risks would be managed by implementing measures detailed in the CEMP and works would be undertaken in accordance with the conditions of any necessary environmental permits/consents.
Geology and soils **Construction:** Although additional works may result in new adverse effects, we do not expect them to change the assessment of the PEIR, which reported that the adverse effects would not be significant. **Operation:** There would be no significant change to the assessment reported in the PEIR.	We will complete an assessment to review all potential sources of historical contamination within the new areas of the development boundary. The potential effects would be reported as part of the ES. Any contamination identified would be remedied appropriately. The storage and stockpile of materials would be managed through measures detailed within the CoCP and CEMP.

Expected effects	What we are doing and why
Materials and waste **Construction:** We would expect the change to have a negligible effect on the assessment of materials and waste presented in the PEIR, which reported that it is unlikely the project would have a significant impact on the UK supply of construction materials. The PEIR also reported that the project would be expected to potentially generate large quantities of waste and therefore the change would be unlikely to alter this conclusion. **Operation:** This change would have a negligible effect on the assessment presented in the PEIR.	Mitigation for materials and waste remains as described in the PEIR. We will continue to refine our approach to balancing the earthworks across the project to maximise the re-use of excavated materials on-site and within the design proposals. This would reduce the requirement for off-site haulage and reliance on third-party waste infrastructure. Measures to manage construction material and waste storage on-site, and encourage off-site recycling, would be detailed in the ES, CoCP and CEMP.
People and communities **Construction:** The suggested changes would result in additional construction activities as reported in the PEIR, for example road closures and diversions. At this stage our understanding of the effect is adverse and represents a material worsening of the effects reported in the PEIR. **Operation:** It is likely that effects associated with the proposed change during operation would be restricted to the visual amenity, as described in the Landscape and visual section.	We are continuing to assess the impact of the project to develop mitigation measures that reduce negative impacts, for example, screening.
Climate **Construction:** Although the changes would lead to additional carbon emissions related to the construction activities and material use, it is likely the changes would have a negligible impact on the project's overall contribution to climate during the construction phase. **Operation:** There would be no significant change to the assessment reported in the PEIR relating to both the contribution of the project on climate and the vulnerability of the project to climate change.	We will continue to understand the project's overall contribution to climate via greenhouse gas emissions through the outputs of carbon modelling. Measures to manage construction phase carbon, which the contractors would be required to employ, would be detailed in the CoCP and CEMP.

6. Utility proposals around Ockendon

Please see the Utilities Update document for details on the utility proposals in this area.

The land in this area has a range of uses including farmland, a landfill site and the residential communities of North and South Ockendon. We will carefully consider how we work in the vicinity of the Mardyke River, M25 junction, local woodland and the railway line when designing and carrying out these works. There are also construction sites that would require utilities provision.

Although much of the utility diversion work would take place on private land and off public roads, the B186 would be temporarily impacted. We would ensure people are given advance notice of any closures, diversions or restrictions so they can plan their travel accordingly. Local footpaths may also be affected.

Expected effects	What we are doing and why
Air quality **Construction:** The enabling works that facilitate the utilities proposals require temporary earthworks and general construction-type activities. These activities would have the potential to release dust emissions. However, dust impacts are generally negligible beyond 200 metres of the source. **Operation:** There would be no operational impact resulting from the utilities proposals.	Construction effects would be controlled through the CoCP and a CEMP. The mitigation measures relevant to air quality were summarised in paragraphs 6.6.4-6.6.7 of the PEIR.
Noise and vibration **Construction:** As a result of the proximity of the utility proposals and works to noise sensitive receptors, there would be the potential for temporary significant adverse effects. **Operation:** We do not expect there to be material differences to the noise effects following the project opening, as described in the PEIR.	Construction effects would be controlled through the CoCP and a CEMP. As set out in the PEIR, best practical means would be followed (detailed in Table 13.15). We would not expect operational noise effects associated with any of the utility proposals.

