

Lower Thames Crossing

6.1 Environmental Statement

Chapter 13 – Population and Human Health

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Lower Thames Crossing

6.1 Environmental Statement

Chapter 13 – Population and Human Health

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13 Population and human health

13.1 Introduction

- 13.1.1 This chapter presents the assessment of the likely significant effects of the A122 Lower Thames Crossing (the Project) on population and human health during construction and operation. The assessment considers potential effects on private property and housing, community land and assets, development land and businesses, agricultural land holdings, and walkers, cyclists and horse riders (WCH). This chapter also considers effects on human health. The assessment follows the methodology set out in the Design Manual for Roads and Bridges (DMRB) LA 112 Population and Human Health (Highways England, 2020b).
- 13.1.2 A separate Health and Equalities Impact Assessment (HEqIA) has been submitted as part of the Development Consent Order (DCO) application (Application Document 7.10), the findings of which inform the human health element of this chapter.
- 13.1.3 This chapter is supported by Figures 13.1 to 13.5 (Application Document 6.2), and additional information contained in the following appendices (Application Document 6.3):
- Appendix 13.1: Population and Human Health Legislation and Policy
 - Appendix 13.2: Ward Sensitivities

13.2 Legislative and policy framework

- 13.2.1 This assessment has been undertaken in accordance with relevant legislation and having regard to national and local plans and policies. A list of plans is provided within Appendix 13.1: Population and Human Health Legislation and Policy requirements, and further detail can be found in the Planning Statement (Application Document 7.2).

Legislative requirements

- 13.2.2 Relevant legislation that has been considered during the assessment is presented in Appendix 13.1 Population and Human Health Legislation and Policy.

National policy framework

- 13.2.3 Nationally Significant Infrastructure Projects (NSIPs) are determined in accordance with the decision-making framework in the Planning Act 2008 (as amended) and relevant National Policy Statements (NPSs), as well as any other matters that are both important and relevant (which may include the National Planning Policy Framework (NPPF) (Ministry of Housing, Communities and Local Government, 2021)).
- 13.2.4 The National Policy Statement for National Networks (NPS NN) (Department for Transport, 2014) sets out the Government's policies to deliver NSIPs on the national road and rail networks in England. Modifications to nationally significant energy infrastructure are required as part of the Project. Four utilities diversions

constitute NSIPs in their own right and therefore the Project will also be assessed against the following energy policy statements:

- a. Overarching National Policy Statement for Energy (EN-1) (Department of Energy and Climate Change, 2011a)
- b. National Policy Statement for Gas Supply Infrastructure and Gas and Oil Pipelines (EN-4) (Department of Energy and Climate Change, 2011b)
- c. National Policy Statement for Electricity Network Infrastructure (EN-5) (Department of Energy and Climate Change, 2011c).

- 13.2.5 However, the NPS NN forms the “case-making” basis for the Project, and the need for nationally significant utilities diversions arises solely from the need for the road element of the Project.
- 13.2.6 National Highways has taken these policy requirements into account during the development and design of the Project and the preparation of this ES.
- 13.2.7 The NPPF sets out the Government’s planning policies. It provides a framework within which locally prepared plans for housing and other development can be produced.
- 13.2.8 The NPPF does not contain specific policies for NSIPs. However, the NPPF advises that local authorities’ planning policies should take into account NSIPs which are located within their local areas. Paragraph 1.17 of the NPSNN states that the NPS and NPPF are consistent, and paragraph 1.18 explains that the NPPF is an important and relevant consideration, 'but only to the extent relevant to [the] project’.
- 13.2.9 Appendix 13.1: Population and Human Health Legislation and Policy (Application Document 6.3) lists the planning policies at a national level and the Project response.
- 13.2.10 An assessment of the likely significant environmental effects of Electric and Magnetic Fields (EMFs) associated with the modification of existing National Grid electricity infrastructure is not considered directly within this chapter; further information is provided in the Health and Equalities Impact Assessment, Appendix D: National Grid Electric and Magnetic Field Report (Application Document 7.10).
- 13.2.11 Further information on the how the application has responded to national planning policies is available in the Planning Statement (Application Document 7.2), including responses to the relevant Energy NPS’s EN-1, EN-4 and EN-5 at Appendix B of the Planning Statement (Application Document 7.2).

Local policy framework

- 13.2.12 Consideration has been given to county policies within Kent and Essex, the London Plan and local policies relating to population and human health within the following local authorities within the study area: Maidstone, Tonbridge and Malling, Medway, Dartford, Gravesham, Thurrock, Havering and Brentwood. These are outlined in Appendix 13.1: Population and Human Health Legislation and Policy (Application Document 6.3). Local planning policies of host authorities (i.e. Gravesham, Medway, Thurrock, Havering (including the London

Plan) and Brentwood) are considered further within the Planning Statement (Application Document 7.2).

13.3 Assessment methodology

Standards and guidance

- 13.3.1 The following standards and guidance documents have been used in devising the methodology for data collection and assessment of population and human health impacts:
- a. DMRB LA 104 Environmental Assessment and Monitoring (Highways England, 2020a).
 - b. DMRB LA 112 Population and Human Health (National Highways, 2020b).
 - c. Health in Environmental Impact Assessment - A Primer for a Proportionate Approach (Institute of Environmental Management and Assessment, 2017). This is primarily a discussion document designed to outline and identify issues arising from changes to the Environmental Impact Assessment (EIA) Directive 2014/52/EU. The Institute of Environmental Management and Assessment guidance notes that scoping of population and human health issues should be proportionate and pay specific attention to vulnerable groups.
 - d. Human Health: Ensuring a High Level of Protection (International Association of Impact Assessment and European Public Health Association, 2020) is a reference paper prepared to address human health in environmental impact assessment and provides guidance in terms of assessing sensitivity, magnitude and significance of health effects. The document has been used to inform decision-making in relation to the assessment of significant effects.
 - e. A stand-alone HEqIA has been prepared for the Project (Application Document 7.10). Findings from the HEqIA are summarised in this chapter. Preparation of the HEqIA has recognised good practice guidance for identifying vulnerable populations as presented by the Wales Health Impact Assessment Support Unit (WHIASU, 2021) and agreed with stakeholders.
 - f. The assessment of impacts on mental health and wellbeing has followed the approach set out in the Mental Health and Wellbeing Impact Assessment Toolkit (Cooke et al, 2011).
- 13.3.2 Where no specific guidance is available for determining impacts and significance of effects, professional judgement has been used.

Scope of the assessment

- 13.3.3 The scope of the population and human health assessment follows the requirements set out in DMRB LA 112 (Highways England, 2020b). Additional

areas of assessment to the scope set out in DMRB LA 112 have been included within this chapter as a result of comments made in the Scoping Opinion provided by the Planning Inspectorate (2017).

- 13.3.4 The scope of the population and human health assessment consequently covers the following topic areas for both construction and operational phases:
- a. Private property and housing (including traveller sites)
 - b. Community land and assets (this includes an assessment of impacts of the construction workforce on local communities)
 - c. Development land and businesses
 - d. Agricultural land holdings
 - e. WCH
 - f. Human health – this chapter includes a summary of the findings from the stand-alone HEqIA prepared for the Project (Application Document 7.10). The health assessment covers the potential impacts of the Project on both mental and physical wellbeing.
- 13.3.5 No aspects have been scoped out for the assessment of impacts on population and human health as a result of the Project.
- 13.3.6 There are linkages between the assessment of potential effects on population and human health and other chapters of the Environmental Statement (ES), notably:
- a. Chapter 5: Air Quality; Chapter 7: Landscape and Visual; and Chapter 12: Noise and Vibration – findings from these chapters are referred to specifically in relation to changes in amenity/quality of life for local residents and businesses.
 - b. Chapter 10: Geology and Soils – this chapter describes the potential effects of the Project as they relate to agricultural land (for example Best and Most Versatile land). It also informs the assessment of human health in relation to pollution and contaminated land.
 - c. Chapter 11: Material Assets and Waste – this chapter considers the handling of soils and waste (which may have implications for human health).

Temporal scope

- 13.3.7 This chapter uses defined temporal scales to characterise the duration of potential effects. Effects are described as temporary and permanent. The temporal scope refers to the time periods over which impacts may be experienced by receptors.

- 13.3.8 Temporary (short- and medium-term) effects are typically those associated with demolition and construction works, and permanent (long-term) effects are typically those associated with the completed and operational development.
- 13.3.9 Due to the length of the construction programme, however, this chapter uses defined temporal scales as follows:
- a. Short term is defined as under six months
 - b. Medium term is defined as between six months and two years
 - c. Long term is defined as more than two years in duration
 - d. Permanent duration (effects which are not reversible)

Limits of deviation and Rochdale Envelope

- 13.3.10 The Project's application of the Rochdale Envelope is summarised in Chapter 2: Project Description. The Limits of Deviation (LOD) for the project (defined in the Draft DCO (Applications Document 3.1)) represent an 'envelope' within which the Project would be constructed and have informed the reasonable worst case approach to assessment for the purposes of this chapter. The topic based assessments, which have been used to inform the assessments in this Chapter, already consider the LOD. Therefore, the assessments presented which build on those assessments here have already incorporated consideration of the LOD.

Use of the River

- 13.3.11 Based on the predicted vessel movements associated with the construction of the Project, as outlined in Chapter 2: Project Description, this Chapter considers the requirement for assessment of the use of the river and a qualitative assessment has been undertaken.
- 13.3.12 Material supply vessels have been excluded from the preliminary Navigation Risk Assessment (pNRA) (Application Document 7.15), although Project vessels were included. Project vessels are those that would be used for temporary works site investigations and during temporary construction works. The reason for the exclusion of material supply vessels from the pNRA is that the imports would be to existing established facilities. The use of established facilities would not give rise to the use of any vessels or any additional vessel movements that would not otherwise be likely to occur in the absence of the Project. Therefore, these movements would be in the scope under existing navigational risk assessments of the Port of London Authority (PLA) and any other Statutory Harbour Authority (SHA) (eg PoTLL if movements enter their limits). This position was agreed with the PLA and PoTLL in a meeting on 10 May 2021.

Scoping Opinion

- 13.3.13 A Scoping Report (Highways England, 2017) was submitted to the Planning Inspectorate on 2 November 2017, setting out the proposed approach to this EIA. A Scoping Opinion was received from the Secretary of State on 13 December 2017, which included comments on the scope of assessment from the Planning Inspectorate and Statutory Environmental Bodies. These

comments have been taken into account in the preparation of this chapter, and the Project's response is set out in Appendix 4.1: The Inspectorate's Scoping Opinion and National Highways' Responses (Application Document 6.3).

- 13.3.14 The Scoping Report was submitted prior to new DMRB guidance being published and hence the Scoping Report chapter was titled 'People and Communities' and followed a different structure to this ES chapter. The Scoping Report identified topics for assessment which are not included within DMRB LA 112 (Highways England, 2020b), namely effects on the local and wider economy, views from the road and driver stress. These are considered elsewhere, as follows:
- a. Effects on the local and wider economy are described as part of the Economic Appraisal Package contained within Appendix D of the Combined Modelling and Appraisal Report (Application Document 7.7).
 - b. Views from the road remain a component of the wider landscape assessment and further information is set out in Appendix 7.13 (Application Document 6.3) of Chapter 7: Landscape and Visual.
 - c. Driver stress comprises three components – frustration (such as caused by congestion or roadworks), fear of potential accidents and route uncertainty. An Outline Traffic Management Plan for Construction (oTMPfC) has been prepared which sets out proposals for minimising disruption to users of the public highway network (Application Document 7.14). Health outcomes associated with road safety (including a qualitative assessment of the three components of the driver stress assessment) are considered within the human health section of this chapter and the HEqIA (Application Document 7.10). The Transport Assessment (Application Document 7.9) considers impacts of the Project in terms of road safety during the operation phase.

Consultation

Project consultation

- 13.3.15 Statutory Consultation under Section 42 of the Planning Act 2008 was undertaken on the Project from 10 October 2018 to 20 December 2018. This provided an opportunity for consultees to comment on the Preliminary Environmental Information Report (PEIR) (Highways England, 2018). A summary of the responses to the Statutory Consultation can be found in the Consultation Report (Application Document 5.1). Consultees comprised prescribed bodies, local authorities, people with an interest in land affected by the Project and local communities.
- 13.3.16 The Project design continued to be developed, which resulted in changes to the Project. These formed the basis for the Supplementary Consultation, which was undertaken from 29 January 2020 to 2 April 2020. A Design Refinement Consultation was undertaken from 14 July 2020 to 12 August 2020.
- 13.3.17 A Community Impacts Consultation was undertaken from 14 July 2021 to 8 September 2021. This sought feedback on the impacts of the Project at a local ward level, as well as the mitigation proposed for those impacts. Changes to the

Project since the Design Refinement Consultation were also presented, along with a summary of how feedback to earlier consultations had shaped the development of the Project.

- 13.3.18 Prior to the submission of this DCO application, a Local Refinement Consultation was held between 12 May 2022 and 20 June 2022. This provided local communities with the opportunity to comment on proposed refinements to the Project.
- 13.3.19 These consultations all included information about the environmental impacts associated with the refinements presented for consultation. A summary of the responses to these consultation stages can be found in the Consultation Report (Application Document 5.1).

Stakeholder engagement

- 13.3.20 A summary of stakeholder engagement specific to population and human health during the EIA process is provided in Table 13.1.

Table 13.1 Stakeholder engagement

Stakeholder	Date of meeting / communication	Summary of discussions
Port of London Authority	July 2019 September 2019	Discussion of relevant infrastructure, assets and activities which need to be listed and assessed in the ES.
Forestry England/Thames Chase Trust	Various 2019 to 2022	Discussions around sensitive areas of land, implications of potential land required and ways to reduce potential impacts of the Project.
Local authority workshops	4 and 12 September 2019	Discussion of work in relation to Green Infrastructure Strategy and potential impacts on WCH.
Local authority workshops	11 December 2019	Presentation of information regarding construction compounds, accommodation, and Heavy Goods Vehicle routes and diversions.
Local authorities and Statutory Environmental Bodies	21 April 2020 22 April 2020	Preliminary Environmental Impacts and Mitigation Workshop North. Preliminary Environmental Impacts and Mitigation Workshop South. Provided an update on the methodology for assessing potential effects, significance of effects and approach to mitigation.
Local authority workshops	21 May 2020	Presentation of environmental mitigation relating to population and human health, together with that associated with other environmental topics.

Stakeholder	Date of meeting / communication	Summary of discussions
Local authorities and Statutory Environmental Bodies	Part 1 23 June 2020 Part 2 25 June 2020	Environmental Impact & Mitigation and REAC Review Workshop – provided a recap on approach to environmental assessment and mitigation.
Kent Downs Area of Outstanding Natural Beauty (AONB) Unit	March 2019 July 2019	Potential impacts on recreational users of the AONB and potential impacts on Public Rights of Way (PRoWs).
<p>Community Impacts and Public Health Advisory Group, comprising representatives from:</p> <ul style="list-style-type: none"> • Gravesham Borough Council • Kent County Council • Thurrock Council • London Borough of Havering • Brentwood Borough Council • Southend-on-Sea Borough Council • Medway Council • Essex County Council • Dartford Borough Council • NHS Mid Essex Clinical Commissioning Group • UK Health Security Agency (UKHSA) (formerly Public Health England) (note: attendance in an observational capacity only) 	<p>January 2019 April 2019 June 2019 September 2019 November 2019 February 2020 May 2020 July 2020 May 2021 June 2021 July 2021 September 2021 December 2021 January 2022 March 2022 May 2022 July 2022 August 2022 October 2022</p>	<p>Meetings held regularly to discuss potential community and public health impacts associated with the Project. Specific areas for discussion have included data sources, the scope of the HEqIA, potential mitigation and topic-based discussions. Provisional findings have been discussed with the group where possible.</p>
Owners and operators of community assets – various	2019 to 2022	Various levels of discussion have taken place with individual owners and operators of community assets potentially affected by the Project, together with potential mitigation measures where appropriate.
Business owners and operators – various	2019 to 2022	Discussions relating to land requirements (temporary and permanent) and potential mitigation measures where appropriate.
Medway Council	7 October 2022	Discussion on environmental impacts in Medway, focusing on air quality, noise and vibration and health.