Expected effects	What we are doing and why
Cultural heritage **Construction:** The increase in the area required for the utilities works as a result of this change would increase the adverse effect on any archaeological remains within the works area. This would include a likely significant effect on the recorded location of a non-designated Romano-British cremation and inhumation cemetery, which would be a significant increase on the effect assessed in the PEIR. **Operation:** There would be no significant change to the assessment in the PEIR for operation.	Mitigation to archaeological remains is as described in the PEIR. A full assessment would be included in the ES.
Landscape and visual **Construction:** The nature of the effects would be similar to those reported in the PEIR, i.e. a major negative landscape change and a typically moderate to major negative change in views for a range of visual receptors. The main impact would occur within the relatively remote and tranquil landscape of the former low-lying, flat Orsett Fen. This would impact a number of rural receptors within this area including public rights of way and isolated residential properties. **Operation:** The nature of the effects would be similar to those reported in the PEIR, i.e. a major negative landscape change and a moderate to major negative change in the view for a range of visual receptors.	Mitigation proposals continue to reflect those outlined in the PEIR. This would include development of fen landscape and habitat creation, and false cuttings. A full assessment would be included in the ES supported by photomontages.

Expected effects	What we are doing and why
Biodiversity (terrestrial and marine) **Construction:** The proposed change would result in new areas of land being affected. However, the areas affected and the construction techniques proposed would not be considered likely to alter the assessment of effects for project construction, as reported in the PEIR. **Operation:** We would not expect the change to alter the assessment of effects for project operation in the PEIR.	If required, mitigation would be designed appropriately and proportionately. Appropriate construction techniques would be used.
Road drainage and the water environment **Construction:** The utilities works would introduce potential new minor adverse effects to those reported in the PEIR. The effects would be linked to the potential for works that break ground to open a pollution pathway to the underlying groundwater resource, disturb existing ground contamination or generate runoff to pollute surface waters. Trenches could also act as a preferential flow path for groundwater, affecting local groundwater dependent features down gradient. In addition, temporary works in the Mardyke floodplain would be subject to a risk of flooding. **Operation:** We do not expect this to change the assessment of the operational effects of the proposed development.	This design change would be subject to detailed assessment in the ES and relevant works would be included within the scope of the hydrogeological risk assessment. Pollution risks would be managed by implementing measures detailed in the CEMP. Works would be undertaken in accordance with the conditions of any necessary environmental permits/consents. Flood risk would be managed in accordance with the protocols set out in project control documents.

Expected effects	What we are doing and why
Geology and soils **Construction:** There would be no significant changes to the assessment and effects reported in the PEIR, which were assessed as unlikely to be significant. **Operation:** This change would have a negligible effect on the assessment presented in the PEIR, which reported that it was unlikely there would be significant effects.	Construction effects would be controlled through the CoCP and a CEMP. Should ground investigation encounter any contamination, appropriate assessment would be undertaken and, if required, a remediation strategy would be developed and agreed with our stakeholders.
Materials and waste **Construction:** We would expect the change to have a negligible effect on the assessment of materials and waste presented in the PEIR, which reported that it was unlikely the project would have a significant impact on the UK supply of construction materials. The PEIR also reported that the project would be expected to potentially generate large quantities of waste and therefore the change would be unlikely to alter this conclusion. **Operation:** This change would have a negligible effect on the assessment presented in the PEIR.	Mitigation for materials and waste remains as described in the PEIR. We will continue to refine our approach to balancing the earthworks across the project to maximise the re-use of excavated materials on-site and within the design proposals. This would reduce the requirement for off-site haulage and reliance on third-party waste infrastructure. Measures to manage construction material and waste storage on-site, and encourage off-site recycling, would be detailed in the ES, CoCP and CEMP.
People and communities **Construction:** There would be temporary adverse effects related to severance (due to impacts on the B186) and temporary closures/ diversions of the local footpath network. Effects are likely to represent a worsening of those reported in the PEIR. **Operation:** We would not expect this to change the assessment of the operational effects of the proposed project.	We are continuing to assess the impact of the project to develop mitigation measures that reduce negative impacts, for example, screening.