Study area

- 13.3.21 Study areas have been defined on a topic-by-topic basis, as set out in Table 13.2. In line with DMRB LA 112, the study area is generally based on the area within the Order Limits land required together with a buffer area extending 500m from the Order Limits. The study areas outlined apply to both the construction and operational phases.
- 13.3.22 Where the potential for significant effects has been identified beyond 500m from the Order Limits, the buffer area has been extended accordingly. Similarly, where effects were considered unlikely to occur within 500m, the buffer area has been reduced accordingly.

Table 13.2 Description of study areas by topic

Topic	Study area
Private property and housing (including traveller sites)	The study area is based on the Order Limits plus a 500m area surrounding it.
Community land and assets	The study area is based on the Order Limits plus a 500m area surrounding it. Where likely effects have been identified beyond this (for example relating to potential catchment areas of individual facilities), the study area has been extended to reflect this. The study area for construction workforce impacts on accommodation provision has focused on a 60-minute travel time catchment area from construction compounds covering the local authority areas of Gravesham, Medway, Dartford, Thurrock, Havering and Brentwood.
Development land and businesses	The study area is based on the Order Limits plus a 500m area surrounding it.
Agricultural land holdings	The study area is based on the extent of the agricultural land holdings affected by the Project. This includes all land within the Order Limits and the whole of each affected land holding beyond the Order Limits (which may extend more than 500m from the boundary), where information is available, to ensure that the full extent of potential impacts is assessed.
WCH	The study area has been defined to include footpaths, bridleways and cycle routes potentially severed or otherwise affected by the Project. The 500m buffer area has been used to establish the wider PRoW network, including circular and connecting routes.
Human health	The study area has been defined to include communities directly and indirectly affected by the Project. At a local level, this primarily includes wards identified as being within 1km of the Order Limits. A wider study area has been used to provide comparative information and this encompasses the local authority areas of Gravesham, Medway, Dartford, Tonbridge and Malling, Thurrock, Southend-on-Sea, Havering, Brentwood and Basildon. For specific environmental topics (notably air quality and noise), the study area for human health effects is aligned with those provided for the relevant topic (Chapter 5: Air Quality and Chapter 12: Noise and Vibration). This accords with the study area defined in the HEqIA (Application Document 7.10).

Impact assessment methodology

- 13.3.23 The assessment follows the general approach described in Chapter 4: EIA Methodology. This section provides topic-specific information regarding the methodology used for establishing the baseline conditions, and the methods used for the construction and operational phase assessments.

Method of establishing baseline conditions

Existing baseline

- 13.3.24 The existing baseline in relation to population and human health was established via data collection using published sources as well as findings from consultations (where relevant), site visits, spatial data mapping and survey work. Types of data collected to inform the baseline have had regard to the indicative list set out in DMRB LA 112 (Highways England, 2020b).

Desk-based studies

- 13.3.25 A desk-based review of the following data sources was undertaken to determine baseline conditions within the study areas:
- a. Land use data was collected from a variety of sources, including Ordnance Survey mapping, MAGIC online maps (Natural England, 2021) and local authority websites.
 - b. Statistical data was collated using online sources such as the Office for National Statistics (ONS) (for example Nomis official labour market statistics (ONS, 2022a), Annual Population Surveys, Business Register and Employment Survey); London Datastore; the Department for Levelling Up, Housing and Communities; and the Office for Health Improvement and Disparities (formerly Public Health England) Local Health website. Latest releases of 2021 Census data (ONS, 2022b) have been incorporated as relevant (notably population data).
 - c. Agricultural land holdings assessment data was collected from Ordnance Survey mapping and aerial photography (to establish land use and settlement patterns), the MAGIC website (to determine information on agri-environmental schemes) and information gathered from individual landowners. The extent of agricultural land calculated in this assessment includes the land used, or which has the potential to be used, to produce crops or support livestock and all associated farm infrastructure.
 - d. PRowS within the study area were identified from definitive mapping accessed via local authority websites.

Fieldwork

- 13.3.26 A walkover survey was undertaken in April 2018 to inform the assessment of potential impacts on WCH. The walkover survey was undertaken to confirm locations of PRowS within the buffer area as shown on Figure 13.2 (Application Document 6.2) and to ascertain the condition of those PRowS severed by the

Project. The surveys enabled an understanding to be gained of what facilities and services were accessed by these routes and how they were used by local people. The walkover survey informed the selection of routes for which more detailed user surveys were required.

- 13.3.27 In August and September 2019, user surveys were undertaken to establish the use of specific PRowS and minor roads that would be affected by the Project during construction and operation. The survey locations included minor roads and associated footways intersected by the Project, and PRowS (including footpaths, cycleways, bridleways and byways) either intersected or otherwise affected by the Project. The user surveys comprised a combination of user counts and questionnaire surveys. User survey locations were informed by factors including the observed level of use from the walkover survey in April 2018, consultation with local authorities to establish the importance of particular links/routes, and level of impact as a result of the Project.
- 13.3.28 User surveys were carried out during a summer weekend (August 2019) to capture leisure use. Additional user surveys were carried out in selected locations on a weekday where there was thought to be a specific weekday peak (for example use of routes for non-leisure purposes such as commuting). Both weekday and weekend surveys were undertaken between 06:00 and 19:00. User surveys were planned to avoid inclement weather. Survey methods included manual counts and interviews on rural PRowS in addition to camera counts where PRow and rural road use could be captured from the highway.
- 13.3.29 In order to develop a better understanding of how Thames Chase Community Forest is used by visitors, visitor surveys including counts and questionnaires were undertaken across four days in September 2021. The surveys identified how people travelled to the site, where they travelled from, and the purpose of their visit.

Future baseline ('Without Scheme' scenario)

- 13.3.30 The anticipated future population, housing and employment baseline has been determined using sources including regional and borough level population forecasts, and housing and employment growth projections.

Method of assessment – construction

- 13.3.31 The methodology for the construction phase assessment is outlined below for each topic area. Topics are divided between 'land-use and accessibility' and 'human health' as set out in Section 3 of DMRB LA 112 (Highways England, 2020b).

Land-use and accessibility

Private property and housing

- 13.3.32 Section 3 of DMRB LA 112 (Highways England, 2020b) requires an assessment of the location and number of properties at risk of demolition (including, for example travellers' sites), or from which land will be required/access affected, together with the location of residential development and number of units that will be affected. The extent of land required, including identification of potential effects on access, have been identified using information set out in the Book of Reference (Application Document 4.2) and

Statement of Reasons (Application Document 4.1) submitted as part of the DCO application. Private assets include marine and utilities infrastructure.

- 13.3.33 Assessment of potential effects during the construction phase required information regarding the location of assets obtained through consultation with relevant stakeholders and information set out in the Book of Reference (Application Document 4.2) and Statement of Reasons (Application Document 4.1).

Community land and assets

- 13.3.34 Section 3 of DMRB LA 112 (Highways England, 2020b) requires the identification of community land and assets potentially affected by the Project as a result of either land required or access restrictions. The assessment identified the location and amount of community land (for example common land, village greens, open green space, allotment, sports facilities) required or for which access would be affected by the Project; the location and types of community assets (for example village halls, healthcare facilities, education facilities, religious facilities) from which land would be required or for which access would be affected by the Project; and resultant effects on accessibility/severance.
- 13.3.35 This assessment was informed by data provided in the Book of Reference (Application Document 4.2) and Statement of Reasons (Application Document 4.1) together with information relating to the frequency of use of community land and assets (using publicly available information and from stakeholder engagement where appropriate).
- 13.3.36 The definition of community land in the DMRB is wider than the definition of land described in sections 131 and 132 of the Planning Act 2008 and includes, for example, private sports facilities. Special Category Land identified by sections 131 and 132 of the Planning Act 2008 is identified in the Statement of Reasons (Application Document 4.1), with policy compliance considered within the Planning Statement (Application Document 7.2).
- 13.3.37 The accommodation impacts of the construction workforce have also been assessed, together with requirements of the construction workforce in terms of community infrastructure such as healthcare facilities, in line with comments made in the Scoping Opinion. Accommodation in its broadest sense has been considered as a community resource.

Development land and businesses

- 13.3.38 The assessment considered impacts of the Project on development land and businesses, in line with Section 3 of DMRB LA 112. Consideration was given to the location and number of businesses (and associated jobs) at risk or from which land would be required or access affected as a result of the Project, impacts on land allocated by local authorities (and associated jobs where this is relevant), land subject to planning applications that may be related to employment uses, and the level of existing accessibility restrictions/severance to development land and businesses within the study area. This assessment was informed by information provided in the Book of Reference (Application Document 4.2) and Statement of Reasons (Application Document 4.1).

Agricultural land holdings

- 13.3.39 The assessment considered potential impacts on agricultural land holdings in line with Section 3 of DMRB LA 112 (Highways England, 2020b). Consideration has been given to the type, location and number of agricultural holdings from which land will be required or access affected; issues relating to severance / accessibility restrictions; and the level of use of agricultural holdings and assets within the study area.

Walkers, cyclists and horse riders (WCH)

- 13.3.40 Routes potentially affected by the Project were identified (including PRowS, cycle routes and minor roads used by WCH) and current usage levels ascertained, as outlined in Section 13.4. The assessment identified the sensitivity of individual routes, taking into account usage levels (including by vulnerable travellers), opportunities for substitution and enhancement, and level of vehicular traffic (relevant to rights of way for WCH crossing roads at grade). Temporary and permanent closures of PRowS, associated diversions and changes in journey length (increase or decrease) for WCH as a result of the Project were identified.

Human health

- 13.3.41 Health determinants have been identified from Section 3.26 of DMRB LA 112 and also from stakeholder consultation. The assessment includes consideration of effects on both physical and mental health and wellbeing arising from changes to health determinants. Health determinants comprise the following:
- a. Accessibility to a range of destination types (including community, education, recreational and healthcare facilities, and employment). The determinant covers changes in the outline spatial characteristics of the transport network, including the surrounding road network, public transport routes and changes in access by car and public transport.
 - b. Severance as a result of changes in access or traffic flows. This includes severance of communities from community, education, recreational and healthcare facilities.
 - c. Impacts on the ability of people to access and experience areas of green space and outdoor recreation
 - d. The impacts of changes to WCH routes on active travel
 - e. Health determinants associated with changes in environmental conditions (air quality, noise, sources and pathways of potential pollution (for example light pollution), flood-risk, residential and landscape amenity, and climate change)
 - f. Safety information associated with the existing Affected Road Network (this describes the network of roads impacted by the Project)
 - g. Work and training

- h. Housing and community related impacts
- i. Mental health and wellbeing

- 13.3.42 A stand-alone HEqIA (Application Document 7.10) has been prepared for the Project and has informed this assessment. Whilst preparation of an HEqIA is not a requirement of DMRB LA 112, it follows the principles outlined in this guidance, provides a qualitative assessment of potential impacts on human health and identifies potential changes to health determinants as a result of the Project.
- 13.3.43 Outputs of transport modelling data from the Lower Thames Area Model (LTAM) (described in the Transport Assessment (Application Document 7.9) and the Combined Modelling and Appraisal Report (Application Document 7.7)) have been used for the Population and Human Health assessment to inform the determination of health impacts relating to traffic-related severance, air quality and noise effects during operation. Further information can be found in Section 13.6 (Human Health) of this Chapter of the ES and in the HEqIA (Application Document 7.10).

Method of assessment – operation

- 13.3.44 The methods used to undertake the operational phase assessment are largely the same as for construction. Exceptions are highlighted below as they relate to individual sub-topics:
- a. Private property and housing, community land and assets, development land and businesses – the operational phase assessment highlights where permanent land acquisition is required.
 - b. Agricultural land holdings – agricultural land is affected at the point it is taken out of agricultural use at the start of the construction phase. As such, impacts are addressed during the construction phase. Potential operational impacts from, for example, noise and dust, have been assessed.
 - c. WCH – the operational phase assessment identifies permanent closures of PRoWs, together with associated diversions and changes in journey length (increase or decrease).
- 13.3.45 Outputs of transport modelling data from the Lower Thames Area Model (LTAM) (described in the Transport Assessment (Application Document 7.9) and the Combined Modelling and Appraisal Report (Application Document 7.7)) have been used for the Population and Human Health assessment to inform the determination of health impacts relating to traffic-related severance, air quality and noise effects during operation. Further information can be found in Section 13.6 human health of this Chapter of the ES and the HEqIA (Application Document 7.10).

Determining significance of effects

- 13.3.46 As described in Chapter 4: EIA Methodology, the significance of environmental effects was determined by taking into account the value (sensitivity) of the receptor and the magnitude of the impact.
- 13.3.47 The following paragraphs set out the value (sensitivity) and impact magnitude criteria used in this assessment, based on DMRB LA 112. Significance of effect was then determined using the matrix approach shown in Table 4.3 of Chapter 4: EIA Methodology.
- 13.3.48 The assessment of significance undertaken in this chapter is used as the basis for identifying effects which are considered significant in the context of the Infrastructure Planning (Environmental Impact Assessment) Regulations 2017 (EIA Regulations).

Defining the importance/sensitivity of resources and/or receptors

- 13.3.49 DMRB LA 112 divides the assessment approach into land use and accessibility, and human health.

Land use and accessibility

- 13.3.50 The value (sensitivity) of the identified receptors/resources for land use and accessibility was determined using the criteria shown in Table 13.3.