Expected effects	What we are doing and why
Climate **Construction:** Although the changes would lead to additional carbon emissions related to the construction activities and material use, it is likely the changes would have a negligible impact on the project's overall contribution to climate during the construction phase. **Operation:** There would be no significant change to the assessment reported in the PEIR relating to both the contribution of the project to climate and the vulnerability of the project to climate change.	We will continue to understand the project's overall contribution to climate via greenhouse gas emissions through the outputs of carbon modelling. Measures to manage construction phase carbon, which the contractors would be required to employ, would be detailed in the CoCP and CEMP.

7. Utility proposals around the LTC/M25 junction

Please see the Utilities Update document for details on the utility proposals in this area.

Considerations in this area include the community of North Ockendon, Thames Chase Community Forest, the railway line and a number of existing utility services. There are also listed buildings in the area and we would ensure diversions around any protected building.

Expected effects	What we are doing and why
Air quality **Construction:** The enabling works that facilitate the utilities proposals require temporary earthworks and general construction-type activities. These activities would have the potential to release dust emissions. However, dust impacts are generally negligible beyond 200 metres of the source. **Operation:** There would be no operational impact resulting from the utility proposals.	Construction effects would be controlled through the CoCP and a CEMP. The mitigation measures relevant to air quality were summarised in paragraphs 6.6.4-6.6.7 of the PEIR.
Noise and vibration **Construction:** As a result of the proximity of the utility diversions and works to noise sensitive receptors, including dwellings and other sensitive uses, there is the potential for temporary significant adverse effects. **Operation:** We do not expect there to be material differences to the noise effects following the project opening, as described in the PEIR.	Construction effects would be controlled through the CoCP and a CEMP. As set out in the PEIR, best practical means would be followed (detailed in Table 13.15). We would not expect operational noise effects associated with any of the utility proposals.

Expected effects	What we are doing and why
Cultural heritage **Construction:** The increase in the area required for the utilities works as a result of this change would increase the adverse effect on any archaeological remains within the works area. The utilities works area would extend further towards North Ockendon Conservation Area, increasing the adverse effect assessed in the PEIR due to the further change to setting that affects the significance of the conservation area. **Operation:** There would be no significant change to the assessment in the PEIR for operation.	Mitigation to archaeological remains is as described in the PEIR. A full assessment would be included in the ES.
Landscape and visual **Construction:** The nature of the effects would be similar to those reported in the PEIR, i.e. a moderate negative landscape change and a typically moderate to minor negative change in views for a range of visual receptors. This would be a result of loss of vegetation along the M25 and within the Thames Chase Community Forest. **Operation:** The nature of the effects would be similar to those reported in the PEIR, i.e. a moderate negative landscape change and a moderate to minor negative change in the view for a range of visual receptors.	A full assessment would be included in the ES supported by representative photomontages.

Expected effects	What we are doing and why
Biodiversity (terrestrial and marine) **Construction:** The proposed change would result in new areas of land being affected. However, the areas affected and the construction techniques proposed would not be considered likely to alter the assessment of effects for project construction, as reported in the PEIR. The removal of existing above-ground utilities within the Thames Chase Community Forest would present opportunities for biodiversity benefit, although this would be considered unlikely to alter the assessment of effects for project construction, as reported in the PEIR. **Operation:** We do not expect the change to alter the assessment of effects for project operation in the PEIR.	If required, mitigation would be designed appropriately and proportionately. Appropriate construction techniques would be used.
Road drainage and the water environment **Construction:** The utilities works would introduce potential new minor adverse effects to those reported in the PEIR. Effects would be linked to the potential for works that break ground to open a pollution pathway to the underlying groundwater resource or generate runoff to pollute surface water features in the Thames Chase Forest. Trenches could also act as a preferential flow path for groundwater, affecting local groundwater dependent features/uses down gradient. **Operation:** We would not expect this to change the assessment of the operational effects of the proposed development.	This design change would be subject to detailed assessment in the ES and relevant works would be included within the scope of the hydrogeological risk assessment. Pollution risks would be managed by implementing measures detailed in the CEMP and works would be undertaken in accordance with the conditions of any necessary environmental permits/consents.