Table 13.3 Criteria for determining environmental value (sensitivity)

Receptor value (sensitivity)	Description
Very high	<p>Private property and housing:</p> <ul style="list-style-type: none"> Existing private property or land allocated for housing located in a local authority area where the number of households are expected to increase by >25% by 2041 (ONS data) Existing housing and land allocated for housing (e.g. strategic housing sites) covering >5ha and/or >150 houses <p>Community land and assets where there is a combination of the following:</p> <ul style="list-style-type: none"> Complete severance between communities and their land/assets, with little/no accessibility provision Alternatives are only available outside the local planning authority area The level of use is very frequent (daily) The land and assets are used by the majority (≥50%) of the community <p>Development land and businesses:</p> <ul style="list-style-type: none"> Existing employment sites (excluding agriculture) and land allocated for employment (e.g. strategic employment sites) covering >5ha <p>Agricultural land holdings:</p> <ul style="list-style-type: none"> Areas of land in which the enterprise is wholly reliant on the spatial relationship of land to key agricultural infrastructure Access between land and key agricultural infrastructure is required on a frequent basis (daily) <p>WCH:</p>

Receptor value (sensitivity)	Description
	<ul style="list-style-type: none"> • National Trails and routes likely to be used for both commuting and recreation that record frequent (daily) use. Such routes connect communities with employment land uses and other services with a direct and convenient WCH route, and there is little/no potential for substitution • Routes regularly used by vulnerable travellers such as the elderly, school children and people with disabilities, who could be disproportionately affected by small changes in the baseline due to potentially different needs • Rights of way for WCH crossing roads at grade with >16,000 vehicles per day
High	<p>Private property and housing:</p> <ul style="list-style-type: none"> • Private property or land allocated for housing located in a local planning authority area where the number of households is expected to increase by 16–25% by 2041 (ONS data) • Existing housing and land allocated for housing (e.g. strategic housing sites) covering >1-5ha and/or >30–150 houses <p>Community land and assets where there is a combination of the following:</p> <ul style="list-style-type: none"> • There is substantial severance between community and assets, with limited accessibility provision • Alternative facilities are only available in the wider local planning authority area • The level of use is frequent (weekly) • The land and assets are used by the majority (≥50%) of the community <p>Development land and businesses:</p> <ul style="list-style-type: none"> • Existing employment sites (excluding agriculture) and land allocated for employment (e.g. strategic employment sites) covering 1–5ha <p>Agricultural land holdings:</p> <ul style="list-style-type: none"> • Areas of land in which the enterprise is dependent on the spatial relationship of land to key agricultural infrastructure • Access between land and key agricultural infrastructure is required on a frequent basis (weekly) <p>WCH:</p> <ul style="list-style-type: none"> • Regional trails and routes (e.g. promoted circular walks) likely to be used for recreation, and to a lesser extent commuting, that record frequent (daily) use, for which there is limited potential for substitution • Rights of way for WCH crossing roads at grade with 8,000–16,000 vehicles per day
Medium	<p>Private property and housing:</p> <ul style="list-style-type: none"> • Houses or land allocated for housing located in a local authority area where the number of households are expected to increase by 6–15% by 2041 (ONS data) • Existing housing and land allocated for housing (e.g. strategic housing sites) covering <1ha and/or <30 houses

Receptor value (sensitivity)	Description
	<p>Community land and assets where there is a combination of the following:</p> <ul style="list-style-type: none"> • There is severance between communities and their land/assets but with existing accessibility provision • Limited alternative facilities are available at a local level within adjacent communities • The level of use is reasonably frequent (monthly) • The land and assets are used by the majority (≥50%) of the community <p>Development land and businesses:</p> <ul style="list-style-type: none"> • Existing employment sites (excluding agriculture) and land allocated for employment (e.g. strategic employment sites) covering <1ha <p>Agricultural land holdings:</p> <ul style="list-style-type: none"> • Areas of land in which the enterprise is partially dependent on the spatial relationship of land to key agricultural infrastructure • Access between land and key agricultural infrastructure is required on a reasonably frequent basis (monthly) <p>WCH:</p> <ul style="list-style-type: none"> • PRoWs and other routes close to communities which are used for recreational purposes (e.g. dog walking), but for which alternative routes can be taken. These routes are likely to link to a wider network of routes to provide options for longer, recreational journeys • Rights of way for WCH crossing roads at grade with 4,000–8,000 vehicles per day
Low	<p>Private property and housing:</p> <ul style="list-style-type: none"> • Proposed development on unallocated sites providing housing with planning permission/in the planning process <p>Community land and assets where there is a combination of the following:</p> <ul style="list-style-type: none"> • Limited existing severance between community and assets, with existing full Disability Discrimination Act 1995 compliant accessibility provision • Alternative facilities are available at a local level within the wider community • The level of use is infrequent (monthly or less frequent) • The land and assets are used by the minority (<50%) of the community <p>Development land and businesses:</p> <ul style="list-style-type: none"> • Proposed development on unallocated sites providing employment with planning permission/in the planning process <p>Agricultural land holdings:</p> <ul style="list-style-type: none"> • Areas of land in which the enterprise is not dependent on the spatial relationship of land to key agricultural infrastructure • Access between land and key agricultural infrastructure is required on an infrequent basis (monthly or less frequent)

Receptor value (sensitivity)	Description
	<p>WCH:</p> <ul style="list-style-type: none"> Routes which have fallen into disuse through past severance or which are scarcely used because they do not currently offer a meaningful route for either utility or recreational purposes Rights of way for WCH crossing roads at grade with <4,000 vehicles per day
Negligible	<p>Private property and housing: n/a</p> <p>Community land and assets where there is a combination of the following:</p> <ul style="list-style-type: none"> No or limited severance or accessibility issues Alternative facilities are available within the same community The level of use is very infrequent (a few occasions yearly) The land and assets are used by the minority (<50%) of the community <p>Development land and businesses: n/a</p> <p>Agricultural land and holdings:</p> <ul style="list-style-type: none"> Areas of land which are infrequently used on non-commercial basis <p>WCH: n/a</p>

13.3.51 The magnitude of impacts on receptors/resources for land use and accessibility was determined using the criteria outlined in Table 13.4.

Table 13.4 Criteria for determining the magnitude of impact

Magnitude of change	Description
Major	<p>Private property and housing, community land and assets, development land and businesses:</p> <ul style="list-style-type: none"> Loss of resource and/or quality and integrity of resource; severe damage to key characteristics, features or elements, e.g. direct acquisition and demolition of buildings and direct development of land to accommodate highway assets Introduction (adverse) or removal (beneficial) of complete severance with no/full accessibility provision <p>Agricultural land and holdings:</p> <ul style="list-style-type: none"> As a result of the complexity of the nature of agricultural land holdings and land use, a quantitative approach has been applied to the above in relation to agricultural holdings to provide a consistent and equitable means to determine the magnitude of impact. It has been assumed that a loss of >50% of a landholding equates to a loss of integrity and a major impact. <p>WCH:</p> <ul style="list-style-type: none"> >500m increase (adverse) or decrease (beneficial) in WCH journey length

Magnitude of change	Description
Moderate	<p>Private property and housing, community land and assets, development land and businesses:</p> <ul style="list-style-type: none"> • Partial loss of/damage to key characteristics, features or elements, e.g. partial removal or substantial amendment to access or acquisition of land compromising viability of property, businesses, community assets or agricultural holdings • Introduction (adverse) or removal (beneficial) of severe severance with limited/moderate accessibility provision <p>Agricultural land and holdings:</p> <ul style="list-style-type: none"> • As a result of the complexity of the nature of agricultural land holdings and land use, a quantitative approach has been applied to the above in relation to agricultural holdings to provide a consistent and equitable means to determine the magnitude of impact. It has been assumed that a loss of between 20 and 50% of the landholding is assumed to result in some impact on integrity and a moderate impact. <p>WCH:</p> <ul style="list-style-type: none"> • 250m–500m increase (adverse) or decrease (beneficial) in WCH journey length
Minor	<p>Private property and housing, community land and assets, development land and businesses:</p> <ul style="list-style-type: none"> • A discernible change in attributes, quality or vulnerability; minor loss of, or alteration to, one (maybe more) key characteristics, features or elements, e.g. amendment to access or acquisition of land resulting in changes to operating conditions that do not compromise overall viability of property, businesses, community assets or agricultural holdings • Introduction (adverse) or removal (beneficial) of severance with adequate accessibility provision <p>Agricultural land and holdings:</p> <ul style="list-style-type: none"> • As a result of the complexity of the nature of agricultural land holdings and land use, a quantitative approach has been applied to the above in relation to agricultural holdings to provide a consistent and equitable means to determine the magnitude of impact. It has been assumed that a loss of between 5 and 20% is considered a minor impact. <p>WCH:</p> <ul style="list-style-type: none"> • 50m–250m increase (adverse) or decrease (beneficial) in WCH journey length

Magnitude of change	Description
Negligible	<p>Private property and housing, community land and assets, development land and businesses:</p> <ul style="list-style-type: none"> • Very minor loss or detrimental alteration to one or more characteristics, features or elements, e.g. acquisition of non-operational land or buildings not directly affecting the viability of property, businesses, community assets or agricultural holdings • Very minor introduction (adverse) or removal (beneficial) of severance with ample accessibility provision <p>Agricultural land and holdings:</p> <ul style="list-style-type: none"> • As a result of the complexity of the nature of agricultural land holdings and land use, a quantitative approach has been applied to the above in relation to agricultural holdings to provide a consistent and equitable means to determine the magnitude of impact. It has been assumed that with any loss <5% of the total landholding considered negligible. <p>WCH:</p> <ul style="list-style-type: none"> • <50m increase (adverse) or decrease (beneficial) in WCH journey length.
No change	No loss or alteration of characteristics, features, elements or accessibility; no observable impact in either direction

13.3.52 The significance of effects is assessed as set out in Table 4.3 in Chapter 4. Where two significance categories are set out in Table 4.3, the higher significance category has been used to represent the worst case scenario given that the loss of agricultural land is permanent.

Human health

- a. For human health, the sensitivity of a community/population has been reported in line with Section 3 of DMRB LA 112 as low, medium or high. Supporting evidence for the assessment of sensitivity of individual wards within the local study area is provided in Appendix 13.2 Ward Sensitivities.
- b. A wider range of sensitive population groups have been identified as part of the health assessment, through baseline data gathering, evidence from research findings (set out in more detail in the HEqIA (Application Document 7.10), stakeholder engagement and consideration of information contained in WHIASU guidance (WHIASU, 2021). The guidance provides a population group checklist, identifying groups considered to be more susceptible to poorer health and wellbeing outcomes. Table 13.5 sets out populations of high sensitivity for each of the human health topic areas.

Table 13.5 Identification of sensitive populations

Human health assessment topic	Sensitive populations
Accessibility	<ul style="list-style-type: none"> • Children and young people • Older people • Women • People in low-income households • People with disabilities / long-term health conditions • People living in rural areas • Carers • People in key settings: workplaces/schools/hospitals/ care homes/ prisons
Severance	<ul style="list-style-type: none"> • Children and young people • Older people • People with disabilities / long-term health conditions • Parents with young children / pushchairs • People in low-income households • People living in rural areas • Lone-parent families • Carers • People in key settings: workplaces/schools/hospitals/ care homes/ prisons
Access to green space and outdoor recreation	<ul style="list-style-type: none"> • Children and young people • People living in areas which exhibit poor economic/health indicators • Users of existing areas of open space and recreational assets • People with disabilities/long term health conditions • People with mental health conditions • Older people • Carers • Lone-parent families
Active Travel	<ul style="list-style-type: none"> • Children and young people • Women • People in low-income households • Lone-parent families • People living in rural areas
Road safety	<ul style="list-style-type: none"> • Children and young people • Older people • People in low-income households • People with disabilities / long term health conditions
Air quality	<ul style="list-style-type: none"> • Children and young people

Human health assessment topic	Sensitive populations
	<ul style="list-style-type: none"> • Older people • People with disabilities / long term health conditions (for example people with pre-existing respiratory health conditions such as asthma) • People living in areas which exhibit poor economic/health indicators • People in key settings: workplaces/schools/hospitals/care homes/prisons
Noise and vibration	<ul style="list-style-type: none"> • Children and young people • Older people • Early years (for example pregnant women/parents with newborn babies who may already be suffering from sleep disturbance) • People with disabilities / long term health conditions (for example people with pre-existing aural health conditions or cardiovascular conditions) • People with mental health conditions (for example people with autism or dementia who may have different levels of susceptibility to changes in noise levels) • Shift workers (for example carers) • People living in areas which exhibit poor economic/health indicators • People living in close proximity to the route or construction activities (e.g. residents of the Gammonfields Way Travellers' Site) • People in key settings: workplaces/schools/hospitals/care homes/prisons
Work and training	<ul style="list-style-type: none"> • People living in areas which exhibit poor economic/health indicators • People who are economically inactive or unemployed • Children and young people (who may be affected by changes in household income) • People who are unable to work due to ill health • Lone-parent families • Carers • Migrant and itinerate workers (potential members of the construction workforce)
Housing and community-related impacts	<ul style="list-style-type: none"> • People living in properties affected by permanent land acquisition • People living in communities affected by loss of properties (e.g. Baker Street, North Ockendon) • Older people • People in low-income households • Younger families with school-age children

Human health assessment topic	Sensitive populations
	<ul style="list-style-type: none"> • Gypsy and traveller communities • People with disabilities / long term conditions • Carers • People living in rural areas • People living in properties within close proximity of the route • People with mental health conditions
Mental health and wellbeing	<ul style="list-style-type: none"> • People in low-income households • People who are long-term unemployed • People in poor living conditions • People with a long-term or chronic illness or disability • People from ethnic minority groups • People with a history of drug and/or alcohol misuse • Lone-parent families • People with existing mental health conditions/needs • Carers • Gypsy and traveller communities
Pollution and flood-risk	<ul style="list-style-type: none"> • Local residents and land-users in the vicinity of significant earthwork movements • Construction workers • Road users • Maintenance workers
Light pollution	<ul style="list-style-type: none"> • Residential populations located in close proximity to construction compounds/activities • Older people • Children and young people • People with sensory disabilities • People living in rural areas • People with mental health conditions
Climate change	<ul style="list-style-type: none"> • People in low-income groups • People with disabilities • Older people • People living in areas which exhibit poor economic/health indicators • People with disabilities / long-term health conditions • People living in high flood risk zones
Electric and magnetic fields (EMF)	N/A

13.3.53 Once community/population sensitivity and changes to health determinants likely to occur as a result of the Project had been established, the likely health outcome(s) were identified in line with the categories set out in Table 13.6 with evidence provided to support conclusions.

Table 13.6 Human health outcome categories

Health outcome category	Health outcome description
Positive	A beneficial health impact is identified
Neutral	No discernible health impact is identified
Negative	An adverse health impact is identified
Uncertain	Where uncertainty exists as to the overall health impact

13.3.54 DMRB LA 112 does not currently include significance criteria for health. Consultation with health stakeholders via the CIPHAG has highlighted that the assessment of effects on human health should include an assessment framework which identifies the sensitivity of the community/ population, whether the change is beneficial or adverse, the duration (temporary or permanent), the magnitude and severity of the change and a judgement as to whether or not the effect is likely to be significant.

13.3.55 The guidance document ‘Human health: ensuring a high level of protection. A reference paper on addressing human health in Environmental Impact Assessment’ (International Association of Impact Assessment and European Public Health Association, 2020) has been used to inform an approach to identifying significance, taking into account multiple criteria.

- a. Accordingly, the following has been taken into account when assessing population health effects that may arise as a result of the Project:
 - i. The strength of evidence to support an association between changes arising from the Project, the determinant of health and a health outcome
 - ii. The relationship with the health policy context and/or local health priorities
 - iii. The extent to which stakeholders are concerned about particular determinants of health or health outcomes
 - iv. The proportion of the population likely to be affected by or exposed to the potential change including the distribution of effects where this is relevant and the nature of the population affected (for example where a population may be particularly sensitive due to pre-existing health conditions or other factors)
 - v. Duration of effect (short, medium, long-term or permanent in line with the temporal scope set out in paragraph 13.3.8)

- vi. An assessment of the severity of health outcome, for example whether this relates to changes in mortality/morbidity or whether the change is related to wellbeing or quality of life
- vii. The potential impact of the change on health inequalities at a population level
- viii. Whether the change is likely to be beneficial, adverse, neutral or uncertain (in line with categories set out in DMRB LA 112 as described in paragraph 13.3.54)
- ix. Taking the above factors into account, an assessment of whether the effect is likely to be significant or not significant in terms of population health.

Assumptions and limitations

- 13.3.56 General assumptions used throughout the ES, and limitations affecting the assessments are set out in Chapter 4: EIA Methodology. Relevant assumptions and any other limitations encountered during the population and human health assessment are as described below. Acknowledging the assumptions and limitations identified below and in Chapter 4: EIA Methodology, the ES is considered robust and in line with relevant legislation, policy and guidance.
- 13.3.57 Baseline conditions have been established using currently available and most-recent data where appropriate. In some cases, more recent data may be available, however this is not utilised due to the impact of COVID-19 resulting in the data being misrepresentative of the true baseline (for example visitor data for tourist attractions is available for 2020 but may not be representative due to lockdowns as a result of COVID-19).
- 13.3.58 The construction modelling undertaken using the Project's transport model provides an extensive quantitative assessment of the forecast impact of construction works on the road network, using the same traffic baseline and forecasting work that has informed the operational modelling.
- 13.3.59 The Population and Human Health assessment considers only the direct effects on commercial land in terms of land required and with reference to employment. The transport impacts on business users during operation have been assessed as part of Appendix D: Economic Appraisal Package of the Combined Modelling and Appraisal Report (Application Document 7.7). Construction impacts on users of the road network are assessed in the Transport Assessment (Application Document 7.9).
- 13.3.60 Community resources are mentioned expressly in the environmental baseline only where they are affected by the Project. Consequently, not all community resources within the study area are mentioned.

- 13.3.61 As explained earlier in paragraph 13.3.14 in relation to the Scoping Opinion, driver stress and views from the road no longer form part of the assessment required within the population and human health chapter (as a result of the introduction of DMRB LA 112 (Highways England, 2020b)). Information relating to these topics is provided elsewhere in the DCO application:
- Appendix 7.13: Views from the Road Assessment (Application Document 6.3) of Chapter 7: Landscape and Visual (views from the road)
 - Appendix 4.4: Traffic and Transport (Application Document 6.3) which explains and signposts to where the environmental assessment of traffic and transport impacts are covered within the Development Consent Order (DCO) application documents
 - Transport Assessment (Application Document 7.9) (effects on the road network and road safety)
 - HEqIA (Application Document 7.10) (health outcomes connected with road safety and a qualitative assessment of driver stress).
- 13.3.62 The COVID-19 pandemic has had implications at local, regional and national level, for example in relation to human health characteristics and travel behaviours. Equally, the future medium to longer-term implications of COVID-19 remain uncertain, and this assessment has, therefore, not made any assumptions as to the impacts on these scenarios. This assessment remains a worst-case scenario assessment based on pre-COVID-19 conditions and forecasts.
- 13.3.63 Where there is overlap with other environmental topics (for example Chapter 5: Air Quality, Chapter 7: Landscape and Visual, Chapter 10: Geology and Soils and Chapter 12: Noise and Vibration), limitations and assumptions set out in those chapters of the ES may be relevant.
- 13.3.64 Land use information has predominantly been gained from publicly available sources, supplemented with information directly from landowners where available. The numbers of landholdings presented in current agricultural operation which fall within the Order Limits should be considered to be the best estimate based on the available information. Where there is uncertainty over whether landholdings are currently in agricultural operation, a cautionary approach has been taken in which operations are assumed to be ongoing. It is considered the available information is sufficient to enable a robust assessment.
- 13.3.65 In relation to impacts on access to agricultural land (for example as a result of severance or increased travel times), it has been assumed that as all roads with the exception of Hornsby Lane would be reconnected, the impacts would be minimal. Where impacts relating to severance or significant increases in journey times become apparent through ongoing landowner discussions, this would be resolved as part of a negotiated landowner compensation agreement.
- 13.3.66 It is assumed that the existing pattern of ownership and agricultural land use would remain substantially unaltered until the start of construction, such that the proportion of land required from agricultural holdings would remain unaltered.

13.3.67 The DCO application has been developed on the basis of a 2030 opening year. This assumes consent is granted in 2024. Following the DCO grant there would be preparatory works, referred to in the draft DCO as preliminary works, taking place in 2024. The main construction period for the Lower Thames Crossing would start in early 2025, with the road being open for traffic in late 2030. Construction would take approximately six years, but as with all large projects there is a level of uncertainty over the construction programme, which will be refined once contractors are appointed and as the detailed design is developed. The 2030 opening year has been selected as the basis for the assessments and is representative of the reasonable worst-case scenario. This has been used consistently across the environmental assessments and transport assessment for the Project.

Nitrogen deposition compensation sites

13.3.68 The DCO application documents identify locations of habitat creation sites proposed as compensation for the effects of nitrogen deposition. The design and management regimes for these locations would be developed as part of the detailed design, in accordance with the control plan documents including the Outline Landscape and Ecology Plan (OLEMP) (Application Document 6.7), Design Principles (Application Document 7.5) and the Environmental Masterplan (ES Figure 2.4: Application Document 6.2).

13.3.69 The environmental assessment of these habitat creation areas has reflected a reasonable worst case, for both construction and operation phases. This is described in Chapter 2: Project Description. The following assumptions have been made in the assessment of population and human health effects associated with the nitrogen deposition compensation sites:

- a. Hole Farm - the Project proposals at Hole Farm overlap with a legacy project being developed by the Applicant for a community woodland in the same location. Further information on these proposals is provided in Chapter 2: Project Description. The timescales for delivery of the community woodland are different to those for the Project. The environmental assessments for Population and Human Health have assumed that the mitigation and compensation planting areas at Hole Farm are in place and have begun to establish prior to the start of construction.

13.4 Baseline conditions

Existing baseline

13.4.1 The baseline conditions for the population and human health study area are described from south to north of the Order Limits.

Land-use and accessibility

Private property and housing

13.4.2 This section provides a description of baseline conditions in relation to private property and housing. Private property includes various sub-categories including residential and commercial property, infrastructure and marine assets. Baseline conditions for housing include a description of the current housing

market to the north and south of the River Thames. Development land (from the perspective of employment) and businesses are covered in paragraphs 13.4.70 to 13.4.76 (south of the River Thames) and paragraphs 13.4.77 to 13.4.88 (north of the River Thames).

South of the River Thames

Private property – residential and commercial assets

- 13.4.3 Table 13.7 shows population figures across local authorities within the local study area to the south of the Thames, including population change between Census data for 2011 and 2021. Each local authority area has been subject to population growth, with Dartford exhibiting the highest estimated increase of nearly 20%. For the local study area as a whole, the growth rate appears to have peaked in 2014 and has been dropping for the past four years (this is based on five-year rolling average growth rates).

Table 13.7 Population change 2011–2021 – south of the River Thames

Local authority	2011 (resident population)	2021 (resident population)	Population growth (%)
Kent	1,463,740	1,576,100	7.7%
Medway	263,925	279,800	6.0%
Gravesham	101,720	106,900	5.1%
Dartford	97,365	116,800	19.9%
Tonbridge and Malling	120,805	132,200	9.4%
England	53,012,456	56,489,800	6.6%

Source: 2011 and 2021 Census Data

- 13.4.4 Communities identified to the south of the River Thames, together with the approximate size of their populations (based on 2020 Mid-Year Population Estimates), are shown in Table 13.8.

Table 13.8 Communities to the south of the River Thames

Community	2020 (resident population)
Riverside	10,124
Riverview	4,268
Higham	3,850
Chalk	2,181
Westcourt	7,033
Singlewell	8,203
Woodlands	6,956
Shorne, Cobham and Luddesdown	4,239
Northfleet South	8,945
Istead Rise	3,363

Community	2020 (resident population)
Painters Ash	5,454
Central	7,139
Coldharbour	4,979
Cuxton and Halling	6,683
Strood Rural	15,200
Strood South	16,495
Strood North	14,393
Newtown	6,413
Stone Castle	7,833
Stone House	6,689
Bridge	2,940
Temple Hill	12,137
Longfield, New Barn and Southfleet	6,542
Snodland East	5,308

Source: ONS Mid-Year Population Estimates, 2020b

- 13.4.5 Residential areas within 500m of the Order Limits include the outskirts of Strood, the villages of Shorne, Thong and Cobham and eastern suburbs of Gravesend (notably the Singlewell, Riverview Park and Chalk areas), together with isolated rural properties.
- 13.4.6 According to data collated by relevant local authorities and submitted to the Department for Levelling Up, Housing and Communities on a biennial basis, there are no publicly managed traveller sites within the study area to the south of the River Thames. However, two privately owned sites have been identified to the south-east of Chalk, at the point where Rochester Road becomes Gravesend Road. The two sites are next to each other, one being accessed via View Point Place (up to four static caravans) with the other accessed via an adjacent track (between two and four static caravans). The majority of both sites are outside the Order Limits. However, a 10m strip of each property's title fronting Rochester Road is within the Order Limits to allow for the diversion of utilities.
- Private property – transport and utilities infrastructure*
- 13.4.7 The road network within the Order Limits includes the following:
- The A289, which is a dual carriageway connecting M2 junction 1 through to London Thamesport and Grain Power Station.
 - The A229, which is a dual carriageway connecting M20 junction 6 to M2 junction 3. It has an additional southbound climbing lane approaching M2 junction 3.

- c. Several single carriageway roads including Lower Higham Road, the A226 and Thong Lane. These roads provide connections between Gravesend and the A2/M2 and smaller villages including Shorne and Higham.
- d. There are also a number of local roads that connect to or cross the A2 to the east of Gravesend. These include Hever Court Road, Henhurst Road, Valley Drive and Brewers Road.

13.4.8 The Project would cross, or be close to, the following rail infrastructure:

- a. High Speed 1, the high-speed railway connecting London St Pancras International and the Channel Tunnel, runs parallel to and south of the A2 at the southern end of the Project.
- b. The North Kent railway line from London Charing Cross to Strood is used by South Eastern railway services from Kent into London and Thameslink services. It crosses the Project route at ground level approximately 500m south of the River Thames.
- c. The Upminster and Grays Branch railway line, used by c2c services, connecting the Tilbury Loop railway line to the Shoeburyness railway line and crossing under the M25 cutting at North Ockendon, to the west of the proposed new road.
- d. The Shoeburyness railway line, used by c2c services, connecting London (Liverpool Street and Fenchurch Street) to Shoeburyness via Upminster and Basildon. It crosses under the M25 approximately 1km south of junction 29.

13.4.9 Utilities infrastructure located to the south of the River Thames is shown on Figure 13.1 (Application Document 6.2) and includes:

- a. The Singlewell Infrastructure Depot, located between the A2 and High Speed 1 (Channel Tunnel Rail Link), including fuelling facilities, workshop, storage and office space.
- b. Singlewell electricity substation, with high-voltage overhead powerlines running across the A2 and across the Project route at Thong.
- c. Gravesend electricity tunnel and cable sealing end compound, with high-voltage overhead powerlines running next to the North Kent railway line across the Project route.
- d. Two Above Ground Installations (AGIs) are located at Lower Higham Road (to the east of Church Lane) and to the south of Shornemead Fort.

Private property – marine and riparian assets

13.4.10 The River Thames runs west to east through the Order Limits. At the site of the proposed new road crossing, the River Thames is about 1.3km wide. At this location, the navigation channel is 300m wide, with a riverbed level of about minus 13m above ordnance datum (AOD). The mean high-water spring level is

3.47m AOD and the mean low water spring level is minus 2.51m AOD. There is a flood protection embankment on the south bank of the river and a flood protection wall on the north bank. This area of the River Thames is known as Gravesend Reach.

- 13.4.11 The river is subject to many thousands of boat movements each year, with passenger vessels on scheduled and charter services, tugs and tows (water transfer of barges delivering aggregates) and service vessels (for example, emergency services and Environment Agency services). In this area, the River Thames is popular for recreational boating, with sailing clubs found at Gravesend and Cliffe. In addition, the river is used for the Great River Race and the Barge Race, both of which attract many competitors annually.
- 13.4.12 Existing marine use is described further in the Preliminary Navigational Risk Assessment prepared for the Project (Application Document 7.15).
- 13.4.13 Infrastructure within this section of the River Thames includes the following:
- a. Port Control Centre, managed by the Port of London Authority
 - b. Gravesend Embankment Marina and Sailing Club, which has a serviced pontoon berth, lock access to the Thames and an established community of residential and leisure berth holders
 - c. Gravesend Lifeboat Station, which is one of the Royal National Lifeboat Institution's newest lifeboat stations and one of four operating on the River Thames
 - d. Denton Wharf, managed by the Port of London Authority and providing a purpose-built facility to undertake a wide range of marine operations
 - e. Town Pier, which is the oldest surviving cast iron pier in the world and is Grade II* listed.

Residential development land

- 13.4.14 Residential development land identified within the study area is shown in Table 13.9 and identified in Figure 13.1 (Application Document 6.2).

Table 13.9 Residential development land – south of the River Thames

Location	Description	Current status	Distance from Order Limits
Albion Waterside, Canal Basin, Gravesend	Mixed Use developments comprising C3 and C2 residential uses and commercial floorspace (Use Class E)	Hybrid Planning Application 20210270 Validated 9 March 2021 Pending Consideration	400m from Order Limits

North of the River Thames

Private property – residential and commercial assets

13.4.15 Table 13.10 shows population figures across local authorities within the local study area to the north of the River Thames, including population change between Census data for 2011 and 2021. Each local authority has been subject to population growth, with Thurrock exhibiting the highest increase of over 11%. As with the area south of the River Thames, the growth rate appears to have peaked in 2014 and has been dropping for the past four years (based on five-year rolling average rates).

Table 13.10 Population change 2011-2021 – north of the River Thames

Area	2011 (resident population)	2021 (resident population)	Population growth (%)
Essex	1,393,587	1,503,300	7.8%
Thurrock	157,705	176,000	11.6%
Havering	237,232	262,000	10.4%
Brentwood	73,601	77,000	4.6%
England	53,012,456	56,489,800	6.6%

Source: ONS 2011 and 2021 Census Data

13.4.16 Communities identified to the north of the River Thames, together with the approximate size of their populations (based on 2020 Mid-Year Population Estimates), are shown in Table 13.11.

Table 13.11 Communities to the north of the River Thames

Community	2020 (resident population)
Ockendon	11,790
Belhus	10,679
Orsett	5,944
Stifford Clays	6,760
Little Thurrock Rectory	6,186
Little Thurrock Blackshots	6,695
Chadwell St Mary	10,489
Tilbury St Chads	6,813
Tilbury Riverside and Thurrock Park	8,181
East Tilbury	7,309
Aveley and Uplands	10,639
West Thurrock and South Stifford	14,223
Chafford and North Stifford	8,324
Stanford-le-Hope West	7,115
Stanford East and Corringham Town	8,288

Community	2020 (resident population)
The Homesteads	8,282
Corringham and Fobbing	5,425
Upminster	13,260
Cranham	12,973
Harold Wood	15,117
Rainham and Wennington	13,384
Warley	6,432
South Weald	1,911
Herongate, Ingrave and West Horndon	3,699
Gooshays	17,443

Source: ONS Mid-Year Population Estimates, 2020b

- 13.4.17 Residential areas within 500m of the Order Limits include the town of Tilbury, the northern outskirts of Grays (specifically the Stifford Clays area), the villages of West Tilbury and East Tilbury, Linford, Chadwell St Mary, Orsett, North Ockendon and South Ockendon, the hamlet of Baker Street and the eastern outskirts of Upminster (notably the Cranham area).
- 13.4.18 Traveller communities are also located within the study area. Information relating to publicly owned traveller sites is collated by relevant local authorities and submitted to the Department for Levelling Up, Housing and Communities on a regular basis. The latest information (Department for Levelling Up, Housing and Communities, 2022) identifies the following sites:
- a. The Gammonfields Way travellers' site is located off Long Lane, within the Order Limits, and is owned and managed by Thurrock Council. The site has 21 pitches, with capacity for 42 caravans and covers an area of 1.5ha. There is a site office and a small car park on site. Although detached from the urban edge, the site has good road access and is close to existing community facilities and services.
 - b. A further travellers' site is the Pilgrims Lane site at Grays (which has 22 pitches and capacity for 44 caravans), located between the A13 and Chafford Hundred. The site is located more than 500m from the Order Limits.
 - c. Buckles Lane Traveller Camp is located south of South Ockendon, 0.5km to the west of the Order Limits and is owned and managed by Thurrock Council. Buckles Lane is made up of nine distinct sub-yards containing a total of 109 distinct plots. These include over 700 accommodation units, of which nearly 250 are occupied by Travelling Showpeople (Thurrock Council, 2018a). This site is not included within the DLUHC data reported by Thurrock Council.