Expected effects	What we are doing and why
Geology and soils **Construction:** There would be no significant changes to the assessment and effects reported in the PEIR, which were assessed as unlikely to be significant. **Operation:** This change would have a negligible effect on the assessment presented in the PEIR, which reported that it was unlikely there would be significant effects.	Construction effects would be controlled through the CoCP and a CEMP. Should ground investigation encounter any contamination, appropriate assessment would be undertaken and, if required, a remediation strategy would be developed and agreed with our stakeholders.
Materials and waste **Construction:** We would expect the change to have a negligible effect on the assessment of materials and waste presented in the PEIR, which reported that the project would be unlikely to have a significant impact on the UK supply of construction materials. The PEIR also reported that the project would be expected to potentially generate large quantities of waste and therefore the change described would be unlikely to alter this conclusion. **Operation:** This change would have a negligible effect on the assessment presented in the PEIR.	Mitigation for materials and waste remains as described in the PEIR. We will continue to refine our approach to balancing the earthworks across the project to maximise the re-use of excavated materials on-site and within the design proposals. This would reduce the requirement for off-site haulage and reliance on third-party waste infrastructure. Measures to manage construction material and waste storage on-site, and encourage off-site recycling, would be detailed in the ES, CoCP and CEMP.
People and communities **Construction:** The proposed changes would be expected to lead to a worsening of the effects reported in the PEIR, with temporary adverse effects relating to loss of land within the Thames Chase Community Forest. **Operation:** We would not expect this to change the operational effects of the proposed development.	We are working with stakeholders to minimise land take and associated impacts on recreational facilities, such as the Thames Chase Community Forest.

Expected effects	What we are doing and why
Climate **Construction:** Although the changes would lead to additional carbon emissions related to the construction activities and material use, the changes would be likely to have a negligible impact on the project's overall contribution to climate during the construction phase. **Operation:** There would be no significant change to the assessment reported in the PEIR relating to both the contribution of the project to climate and the vulnerability of the project to climate change.	We will continue to understand the project's overall contribution to climate via greenhouse gas emissions through the outputs of carbon modelling. Measures to manage construction phase carbon, which the contractors would be required to employ, would be detailed in the CoCP and CEMP.

8. Utility proposals around the M25 junction 29

Please see the Utilities Update document for details on the utility proposals in this area.

Key considerations in this area include the operation of junction 29 of the M25 and the railway line during the proposed works.

Expected effects	What we are doing and why
Air quality **Construction:** The enabling works that facilitate the utilities proposals require temporary earthworks and general construction-type activities. These activities would have the potential to release dust emissions. However, dust impacts are generally negligible beyond 200 metres of the source. **Operation:** There would be no operational impact resulting from the utility proposals.	Construction effects would be controlled through the CoCP and a CEMP. The mitigation measures relevant to air quality were summarised in paragraphs 6.6.4-6.6.7 of the PEIR.
Noise and vibration **Construction:** As a result of the proximity of the utility proposals and works to noise sensitive receptors including dwellings and other sensitive uses, there would be the potential for temporary significant adverse effects. **Operation:** We do not expect there to be material differences to the noise effects following the project opening, as described in the PEIR.	Construction effects would be controlled through the CoCP and a CEMP. As set out in the PEIR, best practical means would be followed (detailed in Table 13.15). We would not expect operational noise effects associated with any of the utility proposals.

Expected effects	What we are doing and why
Cultural heritage **Construction:** The reduction in land required for utilities works, due to fewer overhead electricity cable diversions, would result in a minor reduction in the adverse impacts assessed in the PEIR, both through a reduction in physical impact to buried archaeological remains and to impacts arising through the change to setting. **Operation:** There would be no significant change to the assessment in the PEIR for operation.	Mitigation to archaeological remains is as described in the PEIR. A full assessment would be included in the ES.
Landscape and visual **Construction:** The nature of the effects would be slightly worsened to those reported in the PEIR, i.e. a minor negative landscape change and a major negative change to isolated visual receptors. This considers the increase in extent of vegetation removal at this junction. **Operation:** There would be new adverse effects that would lead to a worsening of effects reported in the PEIR, i.e. a negligible negative change for landscape and a moderate change in the view for a range of visual receptors. This would be a result of direct impacts and permanent vegetation loss allowing for the required clearance zones for the protection of, and access to, utility corridors through the junction.	There would be new mitigation proposals to replace lost vegetation features in this location, where possible. In certain corridors, required clearance zones for the protection of, and access to, utility corridors would remain. A full assessment would be included in the ES supported by representative photomontages.
Biodiversity (terrestrial and marine) **Construction:** We do not expect the change to alter the assessment of effects for project construction in the PEIR. **Operation:** We do not expect the change to alter the assessment of effects for project operation in the PEIR.	If required, mitigation would be designed appropriately and proportionately. Appropriate construction techniques would be used.