- 13.4.19 There are a number of privately owned traveller sites within the study area. Sites located within Thurrock are as follows:
- a. A small site is located at the western end of Lower Crescent, Linford, with approximately seven caravan pitches. The site overlaps the Order Limits.
- 13.4.20 Currently, there are no publicly owned or operated gypsy and traveller sites within the London Borough of Havering. The London Borough of Havering's (2019) Gypsy and Traveller Accommodation Assessment Update Report confirms that the borough is dependent on privately owned sites to accommodate identified need. Privately owned traveller sites within the study area in the London Borough of Havering are as follows:
- a. A linear site situated to the west of the M25 and Ockendon branch railway line, known as 'Railway Sidings', with approximately eight static caravans. The site is accessed from Ockendon Road to the south. Railway Sidings is outside of, but surrounded by, the Order Limits.
 - b. Fair oak Showman's Quarters, which accommodates approximately seven caravans, is located to the north of the B187 St Marys Lane. The site is listed in the London Borough of Havering's Gypsy and Traveller Accommodation Assessment (London Borough of Havering, 2017) as an authorised travelling showpeople yard. Whilst the site itself is outside of the Order Limits, the entrance to the site (which is accessed from the B187 St Marys Lane) is within the Order Limits.
 - c. Tyas Stud Farm is a linear site of approximately 1.6ha in size which is located to the rear of Latchford Farm, to the east of the M25 and south of the London to Shoeburyness railway line. The site is accessed from the B187 St Marys Lane. The site is divided into six discrete areas or plots, each of which accommodate multiple units including modular buildings and caravans. The most northern plot is located within the Order Limits.
 - d. The Laburnham Stables site is located to the east of Cranham. There are several pitches apparent on the site, which is accessed from Laburnham Gardens. The site is located approximately 130m from the Order Limits.
 - e. A further site, Willow Tree Lodge, is located to the south of the A127, towards the north of Cranham. The site is accessed from Brookman's Park Drive in Cranham and has approximately 12 pitches. The site is approximately 140m from the Order Limits.

Private property – transport and utilities infrastructure

- 13.4.21 Transport and utilities infrastructure are identified on Figure 13.1 (Application Document 6.2). Sections of the road network within the Order Limits include the following:
- a. Several single carriageway roads including the A128, Fort Road, Brentwood Road, Muckingford Road and the A1013 Stanford Road, which runs roughly

parallel to the A13 between Grays and Stanford-le-Hope. These roads provide connections between Tilbury and the surrounding urban areas, East Tilbury, Orsett and north to the A127.

- b. The A127 is located towards the north of the Project. It is a dual carriageway linking London to Southend-on-Sea. The A127 runs west and east from M25 junction 29.

13.4.22 The Project would cross or be close to the following rail infrastructure:

- a. The Tilbury Loop railway line – which forms part of the wider London, Tilbury and Southend Railway, connecting Fenchurch Street Station in Central London with destinations in east London and Essex, including Grays and Tilbury.
- b. The Shoeburyness railway line – which forms part of the wider London, Tilbury and Southend Railway, connecting Fenchurch Street Station in Central London with destinations in east London and Essex, including Grays and Tilbury.
- c. The Project would run immediately adjacent to the Upminster and Grays Branch railway line (which again forms part of the wider London, Tilbury and Southend Railway) in the vicinity of Ockendon Road.

13.4.23 Utilities infrastructure located within the study area to the north of the River Thames is shown on Figure 13.1 (Application Document 6.2) and includes the following:

- a. Tilbury Sewage Treatment Works
- b. Electricity substation at Tilbury and several overhead powerlines running north alongside and across the Project route towards Orsett and Ockendon
- c. Warley electricity substation and several overhead powerlines running north alongside and across the Project route at North Ockendon and west from Warley substation over the M25
- d. Overhead powerlines in the vicinity of the A13/A1089 junction
- e. AGIs at Ockendon and Coalhouse Fort
- f. AGI and gas Pressure Reduction System (PRS) located at Brentwood Road.

Private property – marine and riparian assets

13.4.24 As noted for the south of the River Thames section, the river in this area is used by a wide variety of vessel types including seagoing commercial vessels, tugs and service vessel, inland freight vessel, inland passenger vessels, and recreational craft such as yachts, motorboats and rowing boats. Marine use is further described in the Preliminary Navigational Risk Assessment prepared for the Project (Application Document 7.15).

- 13.4.25 Two jetties are located close to the Order Limits on the north bank of the River Thames: the East Tilbury jetty at Goshem’s Farm and the Ingrebourne Valley Limited (IVL) jetty.
- 13.4.26 The East Tilbury jetty (also known as the Ferrovia Laing O’Rourke (FLO) jetty) comprises a pontoon approximately 98m long by 24m wide, connected to land by a double bridge approximately 95m in length with 4.2m wide carriageways. The jetty is tidally constrained, providing mooring facilities for bulk cargo loading and unloading, currently operating a maximum of three 1,500t barges at high tide (therefore six barges in total per day). The current and proposed future use for this jetty is to receive waste from other local major projects (Tideway and Silvertown Tunnel in due course), and as such, it will be operating at full capacity.
- 13.4.27 The IVL jetty comprises a pontoon approximately 70m long by 15m wide, connected to land by a single bridge approximately 35m in length with a 4.2m wide carriageway. The jetty provides mooring facilities for bulk cargo loading and unloading which is currently operating a maximum of two 1,500t barges at high tide (therefore four barges in total per day). The IVL jetty is used and owned by IVL.
- 13.4.28 The Port of Tilbury is one of London’s major ports, providing distribution services for the benefit of south-east England and beyond. A DCO application for a new port terminal on the north bank of the River Thames at Tilbury (Tilbury2) was approved by the Planning Inspectorate in February 2019 and construction was completed in May 2020. Port of Tilbury and Tilbury2 offer services including high-density container terminals, RoRo (roll-on/roll-off), a Construction Materials Aggregate Terminal, bulk cargo and liquid bulk terminal facilities, deep water mooring quay walls and jetties, and warehouse storage. The Order Limits for the Project intersect those for the Tilbury2 development.
- 13.4.29 The following marine infrastructure is located outside of the study area, but is considered to be of appropriate scale and relevance to be included within the baseline:
- a. London Gateway – a deep-water port 4km to the east of the Project including a fully integrated logistics facility, comprising a semi-automated, deep-sea container terminal.
 - b. London Cruise Terminal (Grade II* listed) – London’s only deep-water purpose-built cruise facility. The terminal has become increasingly popular as a turnaround port for Baltic and Northern European destinations.
- 13.4.30 The River Mardyke flows roughly north-east to south-west between Orsett and South Ockendon and joins the River Thames at Purfleet to the west of the existing Dartford Crossing. This is classified by the Environment Agency as a main river. Other smaller rivers, some of which are classified as main rivers and ditches, join the Mardyke in the area that would be crossed by the Project.
- 13.4.31 Other smaller rivers classified as main rivers are crossed near the Tilbury Loop railway line. There are also smaller unnamed ordinary watercourses which would be crossed near the North Portal.

Residential development land

13.4.32 Residential development land (relating to sites or proposals identified in national or local plans, policies or strategies for development or land subject to planning permission) identified within the study area is shown in Table 13.12 and identified in Figure 13.1 (Application Document 6.2).

Table 13.12 Residential development land – north of the River Thames

Location	Description	Current status	Distance from Order Limits
Star Industrial Estate, Linford Road, Chadwell St Mary	Outline application for residential development (up to 203 dwellings)	Outline planning application 16/00412/OUT Validated 11 July 2016 Approved 5 November 2019	275m from Order Limits
Gothards Field, Rear of The George And Dragon, East Tilbury Road, Linford	Detailed planning application for the construction of 230 affordable dwellings with associated parking, access, landscaping, open space and infrastructure	Full planning application 21/01812/FUL Validated Fri 22 Oct 2021 Awaiting decision	170m from Order Limits

Community land and assets

13.4.33 The following sections consider community land and community assets. Community land is described as land used both formally and informally for sports and recreation purposes, including country parks, areas of community woodland, open green space, open access land and common land. The definition of community land in DMRB is wider than the definition of land set out in sections 131 and 132 of the Planning Act 2008 and includes, for example, private sports facilities. Special Category Land identified by sections 131 and 132 of the Planning Act 2008 is identified in the Statement of Reasons (Application Document 4.1). ‘Community assets’ is the term used to refer to a wide range of facilities used for community purposes including education and healthcare facilities, community centres, places of worship, libraries, residential care homes and post offices.

13.4.34 All land and assets referred to are identified on Figure 13.1 (Application Document 6.2).

South of the River Thames

Community land

13.4.35 The countryside around the Shorne and Cobham area provides a strategic sub-regional resource for local communities. The landscape in this area has been improved as a result of the Cobham Ashenbank Management Scheme (with funding from the Channel Tunnel Rail Link) and subsequently the Thames Gateway Parklands programme. The Cobham Ashenbank Management

Scheme has focused on the implementation of a £6.7 million project to conserve and restore elements of Repton landscape in the Cobham Park area. The Thames Gateway Parklands programme has utilised government funding to deliver projects that improve or enhance green space within the Thames Gateway area.

- 13.4.36 The Kent Downs AONB covers the area to the south of the Project. Described in the AONB Management Plan (Kent Downs AONB Unit, 2021) as a '*living, working landscape shaped and managed by people*', there is considerable demand on the AONB as a resource for access and recreation. A visitor survey undertaken by the AONB Unit in 2014 identified that the main motivations for visiting the Kent Downs are for its beauty and tranquillity, with walking being the main activity (Kent Downs AONB Unit, 2014). The AONB Management Plan states that the Covid-19 pandemic '*brought a new spotlight on the importance of contact with nature and beauty*', with a focus of the area for recreation and day visitor numbers peaking during the pandemic itself.
- 13.4.37 Community land within the study area to the south of the River Thames is identified in Table 13.13 and shown on Figure 13.1 (Application Document 6.2).

Table 13.13 Community land – south of the River Thames

Site	Classification	Approximate distance from Order Limits (distances have been rounded)
Cascades Leisure Centre	Outdoor sports (private business)	Adjacent to Order Limits
Gravesend Golf Centre	Outdoor sports (private business)	Within and adjacent to Order Limits
Cobham Hall Park and Gardens	Park and gardens	Within Order Limits
Claylane Wood	Semi/natural greenspace	Within Order Limits
Rochester & Cobham Park Golf Club	Outdoor sports (private business)	Within Order Limits
Cyclo park (two interconnected sites)	Outdoor sports	Within / adjacent to Order Limits
Southern Valley Golf Club (SVGC)	Outdoor sports (private business)	Within Order Limits
Jeskyns Community Woodland	Semi/natural greenspace	Within Order Limits
Mackenzie Way Open Space	Informal recreation	10m from Order Limits
Michael Gardens Play Area	Informal recreation	Within Order Limits
Shorne and Ashenbank Woods	Semi/natural greenspace	Within Order Limits
Shorne Marshes	Semi/natural greenspace	200m from Order Limits

Site	Classification	Approximate distance from Order Limits (distances have been rounded)
Shorne Woods Country Park	Semi/natural greenspace	Within Order Limits
Thames and Medway Canal Corridor	Semi/natural greenspace	Within Order Limits
Cobham Village Sports Ground	Outdoor sports	10m from Order Limits
Cobham Cricket and Tennis Club	Outdoor sports (private business)	200m from Order Limits
North Kent College Sports Ground	Outdoor sports	250m from Order Limits
Chalk Old Allotments	Allotments	200m from Order Limits
Chalk New Allotments	Allotments	25m from Order Limits
Roman Road	Outdoor recreation	Within Order Limits

13.4.38 An Open Space Assessment Report prepared for Gravesham Borough Council in April 2016 (Knight, Kavanagh & Page, 2016a) provides information relating to the condition, distribution and overall quality of areas of open space. The assessment included findings relating to usage levels derived from a Parks and Open Spaces Survey which asked participants how often they visit particular types of open space.

13.4.39 Sites identified as the most frequently visited within Gravesham, from a survey sample of 338 respondents, include the Jeskyns Community Woodland and Shorne Woods Country Park (both located within the Order Limits). Such areas play an important role throughout the borough by providing access to natural greenspace and opportunities for recreational activities such as walking and physical exercise. A summary of the two sites is given below, using data from the Open Space Assessment Report (Knight, Kavanagh & Page, 2016a):

- a. Shorne Woods Country Park – the Country Park covers an area of 129ha and is managed and maintained by Kent County Council. Facilities include a visitor centre, café, toilets and a gift shop. There are a variety of walking trails in addition to two adventure play areas. The Country Park was one of two areas receiving particularly high quality scores as part of the Open Space Assessment, recognised as being attractive, well maintained and offering good quality ancillary facilities. The Timeball and Telegraph Trail and Darnley Trail pass directly through Shorne Woods Country Park.
- b. Jeskyns Community Woodland – the site, which opened in 2007, is located immediately to the south of the A2 and is approximately 149ha in size. The woodland is managed and maintained by Forestry England and includes woodlands, orchards, ponds, play areas and a café. Interpretation boards inform visitors of the wildlife, planting, restoration and archaeology of the area. Although a relatively new area of community woodland (and consequently parts of the site are quite open), it is already a popular family

destination for informal recreation purposes. The site is host to a range of user groups and has recently become a focus for the Forest Schools Programme. Similar to Shorne Woods, Jeskyns Community Woodland scored highly on quality grounds as part of the Open Space Assessment. There are walking and cycling routes in close proximity, connecting Jeskyns Community Woodland with the wider countryside and to nearby sites such as Shorne Woods Country Park and Ashenbank Woods.

- 13.4.40 Roman Road, located between Gravesend and the A2/M2, is primarily a walking and cycling route (NCR 177) but has substantial green open areas (grass/planting) either side of the route laid out for public recreation. There are other recreational facilities along the route such as benches and bins laid out for public usage. Given this potential wider recreation function, the route has been included within the assessment for community land.
- 13.4.41 Relevant information relating to other areas of semi/natural open space listed in Table 13.13 in terms of levels of usage where known, is as follows:
- a. Cobham Hall Park and Gardens – designated in the National Heritage List for England (Historic England, 2020). The site is predominantly the surrounding grounds of Cobham Hall School. Access to the site for members of the public is restricted to school users only or through guided tours of the grounds on specified days (and as such the park is not formally defined as an area of open space and considered private for the purpose of this assessment).
 - b. Claylane Wood – over 11ha in size and designated as an ancient woodland, which is privately owned. Anecdotal evidence suggests there is some usage of the site for local recreation purposes, although accesses to the site are overgrown. The part of the site within the Order Limits is inaccessible, although there is a PRoW through this section of the site.
 - c. Cyclopark – a charity-run cycling, fitness and well-being centre for all ages and abilities, open to the public, with the main objective to offer an outstanding venue to all ages and abilities within the community. Set in 43ha of landscaped grounds, facilities include 6km of off-road mountain bike trails, a tarmac circuit, BMX track, children’s playground and skate park.
 - d. Shorne and Ashenbank Woods – Ashenbank Wood is managed by the Woodland Trust, and Shorne Woods by Kent County Council. Shorne and Ashenbank Woods are highlighted in the Gravesham Open Space Assessment Report (Knight, Kavanagh & Page, 2016a) as being a priority for enhancement where possible.

- e. Shorne Marshes – a 152ha site which is managed by the Royal Society for the Protection of Birds. The site is identified in the Gravesham Open Space Assessment Report (Knight, Kavanagh & Page, 2016a) as falling below the quality threshold and highlighted as being a priority for enhancement where possible.
- f. Thames and Medway Canal Corridor – a disused canal, originally approximately 11km long stretching between the River Thames at Gravesend and the River Medway at Strood. The canal towpath is part of a circular walk that feeds into the Saxon Shore Way and is also a cycle track.
- g. Chalk Old and New Allotments – the two sites are well-used by the local community. Chalk Old Allotments (located behind houses in Chalk Road and Lower Higham Road) has 32 plots; Chalk New Allotments (located on a site bounded by Rochester Road and Chalk Road) has 55 plots.

13.4.42 There are three golf courses within the Order Limits to the south of the River Thames. While golf courses are commercially operated private sites, they are included under the heading of ‘community land’ on a precautionary basis given their use as recreation land (albeit private recreation):

- a. The Southern Valley Golf Club (SVGC), built in 1998 on approximately 55ha near Shorne, closed in summer 2022. The club, which was privately owned and included 18-holes and a club house, had approximately 200 members (SVGC, 2019).
- b. The Rochester & Cobham Park Golf Course is an 18-hole golf course approximately 90ha in area, located to the south of the A2 near Cobham Hall. Originally established in 1891, the club has gone through various re-designs and expansions over the years and currently has over 600 members. Membership levels have remained steady for the past few years, with a strong ladies’ section of around 70 members. The club has hosted the Kent Amateur Championship, Brabazon Trophy final qualifier and two international matches, as well as being selected to join the elite group of 16 clubs that host regional qualifying for The Open Championship (Rochester & Cobham Park Golf Club, 2019).
- c. The Gravesend Golf Centre consists of a nine-hole par 3 golf course, 32 bay driving range and shop. The nine-hole course is closed to the public until further notice and only the driving range is currently open.

13.4.43 In terms of community events of relevance to the assessment, the Gravesend Regatta is held on the River Thames every year over a two-day period. The regatta includes rowing races, live music, fun fair, trade and charity stalls and a number of other activities. This event is generally well attended with approximately 2,000 attendees (Gravesend Regatta, 2019).

Community assets

13.4.44 Community assets within the study area are listed by settlement in Table 13.14 and identified on Figure 13.1 (Application Document 6.2). Where assets are identified outside of the 500m study area, this is as a result of analysis of their likely catchment area (for example the Thames View Crematorium located on Gravesend Road attracts trips from across a wider area, including routes potentially affected by the Project).

Table 13.14 Community assets – south of the River Thames

Settlement	Community asset	Approximate distance from Order Limits (distances have been rounded)
Strood	Bligh Infant & Junior School	500m from Order Limits
Gravesend	Cascades Leisure Centre	Adjacent to Order Limits
	Metropolitan Police Service Specialist Training Centre and associated rifle range	Within Order Limits
	Westcourt Primary School	500m from Order Limits
	Thamesview School (secondary school and sixth form college)	125m from Order Limits
	North Kent College	250m from Order Limits
	Ifield School (co-educational school for 4–19-year-olds with profound and complex learning needs)	500m from Order Limits
	St Margaret’s Church	50m from Order Limits
	The Gerald Miskin Memorial Hall	100m from Order Limits
	Viewpoint Community Centre	100m from Order Limits
	Tymer Wood Academy	100m from Order Limits
	Riverview Junior School	200m from Order Limits
	Singlewell Primary School	200m from Order Limits
	Thames View Crematorium, Gravesend Road	10m from Order Limits
Cobham	Cobham Hall Independent School	500m from Order Limits
	Cobham Primary School	480m from Order Limits
	St Mary Magdalene Church	50m from Order Limits
Shorne	Shorne Church of England Primary School	500m from Order Limits
	Downs Way Medical Practice	500m from Order Limits
	Shorne Village Hall	600m from Order Limits
	Shorne Methodist Church	600m from Order Limits
Chalk	Chalk Church	100m from Order Limits
	Chalk Parish Hall	250m from Order Limits
Higham	Gad’s Hill School	100m from Order Limits

Community assets – housing

- 13.4.45 This section provides baseline data to inform the assessment of construction workforce accommodation impacts. Housing as a topic has been considered here as a 'community asset'.
- 13.4.46 House prices to the south of the River Thames have been closely aligned with the average for England from 1995 to 2014 and have only recently started to diverge. Increases in the rates of house price growth indicate that the attractiveness of the area has increased rapidly over the past five years (HomeCo Internet Property Ltd, 2019). Property reports earlier in 2022 suggest that price rises have risen in every English region, driven both by considerable demand and scarcity of properties for sale (ONS, 2022c). Average rental rise across the UK has been estimated at 18% over the past year (HomeLet, 2022).
- 13.4.47 The Workers Accommodation Report (Application Document 7.18) identifies that there were 220,276 homes in the private rented sector (PRS) and a further 827,590 owner occupied homes within a 60-minute travel time of the northern and southern tunnel entrance compounds (ONS, 2011). Across the South East, London and East regions, 5.4% of households in the owner occupied sector moved house – applied to the 60 minute area that equates to around 84,000 households each year (ONS, 2011).
- 13.4.48 Data from the 2011 Census shows that the annual level of churn (households moving within a sector in a given year as a proportion of all households in that sector i.e. turnover) for PRS households in England is between 26% and 29% for the East, South East and London – this calculates out to between 2.2% to 2.4% of PRS properties turning over each month.

Community assets – healthcare

- 13.4.49 In a similar way to housing, healthcare has been considered as a community asset and the baseline data provided here has informed the assessment of construction workforce wider impacts. Healthcare facilities within 500m of the Order Limits were included in the list of community assets provided in Table 13.14. However, the Workers Accommodation Report (Application Document 7.18) considers a 60-minute travel time of the northern and southern tunnel entrance compounds. As such a wider review of healthcare services and capacity has been undertaken, based on the former Clinical Commissioning Group (CCG) boundaries from May 2022.
- 13.4.50 To the south of the River Thames, the Project route passes through the Kent and Medway CCG area. Number of patients per general practitioner (GP) has been used as a proxy indicator for capacity of primary healthcare services. Data obtained from the Nuffield Trust (Nuffield Trust, 2021) shows that the average list size for GPs in the Kent and Medway Trust was 2,292 patients (as at May 2022). A crude average list size for a single GP is around 1,600 patients. Although it is noted that list size is only one factor that may demonstrate capacity, the data for Kent and Medway CCG shows this to be one of the highest list sizes in the UK (the highest reported list size was 2,485 patients per GP).

North of the Thames

Community land

13.4.51 Community land within the study area to the north of the River Thames is identified in Table 13.15 and shown on Figure 13.1 (Application Document 6.2).

Table 13.15 Community land – north of the River Thames

Site	Classification	Approximate distance from Order Limits (distances have been rounded)
Thurrock		
Orsett Golf Club	Outdoor sports (private business)	Within Order Limits
Thurrock Rugby Football Club	Outdoor sports (private business)	Within Order Limits
Blackshots Allotments	Allotments	200m from Order Limits
West Tilbury Marshes	Semi/natural greenspace	Within Order Limits
Ron Evans Memorial Field	Public open space	Within Order Limits
Coalhouse Fort	Semi/natural greenspace	Within Order Limits
Orsett Fen	Common land	Within Order Limits
Tilbury Green	Common land	Within Order Limits
Walton Common	Common land	Within Order Limits
ETL Gun Club	Outdoor sports (private business)	50m from Order Limits
TFL Field Target Club	Outdoor sports (private business)	50m from Order Limits
Gobions Park	Informal recreation	250m from Order Limits
Condovers Scout Activity Centre	Community activity	Within Order Limits
Anchor Fields Park	Informal recreation	500m from Order Limits
Tilbury Fort	Semi/natural greenspace	250m from Order Limits
Linford Recreational Ground	Informal recreation	10m from Order Limits
Arthur Barnes Court Recreational Ground	Informal recreation	100m from Order Limits
Orsett Cricket Club	Outdoor sports	200m from Order Limits
Orsett Bowling Club	Outdoor sports	350m from Order Limits
Rectory Road Allotments	Allotments	75m from Order Limits
South Ockendon Recreation Ground	Informal recreation	500m from Order Limits
Mardyke Valley Golf Club	Outdoor sports (private business)	200m from Order Limits

Site	Classification	Approximate distance from Order Limits (distances have been rounded)
Linford Allotments	Allotments	Within Order Limits
King George's Field and associated sports facilities	Leisure centre, public park and sporting facilities	Within Order Limits
Havering		
Folkes Lane Woodland	Semi/natural greenspace	Within Order Limits
Thames Chase Forest Centre	Semi/natural greenspace	Within Order Limits
Top Meadow Golf Club	Outdoor sports (private business)	Within Order Limits
Cranham Golf Course	Outdoor sports (private business)	Within Order Limits
Futsal Arena	Youth sports (private business)	Approximately 90m from Order Limits

13.4.52 The Thurrock Open Spaces Study (Thurrock Council, 2017a) provides information relating to the quality and value of open space within the local authority. Relevant aspects of parcels of community land identified include the following:

- a. Ron Evans Memorial Park covers an area of approximately 22ha and is located to the west of Baker Street. The park has a number of formal and informal footpaths passing through it, including Footpath 97 running in a north-east direction from Long Lane. It is well used for recreational purposes by residents from adjacent residential areas.
- b. Thurrock Rugby Football Club – the 3.2ha site is marked with five senior rugby pitches and two mini rugby pitches. The Thurrock Playing Pitch Strategy (Thurrock Council, 2016a) rates the existing pitches as standard quality, with high levels of overplay identified on two of the senior pitches. The club also uses council-owned pitches to the south, forming part of the King George's Field/Recreation Ground.
- c. West Tilbury Marshes – a Local Wildlife Site approximately 5.75ha in area, located on former contaminated land associated with the West Thurrock Power Station. The site suffers from poor accessibility.
- d. Coalhouse Fort is located at Coalhouse Point near East Tilbury. Built between 1867 and 1874, the fort was part of the defence against the potential threat of French invasion. It is listed as a scheduled monument and is owned by Thurrock Council. The fort has been used as a set location for a number of films, including Batman Begins.

- e. Tilbury Fort is a former artillery fort located immediately to the east of Tilbury Docks on the northern banks of the River Thames and managed by English Heritage (English Heritage, 2019). The site, which is a scheduled monument, attracted approximately 12,000 visitors in 2021 according to the Annual Survey of Visits to Visitor Attractions (Visit England, 2021).
 - f. King George’s Field is a public park, including play areas, located in Grays. The park is bound to the south by the A1013 Stanford Road. The wider site incorporates the Blackshots Athletics Stadium, the Impulse Leisure Centre at Blackshots and Thurrock Bowls Club.
- 13.4.53 The Condozers Scout Activity Centre is located between East and West Tilbury and covers an approximate area of 1.4ha. The Centre is used year-round for Scouting activities, including camping and outdoor activities.
- 13.4.54 The Havering Open Space Assessment (Knight, Kavanagh & Page, 2016b) and Standards Paper (Knight, Kavanagh & Page, 2016c) provide a review of open space provision, quality, accessibility and value of open space within the local authority area, as summarised in the following paragraphs.
- 13.4.55 The Thames Chase Community Forest covers approximately 46ha of land to the north of North Ockendon and Cranham and straddles the M25 in this location. Thames Chase was established in 1990 from disused farmland and today is recognised as a site of particularly high quality and value, and one of the most popular recreational sites in Havering. Thames Chase is considered to have a regional role given its overall quality and the recreational opportunities it provides. The site offers paths for all abilities, cycling and riding in addition to a visitor centre with a café and gift shop. The visitor centre can be used as a meeting venue for community groups and societies. A proportion of the site is used for the planting of trees in memory of the deceased.
- 13.4.56 Thames Chase is managed by a community group (the Thames Chase Trust); future proposals for the site include establishing a community tree nursery to assist in tree stock replenishment and to benefit social interaction opportunities. Part of the Thames Chase Community Forest also comprises open access land. The Thames Chase, Beam and Ingrebourne Area Framework (Mayor of London, 2011) highlights the importance of providing environments such as Thames Chase which are accessible for both the elderly and those with young children, to meet the needs of the expected future population of the borough of Havering.
- 13.4.57 Folkes Lane Woodland is an additional 43ha of woodland which forms part of the wider Thames Chase Forest area and, as with Thames Chase itself, is classified in the Havering Open Space Assessment (Knight, Kavanagh & Page, 2016b) as being of high quality and value.
- 13.4.58 A number of the sites listed in Table 13.15 are designated under the Countryside and Rights of Way (CROW) Act 2000. Land mapped as open country (mountain, moor, heath and down) or registered common land is known as open access land, which gives the public a right of access. Open access/ common land within the study area comprises the following:

- a. Walton Common – located to the east of Tilbury and immediately south of the London, Tilbury and Southend railway line. It is registered as common land under the Commons Act 2006 (part of The Green, Hall Hill, Fort Road, Parsonage, Walton and Tilbury Fort Commons common land parcel). The site is not considered to be well used due to its isolated location and poor accessibility due to overgrown entrances.
- b. Folkes Lane Woodland.
- c. Tilbury Green, while registered as common land, is a footpath (FP200) (rather than a ‘green’ as the name suggests). The site is located to the west of Station Road.
- d. West Tilbury Marshes.

13.4.59 A further site, Orsett Fen Common, does not constitute open access land for the purpose of the CROW Act 2000. The site (which totals an area of some 95ha) is registered as common land. Orsett Fen has two Public Rights of Way passing through it, Bridleway 219 along the Mardyke river and Footpath 90 through the centre of the fen. The land is currently cultivated for agricultural use and is subject to public access rights under Section 193 of the Law of Property Act 1925. Further information relating to Orsett Fen Common is provided in the Statement of Reasons (Application Document 4.1).