Expected effects	What we are doing and why
Road drainage and the water environment **Construction:** The utilities works would introduce potential new minor adverse effects to those reported in the PEIR. Effects would be linked to the potential for works that break ground to open a pollution pathway to the underlying groundwater resource or generate runoff to pollute local surface water features. Trenches could also act as a preferential flow path for groundwater, affecting local groundwater dependent features/ uses down gradient. **Operation:** We would not expect this to change the assessment of the operational effects of the proposed development.	This design change would be subject to detailed assessment in the ES and relevant works would be included within the scope of the hydrogeological risk assessment. Pollution risks would be managed by implementing measures detailed in the CEMP and works would be undertaken in accordance with the conditions of any necessary environmental permits/consents.
Geology and soils **Construction:** There would be no significant changes to the assessment and effects reported in the PEIR, which were assessed as unlikely to be significant. **Operation:** This change would have a negligible effect on the assessment presented in the PEIR, which reported that it was unlikely there would be significant effects.	Construction effects would be controlled through the CoCP and a CEMP. Should ground investigation encounter any contamination, appropriate assessment would be undertaken and, if required, a remediation strategy would be developed and agreed with our stakeholders.

Expected effects	What we are doing and why
Materials and waste **Construction:** We expect the change to have a negligible effect on the assessment of materials and waste presented in the PEIR, which reported that the project would be unlikely to have a significant impact on the UK supply of construction materials. The PEIR also reported that the project would be expected to potentially generate large quantities of waste and therefore the change would be unlikely to alter this conclusion. **Operation:** This change would have a negligible effect on the assessment presented in the PEIR.	Mitigation for materials and waste remains as described in the PEIR. We will continue to refine our approach to balancing the earthworks across the project to maximise the re-use of excavated materials on-site and within the design proposals. This would reduce the requirement for off-site haulage and reliance on third-party waste infrastructure. Measures to manage construction material and waste storage on-site, and encourage off-site recycling, would be detailed in the ES, CoCP and CEMP.
People and communities **Construction:** The changes would result in additional temporary adverse effects to those described in the PEIR, primarily relating to impacts on people's ability to travel. **Operation:** We would not expect this to change the assessment of the operational effects of the proposed development.	We are working with stakeholders to minimise land take and associated impacts on recreational facilities, such as the Thames Chase Community Forest.
Climate **Construction:** Although the changes would lead to additional carbon emissions related to the construction activities and material use, it is likely they would have a negligible impact on the project's overall contribution to climate during the construction phase. **Operation:** There would be no significant change to the assessment reported in the PEIR relating to both the contribution of the project to climate and the vulnerability of the project to climate change.	We will continue to understand the project's overall contribution to climate via greenhouse gas emissions through the outputs of carbon modelling. Measures to manage construction phase carbon, which the contractors would be required to employ, would be detailed in the CoCP and CEMP.

4. Marine works

1. River works

Minor changes to the development boundary to allow flexibility for the location where water will be discharged into the Thames. This would be excess groundwater removed from the construction or operation. The jetty location remains as per Statutory Consultation.