13.4.60 As listed in Table 13.15, there are four golf courses located within the study area for community land to the north of the river. As noted previously, these sites have been included on a precautionary basis given their use as private recreational facilities:

- a. Orsett Golf Club is located to the south of the A13 and south-east of Orsett. The club originally opened in 1899, since which time it has been subject to many changes in terms of its course and facilities provided. Orsett Golf Club is an all-year facility, has approximately 700 members and covers an area of approximately 66ha (Orsett Golf Club, 2019).
- b. Top Meadow Golf Club is located to the east of North Ockendon and covers an area of approximately 42ha. Established in 1985, the golf course has 18 holes, a modern club house and restaurant, hotel, conference rooms and function suite facilities. The golf club is used for weddings and for a range of other uses such as business meetings. The club is described as an entry level club, with a membership of approximately 450 (Top Meadow Golf Club and Hotel, 2020).
- c. Cranham Golf Course is an 18-hole public golf course located in Upminster, immediately to the west of the M25. As it is a pay-and-play course, it does not have a formal membership (Cranham Golf Course, 2019).
- d. Mardyke Valley Golf Club is located to the east of South Ockendon and north of Stifford Clays. The course was developed more than 20 years ago and has an 18-hole parkland course in addition to the ability to cater for functions and events.

Community assets

- 13.4.61 Community assets either within the Order Limits or within 500m of the Order Limits are described by settlement in Table 13.16 and identified on Figure 13.1 (Application Document 6.2). Where assets outside of the study area have been included, this is as a result of analysis of their likely catchment area (for example schools may attract trips from across areas potentially affected by the Project as may assets such as Upminster Cemetery and South Essex Crematorium).
- 13.4.62 Two community assets are shown as being located within the Order Limits:
- Whitecroft Care Home is shown as being within the Order Limits, however this is only in relation to the reconfiguration of their vehicular access from Stanford Road. The care home building is not within the Order Limits.
 - Wild Thyme Outdoors is an outdoor foraging and education activity provider operating in an area of privately owned woodland called The Wilderness to the east of North Road in Thurrock. Wild Thyme offers forest school type activities (for example outdoor foraging, education and survival skills) primarily for children with social and mental health needs. Anecdotal information provided by Wild Thyme suggests that typically around 30 children/young people use the activities in an average week, although activities have also been offered during school holidays when numbers can increase significantly. Activities during 2022 are currently restricted due to damage sustained at the site from Storm Eunice; the provider is instead considering what services can be provided off-site in the meantime (for example workshops at schools).
- 13.4.63 A further group of community assets has been identified which are located outside the study area, but which are included due to their likely catchment area and potential travel impacts which may arise during the construction phase. This relates to the cluster of schools located in the Upminster area and which may be accessed by St Mary's Lane and/or Ockendon Road – schools include Corbets Tey School, Oakfields Preparatory School, The Coopers Company and Coborn School and Upminster Junior School.

Table 13.16 Community assets – north of River Thames

Settlement	Community assets	Approximate distance from Order Limits (distances have been rounded)
West Tilbury	West Tilbury Village Hall	10m from Order Limits
	St James The Old Church	30m from Order Limits
East Tilbury	East Tilbury Primary School and Nursery	200m from Order Limits
	Merrie Loots Farm Residential Home	200m from Order Limits
	Parish Church of St. Catherine	10m from Order Limits
	Post Office	500m from Order Limits

Settlement	Community assets	Approximate distance from Order Limits (distances have been rounded)
Tilbury	St Marys Roman Catholic Primary School	175m from Order Limits
	Lansdowne Primary Academy	150m from Order Limits
	Tilbury Pioneer Academy (nursery and primary education)	50m from Order Limits
	Saint John the Baptist Church	150m from Order Limits
	Tilbury Health Centre (College Health Ltd)	500m from Order Limits
	Commonwealth Health Centre	500m from Order Limits
Linford	Linford Village Hall	10m from Order Limits
	Linford Methodist Church	125m from Order Limits
	St Francis Church Hall	100m from Order Limits
Chadwell St Mary	Herringham Primary Academy	175m from Order Limits
	Chadwell St Mary Primary School	50m from Order Limits
	Chadwell Medical Centre	10m from Order Limits
	Chadwell Working Men's Social Club	125m from Order Limits
	Dilip Sabnis Medical Centre	50m from Order Limits
	Chadwell Dental Practice	150m from Order Limits
	Emmanuel Church	25m from Order Limits
	St Mary's Church	25m from Order Limits
	Chadwell Post Office	300m from Order Limits
	Carolyne House Senior Living Home	175m from Order Limits
	Chadwell St Mary Cemetery	Adjacent to Order Limits
	Acorn Pre-School / Cherubs First Steps	20m from Order Limits
Orsett	Orsett Church of England Primary School	175m from Order Limits
	Orsett Village Hall	25m from Order Limits
	Orsett National Health Service (NHS) Hospital	125m from Order Limits
	St Giles and All Saints Church	500m from Order Limits
	Orsett Churches Centre	500m from Order Limits
	Sugarloaf Riding School	Adjacent to Order Limits
North Ockendon	Saint Mary Magdalene, Parish Church of North Ockendon	50m from Order Limits
South Ockendon	South Ockendon Health Centre	125m from Order Limits
	Benyon Primary School	250m from Order Limits
	South Ockendon Village Social Club	125m from Order Limits
	Saint Nicholas South Ockendon	400m from Order Limits

Settlement	Community assets	Approximate distance from Order Limits (distances have been rounded)
	Ladyville Lodge Care Home	200m from Order Limits
	Street Farm Dental Studio	400m from Order Limits
	Grangewater Outdoor Education Centre	25m from Order Limits
	Wild Thyme Outdoors	Within Order Limits
	Royal Oak – Public House	300m from Order Limits
	North Road Post Office	300m from Order Limits
	West Horndon Primary School	3km from Order Limits
Grays	Orsett Heath Academy	Adjacent to Order Limits
	William Edwards Academy School	250m from Order Limits
	Treetops School	10m from Order Limits
	Beacon Hill Academy (school for children with severe and complex learning difficulties)	10m from Order Limits
	Woodside Academy	150m from Order Limits
	The Worlds End – Public House	250m from Order Limits
	Palmers College	200m from Order Limits
	Stifford Clays Primary School	600m from Order Limits
	The Gateway Academy	25m from Order Limits
	Whitcroft Care Home	Within Order Limits
	Pyramid Resource Centre / Thurrock Play Network	25m from Order Limits
	Thurrock Community Hospital	525m from Order Limits
Upminster	Upminster Cemetery and South Essex Crematorium	1km from Order Limits
	James Oglethorpe Primary School, St Mary's Lane	500m from Order Limits
	Schools accessed from St Mary's Lane / Ockendon Road	>1km from Order Limits
Brentwood	The Woodlands Preparatory School	500m from Order Limits

Community assets – housing

- 13.4.64 This section provides baseline data to inform the assessment of construction workforce accommodation impacts. House prices to the north of the River Thames are higher than the average for England and have been rising faster. Recent increases in the rates of house price growth indicate that the attractiveness of the area has increased rapidly over the past five years. Property reports earlier in 2022 suggest that price rises have risen in every English region, driven both by considerable demand and scarcity of properties for sale (Property Reporter, May 2022). Average rental rise across the UK has been estimated at 18% over the past year (Letting Agent Today, May 2022).

13.4.65 The Workers Accommodation Report (Application Document 7.18) identifies that there were 235,577 homes in the PRS and a further 728,732 owner occupied homes within a 60-minute travel time of the northern tunnel entrance compound (ONS, 2011). Churn rates for both owner occupied and PRS are the same as highlighted previously, i.e. 5.4% of households in the owner occupied sector between 26% and 29% annually for the East, South East and London.

Community assets – healthcare

13.4.66 Baseline healthcare data has been used to inform the assessment of wider construction workforce impacts. Healthcare facilities within 500m of the Order Limits were included in the list of community assets provided in Table 13.16. As previously noted for the area to the south of the River Thames, the Workers Accommodation Report (Application Document 7.18) considers a 60-minute travel time from the northern and southern tunnel entrance compounds and as such a wider review of healthcare services and capacity has been undertaken, based on the former CCG boundaries from May 2022.

13.4.67 To the north of the River Thames, the Project route passes through the Thurrock, South East London and Basildon and Brentwood former CCG areas. Number of patients per general practitioner (GP) has been used as a proxy indicator for capacity of primary healthcare services. Data obtained from the Nuffield Trust (Nuffield Trust, 2022) shows that the average list size for GPs in these CCGs as at May 2022 were as follows (noting an average list size for a single GP is around 1,600 patients):

- a. Thurrock CCG average list size per GP is 2,297 patients
- b. South East London average list size per GP is 1,890 patients
- c. Basildon and Brentwood CCG average list size per GP is 2,123 patients

13.4.68 As noted for data to the south of the River Thames, the CCGs to the north of the river show some of the highest list sizes in the UK (the highest reported list size was 2,485 patients per GP).

Development land and businesses

13.4.69 This section describes the location of development land subject to planning application(s) that may support future jobs, together with types of businesses (and associated numbers of jobs) within the study area. This section does not include information relating to agricultural land holdings, which are considered separately from paragraph 13.4.89 onwards.

South of the River Thames

Development land

13.4.70 A review of relevant development plans has identified no development land within the study area. Outside of the study area, however, there are plans for significant levels of development. DMRB LA 112 (Highways England, 2020b) states that '*where likely effects are identified outside of the 500m area surrounding the project boundary, the study area should be extended accordingly*'; the study area has therefore been extended to include significant areas of development land by virtue of their scale. These are described below and located on Figure 13.1 (Application Document 6.2).

- 13.4.71 The Thames Gateway is Europe’s largest regeneration project, stretching approximately 65km along the Thames Estuary from Canary Wharf in London to Southend in Essex and Sittingbourne in Kent. The area includes the largest designated brownfield site in the south of England. Regenerating existing towns and creating new carbon-neutral urban developments is intended to transform the Thames Gateway region and relieve demand for housing in the South East.
- 13.4.72 The Gravesham Local Plan Core Strategy (Gravesham Borough Council, 2014) identified two Opportunity Areas for the town – Gravesend Riverside East/North-East Gravesend and Gravesend Town Centre. The former is a riverside regeneration area complemented by additional development to improve the poor urban environment in this location. Proposals include around 780 dwellings and 22,230m² of gross employment floorspace. The Gravesend Town Centre Opportunity Area includes the core of the town centre as well as adjoining functional areas; proposals for the area include 330 dwellings and around 10,500m² of retail and commercial floorspace. The council has been working with partner organisations to move forward the regeneration of St George’s Shopping Centre and the Eastern and Western Quarters of Gravesend.
- 13.4.73 Ebbsfleet Garden City is a significant regional redevelopment opportunity located 1km to the north-west of the Order Limits. The Ebbsfleet Development Corporation was established in April 2015 to support the delivery of the project, which currently includes a series of existing development sites of different scales and at different levels of planning status across an area including the Swanscombe Peninsula, Ebbsfleet and Northfleet (Ebbsfleet Development Corporation, 2019). The area encompasses two Opportunity Areas identified within the Gravesham Local Plan Core Strategy (North Embankment and Swanscombe Peninsula Opportunity Area and the Ebbsfleet (Gravesham) Opportunity Area), as well as three strategic sites identified within the Dartford Core Strategy (Dartford Borough Council, 2011) (Ebbsfleet to Stone Priority Area, Ebbsfleet Valley Strategic Site and the Thames Waterfront Priority Area). The Garden City will incorporate a new commercial centre and up to 15,000 new homes across a series of new communities, alongside improved public transport.
- 13.4.74 Proposals are continuing for a new theme park and entertainment resort on the Swanscombe Peninsula in Kent, which is located approximately 3km east of the Order Limits. The project is being taken forward by London Resort Company Holdings as a global destination theme park, covering an area of approximately 215ha. The project has been classed as an NSIP due to scale and likely job creation opportunities. Following extensive consultation and technical assessments, the DCO application for this scheme was accepted for examination by the Planning Inspectorate early in 2021, although it was subsequently withdrawn by the applicant.
- 13.4.75 There are plans for the expansion of the Bluewater Shopping Centre, which opened in 1999 and is located approximately 4km east of the Order Limits. Outline planning consent was granted by Dartford Borough Council in 2017 for plans including expansion of the West Village area and the potential creation of over 2,000 jobs. Expanding the shopping centre remains part of Bluewater’s long-term plans, but no date has been set for work to get underway.

Businesses

13.4.76 Businesses located within the study area are listed in Table 13.17 and shown on Figure 13.1 (Application Document 6.2). Private sports facilities (for example golf courses) have also been included within this table. Table 13.17 provides a brief description of the nature of the businesses together with an indication of the scale of employment according to the number of employees as follows:

- a. Small/medium enterprise – 0 to 10 employees
- b. Medium-sized business/enterprise – 10 to 50 employees
- c. Large business/enterprise – more than 50 employees

Table 13.17 Businesses – south of the River Thames

Business	Description	Size	Approximate distance from Order Limits
Aintree Concrete	Supplies truck-mounted concrete pumps for hire across Kent, Sussex and south-east London	Medium	Within Order Limits
Bennett Grab Services Ltd	Plant hire and leasing	Small	10m from Order Limits
Bentonite (Manufacturing & Supply) Ltd	Mineral suppliers	Small	150m from Order Limits
Best Western Manor Hotel	Hotel	Small	10m from Order Limits
Depot adjacent to the Retreat, Henhurst Road	Construction	Small	Within Order Limits
Cascades Leisure Centre	Leisure Centre	Medium	Adjacent to Order Limits
Gravesend Golf Centre	Pay and play golf course	Medium	Within and adjacent to the Order Limits
Cobham Service Station (Esso), South Watling Street	Service station	Small	Within Order Limits
Crown Garage	Garage	Small	Within Order Limits
Dalefield Industrial Park (various business)	Industrial estate	Medium (combined)	30m from Order Limits
Hartshill Nursery, Thong Lane	Three separate trading businesses operate from the site, namely Baylis Landscape Contractors Ltd, The Artificial Lawn Company, and	Medium	Within Order Limits

Business	Description	Size	Approximate distance from Order Limits
	Sportsmark Group Limited.		
Eastcourt Oast B&B	Bed & breakfast	Small	300m from Order Limits
Harlex Haulage Services Ltd	Plant and machinery hire	Small	Within Order Limits
Hye Oak Ltd	Building materials supplier	Small	175m from Order Limits
Inn on the Lake, Watling Street	Hotel	Medium	Within Order Limits
J Clubb	Sand and gravel supplier	Medium	10m from Order Limits
Knights Place Farm Equestrian Centre	Equestrian centre	Small	400m from Order Limits
Depot located off Henhurst Road	Ground work and civil engineering contractor	Medium	Within Order Limits
Morrisons	Supermarket	Large	30m from Order Limits
Nell's Café, Watling Street	Café	Small	Adjacent to Order Limits
Premier Inn	Hotel	Medium	20m from Order Limits
Regans Bar	Public House	Small	100m from Order Limits
Rochester & Cobham Park Golf Club	Private golf club	Medium	Within Order Limits
Scalers Hill Livery, Watling Street	Stables	Small	20m from Order Limits
Shell Petrol Station	Petrol station	Small	10m from Order Limits
Shops – Mackenzie Way	Local convenience stores	Small	385m from Order Limits
Shops – Princess Margaret Road	Local convenience stores	Small	500m from Order Limits
Shops – Riverview Park	Local convenience stores	Small	300m from Order Limits
Shops – Roman Road	Local convenience stores	Small	25m from Order Limits
Singlewell Service Station	Service station	Small	50m from Order Limits
Skin Deep, 14 Michael Gardens	Beauty salon	Small	25m from Order Limits
Southern Valley Golf Club	Private golf club	Medium	Within Order Limits
Sparks & Co	Timber merchant	Small	50m from Order Limits