Expected effects	What we are doing and why
Air quality **Construction:** The change is expected to have a negligible effect on the assessment of air quality presented in the PEIR. **Operation:** We would not expect this to change the adverse operational air quality effects reported in the PEIR.	Construction and operational air quality effects will be considered as part of the ES.
Noise and vibration **Construction:** We do not expect this to result in material differences to the potential noise effects and they remain as described in the PEIR. **Operation:** We do not expect there to be material differences to the potential noise effects and they remain as described in the PEIR.	Construction noise effects would be controlled through the CoCP and a CEMP. As set out in the PEIR, best practical means would be followed. Potential operational mitigation measures described in the PEIR would remain appropriate and would be incorporated into the design where necessary. With regard to both construction and operational effects associated with the project, noise and vibration continues to be assessed and considered. These will be reported in full in the ES.
Cultural heritage **Construction:** We do not expect this change to result in a material change to the assessment report in the PEIR. **Operation:** We do not expect this change to result in a material change to the assessment report in the PEIR.	Mitigation of impacts to archaeological remains would follow the approach outlined in the PEIR. A detailed assessment would be included in the ES.

Expected effects	What we are doing and why
Landscape and visual **Construction:** We do not expect this change to result in a material change to the assessment report in the PEIR. **Operation:** We do not expect this change to result in a material change to the assessment report in the PEIR.	Mitigation proposals continue to reflect those outlined in the PEIR. A full assessment will be included in the ES supported by photomontages.
Biodiversity (terrestrial and marine): **Construction:** Minor adverse effects on the intertidal zone related to the construction of the dewatering outfall through the intertidal area are currently expected. Effects would be no worse than reported in the PEIR for construction of the temporary jetty. **Operation:** Potential for effects on water quality related to the discharge of operational effluent via the outfall are expected. Effects would be no worse than reported in the PEIR. Appropriate mitigation would ensure these effects are minor.	The method and duration of works would aim to minimise disturbance effects on the intertidal habitats. Recovery of the habitats would be relatively quick following completion of the works. The discharge of effluent via the outfall would be consented by the Environment Agency and be controlled in terms of quality to minimise effects on water quality of the Thames.
Road drainage and the water environment **Construction:** The change in area will not alter the effects reported in the PEIR. **Operation:** As with construction the proposed changes would not alter the effects reported in the PEIR.	Any material discharged into the River Thames would be subject to appropriate approvals and would need to demonstrate that no scour and accretion occurred as a result of this activity. These effects would be controlled through the implementation of measures contained in the CoCP. Appropriate approvals would be obtained from the Port of London Authority and Marine Maritime Organisation.

Expected effects	What we are doing and why
Geology and soils **Construction:** There would be no significant changes to the assessment and effects reported in the PEIR, which were assessed as unlikely to be significant. **Operation:** This change would have a negligible effect on the assessment presented in the PEIR, which reported that it was unlikely there would be significant effects.	Construction effects would be controlled through the CoCP and a CEMP. Should ground investigation encounter any contamination, appropriate assessment would be undertaken and, if required, a remediation strategy would be developed and agreed with our stakeholders.
Materials and waste **Construction:** We do not expect this change to result in a material change to the assessment report in the PEIR. **Operation:** We do not expect this change to result in a material change to the assessment report in the PEIR.	Mitigation for materials and waste remains as described in the PEIR. Best practicable measures for the management of construction materials to be implemented by the contractor, such as the use of secondary and recycled aggregates where possible, would be detailed in the ES, CoCP and CEMP.
People and communities **Construction:** We do not expect this change to result in a material change to the assessment report in the PEIR. **Operation:** We do not expect this change to result in a material change to the assessment report in the PEIR.	Construction and operational effects on people and communities will be considered as part of the ES.
Climate **Construction:** We do not expect this change to result in a material change to the assessment report in the PEIR. **Operation:** We do not expect this change to result in a material change to the assessment report in the PEIR.	We will continue to develop understanding of the project's overall contribution to climate through greenhouse gas emissions via the outputs of carbon modelling. Measures to manage construction phase carbon, which the contractors would be required to employ, would be detailed in the CoCP and CEMP.

5. Air quality, noise and vibration

Air quality

The Lower Thames Crossing would pass close to populated areas both north and south of the River Thames. During the construction phase, dust from construction activities and emissions from construction traffic and machinery could impact on sensitive receptors, such as residential properties, schools and hospitals. Impacts are generally greatest within 50 metres of the source; however, receptors within 200 metres have been included in the assessment to ensure any impacts are fully captured.

Dust impacts would be minimised by adopting effective control measures such as washing the wheels of construction vehicles before they leave site, damping down surfaces during dusty activities, covering stockpiles and moving dust-generating activities as far away as possible.

Measures to reduce emissions from construction traffic and machinery would include switching off engines when they are in use and making sure all vehicles using public highways comply with the London Low Emission Zone and London Non-Road Mobile Machinery emissions standards. Opportunities to transport construction materials and waste by river are being investigated to reduce the number of construction vehicles using the road network.

Once the crossing is operational, our preliminary modelling suggests that local air quality around the approach to the Dartford Crossing would improve owing to a reduction in traffic and congestion in this area. It also suggests there is a low risk of the Lower Thames Crossing project leading to significant adverse air quality effects and exceeding EU limits in the immediate and wider road network affected by the project.

The updated traffic modelling has revealed some changes to the traffic flows on roads across the study area for air quality reported in the PEIR, the details of which can be found in the Traffic Modelling Update. Furthermore, the air quality modelling inputs, including scheme monitoring data and the vehicle emission factors and pollution background maps provided by the Department for Environment, Food and Rural Affairs, have been updated since the PEIR was undertaken. We are working to understand the effects of these changes and ensure the project complies with the National Policy Statement for National Networks.

Noise and vibration

The Lower Thames Crossing would pass close to both populated and rural areas. Preliminary noise modelling of operational effects has been carried out to consider the impacts of the project, to indicate how they would affect communities and the surrounding environment. This work is ongoing and is being further refined within the production of the ES.

During construction, noise is likely to result from construction machinery and compounds, tunnelling activities and site deliveries. Vibration may occur during piling activities and while the tunnel boring machines (TBMs) are in operation. People living within 300 metres of the development boundary could be affected by these activities.

There is potential for both daytime and nighttime noise and vibration impacts to occur during construction; for example, the TBMs would need to operate 24/7 during the tunnelling period.

This noise and vibration would be minimised through:

- carefully locating generators and other static machinery
- installing temporary fencing or barriers around noisy construction activities where necessary
- compliance protocols, including providing contact details for a site representative and ensuring any complaints are dealt with proactively, for example:
  - > using modern technology to limit vibration during excavation and piling
  - > monitoring and intervention triggers below vibration limits

During operation, short-term and long-term adverse changes in road traffic noise levels are expected along the route and have been indicated through preliminary modelling. There may also be localised noise impacts associated with the tunnel ventilation systems. The following measures to reduce noise levels would be investigated:

- installing barriers where required
- using low-noise road surfaces to reduce noise from vehicles travelling at high speeds
- designing tunnel ventilation systems to include low-noise equipment where possible and silencer units/acoustic screening where required

More detailed modelling of the operational and construction noise and vibration effects of the project is being produced through the process of completing the ES. This will include more specific noise modelling based on detailed three-dimensional surfacing and will cover all landscape and groundworks features of the project.

How to have your say

Please take this opportunity to give us your views on the changes we have made to our proposals for the crossing.
You can find all the information about the consultation and events, and download a response form, at **www.lowerthamescrossing.co.uk/consultation-2020.**
Alternatively, you can pick one up from:

- Consultation events
- Information points
- Deposit locations

You can also ask us to send you a form by:

- Emailing us at info@lowerthamescrossing.co.uk
- Calling us on 0300 123 5000

Send your completed response form using one of the communication channels below. These are all free to use.
We cannot guarantee that responses sent by any other means will be included in our analysis and reporting.

Online

Fill in the online survey at
www.lowerthamescrossing.co.uk/consultation-2020

Post

Send your response form or comments to:
FREEPOST LTC CONSULTATION
The Freepost address is the only text needed on the envelope and no stamp is required.

Email

Comments or electronic copies of the response form should be emailed to **LTC.CONSULTATION@TRAVERSE.LTD**

Public information events

Fill in and submit the response form at our public information events.

Scan me

Use your phone to scan this QR code to go straight to the consultation.

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