Business	Description	Size	Approximate distance from Order Limits
The George Public House	Public house	Small	50m from Order Limits
The Nook Pet Hotel, Brewers Road	Animal boarding	Small	Within Order Limits
The Three Crutches Public House	Public house	Small	150m from Order Limits
The Ship Inn Public House	Public house	Small	10m from Order Limits
Toby Carvery	Restaurant	Medium	100m from Order Limits
Travelodge	Hotel	Medium	50m from Order Limits

North of the River Thames

Development land

- 13.4.77 Brentwood Enterprise Park (BEP) is a strategic employment allocation in Brentwood Borough Council’s emerging Local Plan (Brentwood Borough Council, 2019) and is partly located within the Order Limits just off junction 29 of the M25. A planning application was submitted in 2022 for employment uses (use class B and E). The BEP development (as proposed under application reference 22/00402/FUL) overlaps with the Project Order Limits either side of the A127 east of M25 junction 29. The land is needed by the BEP for the Phase 1 Link Road (consisting of a new access off the M25 junction 29 via a new mini roundabout with a link bridge over the A127), a new vehicular access off the B186, the upgraded bridleway 183 and soft landscaping.
- 13.4.78 The DCO application for the expansion of the Port of Tilbury (Tilbury2) was granted consent in February 2019. The Tilbury2 DCO applies to the construction, operation and maintenance of a new port terminal and associated facilities on the site of the former Tilbury Power Station on the north bank of the River Thames. Development proposals include a roll-on/roll-off terminal, a Construction Materials and Aggregates Terminal, as well as associated infrastructure relating to rail, road and marine facilities. The proposals provide a new deep water jetty and increase the size of the Port of Tilbury from approximately 383ha to 445ha. The decision notice from the Secretary of State (2019) refers to the significant contribution the proposal will make to the local economy through job creation.
- 13.4.79 In March 2021, the Government announced Thames Freeport as one of eight selected freeports across the UK, with the site subsequently designated in November 2021 under The Designation of Freeport Tax Sites (Thames Freeport) Regulations 2021 SI 2021/1195. Freeports are defined as areas of operational and development land linked to a port where normal tax and customs rules do not apply, thereby seeking to boost trade, attract inward investment and have a transformative impact on local communities through upskilling and generation of employment opportunities. The Thames Freeport site covers an area of around 650ha and includes the Ford Dagenham site to the west, the Port of Tilbury, and the London Gateway Port, London Gateway

Logistics Park and Thames Enterprise Park to the east. Land within the Tilbury Freeport area falls within the Order Limits for the Project.

13.4.80 Land subject to planning applications that may support future employment is listed in Table 13.18 and identified on Figure 13.1 (Application Document 6.2).

Table 13.18 Land subject to planning applications – north of the River Thames

Location	Description	Status	Distance from Order Limits
Land south of Bucklands Camp, Station Road, East Tilbury	Recovery of pulverised fuel ash	Full planning application 18/01307/FUL Awaiting decision	Within Order Limits
Treetops School	Erection of a new 140 pupil SEND (Special Educational Needs and Disabilities) school with associated parking and landscaping	Full planning application 19/00725/FUL Approved 06 November 2019	5m from Order Limits
South Ockendon Quarry	Erection of solar photovoltaic arrays with associated infrastructure	Application 14/00836/FUL Approved 22 January 2016	Within Order Limits
Orsett Quarry Ecological Park	Creation of a diverse ecological habitat under appropriate environmental permitting regulations	Full planning application 15/00649/FUL 2015 Approved 1 February 2016	Within Order Limits
Land adjacent Fen Farm Judds Farm and part of Bulphan Fen Harrow Lane Bulphan Essex	Installation of renewable-led energy generating station, comprising ground-mounted photovoltaic solar arrays and battery-based electricity storage containers, together with substation, inverter/transformer stations, site accesses, grid connection cable, internal access tracks, security measures, access gates, other ancillary infrastructure, landscaping and biodiversity enhancements	Full planning application 21/00077/FUL Approved 21 October 2021 Discharge of conditions applications submitted to Thurrock Council in November 2021, March 2022 and April 2022 – the latter two are currently awaiting decisions.	Within Order Limits

Location	Description	Status	Distance from Order Limits
Medebridge Solar Farm	Installation of renewable energy generating station comprising ground-mounted photovoltaic solar arrays together with substation, inverter/transformer stations, site accesses, grid connection cables, internal access tracks, security measures, access gates, other ancillary infrastructure and landscape and biodiversity enhancements	Full planning application 21/02159/F Approved 10 May 2022	Within Order Limits

- 13.4.81 Within the wider area, there are plans for significant levels of development, as described below.
- 13.4.82 A major regeneration project at Purfleet-on-Thames is being taken forward by Purfleet Centre Regeneration Limited. The project is located on the northern banks of the River Thames near Tilbury, approximately 5km south of the Order Limits. Outline planning permission was granted by Thurrock Council in April 2019 for the proposal which includes up to 2,850 new homes, a new town centre with upgraded railway station and improved riverside areas, a new primary school, art media village and new parks/leisure space. The aim of the project is to open up Purfleet's river frontage, create employment and educational opportunities, and drive growth; the creative industries area proposed is planned to create more than 2,000 new high-value jobs for local people (Thurrock Council, 2019).
- 13.4.83 Lakeside Shopping Centre opened in 1990. It is the 10th largest shopping centre in the UK (by area) and is located approximately 2.5km south of the Order Limits. A major leisure extension (approximately 21,000m²) was launched at Lakeside in summer 2019 and is predicted to increase footfall at the centre by more than 2 million per annum (pre-COVID-19 figures were around 20 million per annum). A planning application was submitted to Thurrock Council in 2019 for a major refurbishment of other parts of the Lakeside site, including the addition of 3,700m² of retail space. Planning approval for this proposal was given by Thurrock Council on 17 March 2022.
- 13.4.84 The Thames Enterprise Park involves the phased remediation and redevelopment of the former Coryton Oil Refinery to provide up to 480,000m² of commercial development and associated facilities. Located approximately 6km from the Order Limits, an outline planning application was submitted in 2018, which was subsequently granted in June 2022.

Businesses

13.4.85 Businesses located within the study area are listed in Table 13.19 and shown on Figure 13.1 (Application Document 6.2). Private sports facilities (for example golf courses) have also been included within this table.

Table 13.19 Businesses – north of the River Thames

Business	Description	Size	Approximate Distance from Order Limits
Aquaend Group	Construction company	Medium	50m from Order Limits
Beredens Farm Meats	Butchers	Small	100m from Order Limits
Boyle Group Ltd Traffic Management	Traffic management	Medium	Within Order Limits
Chadwell Post Office	Post Office	Small	320m from Order Limits
J. Squires – Podiatrist	Podiatrist	Small	150m from Order Limits
Codham Hall	Business park (various businesses)	Medium	250m from Order Limits
Cranham Caravans & Motorhomes	Motorhomes and caravans	Medium	200m from Order Limits
Cranham Golf Course	Private golf club	Medium	Within Order Limits
Cranham Solar Farm	Solar farm	Small	Within Order Limits
Dansand Quarries	Quarry	Small	Within Order Limits
Dragon Express	Food takeaway	Small	250m from Order Limits
East View Kennels	Kennels	Small	50m from Order Limits
Eastern General Recovery Service	Transportation service	Small	50m from Order Limits
European Metal Recycling, Readmans Industrial Estate	Industrial estate	Medium	10m from Order Limits
Felmac Metals	Scrap metal dealer	Small	50m from Order Limits
The Fox – Public House	Public house	Small	Adjacent to Order Limits
Foxhound Riding School	Riding school	Small	Within Order Limits
George & Dragon – Public House	Public house	Small	200m from Order Limits
Gothard’s Yard	Landscape and land reclamation	Small	Adjacent to Order Limits

Business	Description	Size	Approximate Distance from Order Limits
HW Wilson Limited	Construction company	Small	250m from Order Limits
Hobb's Hole Fishing Lake	Fishing Lake	Small	Adjacent to Order Limits
InFitness Gym – Franks Farm	Gym	Small	10m from Order Limits
Jay's Lodge Caravan Park	Caravan park	Small	75m from Order Limits
JC Fluid Power	Engineers	Medium	250m from Order Limits
John Henry Group - Brentwood Office	Construction company	Medium	Within Order Limits
King's Arms – Public House	Public house	Small	Adjacent to Order Limits
Latchford Farm Aquatics	Pond fish supplier	Small	Within Order Limits
Leyton Stone	Stone supplier	Small	250m from Order Limits
Light industrial south-east of M25 junction 29 – Codham Hall Farm	A number of industrial units as part of wider Codham Hall Farm estate	Medium	Within Order Limits
Manor Farm Shop	Farm shop	Small	10m from Order Limits
Manor Farm Fishing Lake	Fishing lake	Small	Within Order Limits
Mardyke Valley Golf Club	Private golf club	Medium	200m from Order Limits
Markdyke Works – Business Park	Business park	Medium	500m from Order Limits
Mason Car Sales	Car dealership	Small	175m from Order Limits
Mayer Parry Recycling Ltd, Station Road	Metal waste and scrap dealer	Small	100m from Order Limits
Moat Lake Fishing Lake	Fishing Lake	Small	50m from Order Limits
Motorholme Hire Ltd,	Recreational van hire	Small	Within Order Limits
North Road Post Office	Post Office	Small	50m from Order Limits
Nurture Landscapes Ltd	Landscapers	Medium	Within Order Limits

Business	Description	Size	Approximate Distance from Order Limits
Old Station Yard, Station Road	Industrial units	Small	50m from Order Limits
Orsett Golf Club	Private golf club	Medium	Within Order Limits
Orsett Showground	Private showground	Small	Within Order Limits
Peartree Convenience Store	Local shop	Small	50m from Order Limits
Peri Ltd - Construction	Construction company	Medium	10m from Order Limits
Red House Computers	Computer shop and service centre	Small	50m from Order Limits
Metropolitan Waste Management / Recycled in Orsett	Sand and gravel supplier	Small	Within Order Limits
Romford Halal Meats Ltd	Meat wholesaler	Medium	100m from Order Limits
Royal Oak	Public house	Small	300m from Order Limits
SD Samuels – Roofing & Cladding Specialists	Construction company	Small	Within Order Limits
SEIB Insurance Brokers	Insurance brokers	Small	250m from Order Limits
Shops – Avon Road	Local convenience shops	Small	700m from Order Limits
Stubbers Adventure Centre	Adventure sports centre	Medium	450m from Order Limits
KLT Utilities Ltd - Station Road Yard	Multi-utility contractors	Medium	10m from Order Limits
Tarmac Topblock	Concrete product supplier	Medium	Within Order Limits
Tesco Express/Esso Petrol Station	Convenience store/petrol station	Medium	200m from Order Limits
The Kilns Hotel	Hotel	Small	50m from Order Limits
The Ship	Public house	Small	Adjacent to Order Limits
Thamesview Camping	Eco campsite (approx. 25 pitches)	Small	Within Order Limits
The Thatched House	Public house	Small	500m from Order Limits
Partyman World of Play	Children’s play centre	Small	Adjacent to Order Limits

Business	Description	Size	Approximate Distance from Order Limits
Top Meadow Hotel	Hotel	Small	250m from Order Limits
Top Meadow Golf Club	Private golf club	Medium	Within Order Limits
Upminster Trading Park	Trading park	Medium	10m from Order Limits
Voujon – Indian Restaurant	Restaurant	Small	50m from Order Limits
Walton Hall Farm – Indoor Playground	Children’s play centre	Small	10m from Order Limits

13.4.86 Orsett Showground is located on land bounded by Rectory Road to the west and the A13 to the south. The site is owned by Orsett Show Ground Limited. The site is used annually for the Orsett Show which takes place on the first Saturday of September and which is run by the Orsett Horticultural & Agricultural Society. No shows took place during 2020 and 2021 due to the COVID-19 pandemic, however the Show resumed in September 2022. The site is also used year-round for other privately organised events such as fun-fairs and weddings.

13.4.87 Clusters of businesses can be found on enterprise/industrial estates within the Order Limits. Each of these clusters has a combined employment of more than 50 people and include:

- a. Readmans Industrial Estate – surrounded by the Order Limits and to the west of East Tilbury on Station Road. The Estate has approximately 40 small business units, which include small industrial operations, such as construction and engineering companies and garages. The site also has two scrap metal dealers.
- b. Codham Hall – various businesses located at this business park near Great Warley, approximately 100m north of the Order Limits.
- c. Upminster Trading Park – located east of Warley Street near Upminster and home to approximately 10 business units.

13.4.88 Horndon Industrial Park is located just outside of the study area to the east of the Project and is included by virtue of its scale and proximity. The industrial park contains businesses of a variety of types and sizes.

Agricultural land holdings

13.4.89 All land holdings referred to in this section are identified on Figure 13.5 (Application Document 6.2). Information relating to agricultural land quality (based on the Agricultural Land Classification system) and soils can be found in Chapter 10: Geology and Soils.

South of the River Thames

13.4.90 Agricultural land use south of the River Thames is predominantly arable with limited areas of pasture. There are a total of 27 identifiable agricultural landholdings or groupings of landholdings south of the River Thames, as detailed in Table 13.20. These range from very small landholdings (single fields) to landholdings in excess of 350ha in size. In total the landholdings cover approximately 1400ha, with approximately 520ha (37%) falling within the Order Limits. The total landholding areas presented in Table 13.20 relate to the extent of land parcels that overlap or intersect with/are adjacent to the order limits. It should be recognised that this may not describe the full extent of the landholding where land parcels are owned which are distant from the Project, but this will result in the stated percentage of landholding within the order limits being a worst case scenario where such a situation arises.

Table 13.20 Details of agricultural land holdings affected within the Order Limits – south of the River Thames

Holding ID (see figure 13.5)	Description	Landholding area within the Order Limits (ha)	Total landholding area (approx.) (ha)	Percentage of landholding within the Order Limits	Sensitivity to change
CON13011956	Pasture land accessed from Thong Lane	0.970	3.415	28.4	High
GRP341	Multiple parcels of arable land accessed from Rochester Road and Bell .Lane	80.865	369.375	21.9	Low
GRP149	Arable land accessed from Shorne lfield Road	9.135	9.135	100.0	Low
GRP332	Multiple parcels of arable land accessed from Shorne lfield Road and Swillers Lane	52.119	60.689	85.9	Low
CON20062081	Pasture land accessed from Woodlands Lane	6.219	6.219	100.0	High
GRP007	Arable and pasture land accessed from Church Road. Only arable land within the order limits.	19.931	45.233	44.1	Low

Holding ID (see figure 13.5)	Description	Landholding area within the Order Limits (ha)	Total landholding area (approx.) (ha)	Percentage of landholding within the Order Limits	Sensitivity to change
GRP119	Multiple parcels of arable and pasture land accessed from Thong Lane	77.033	85.058	90.6	Medium
GRP077	Arable land accessed from Gravesend Road	51.157	97.580	52.4	Low
CON13016957	Pasture land accessed from Bowesden Lane	1.834	1.834	100.0	High
GRP306	Pasture land accessed from Bowesden Lane	3.495	3.495	100.0	High
GRP053	Pasture land accessed from Thong Lane	10.428	18.479	56.4	High
GRP043	Multiple parcels of arable land accessed from A226 Rochester Road	50.181	54.807	91.6	Low
GRP009	Multiple parcels of pasture land accessed from Lower Higham Road	9.616	56.411	17.0	High
GRP052	Multiple parcels of arable and pasture land accessed from Lower Higham Road and Rochester Road	48.212	61.098	78.9	Medium
GRP010	Arable land accessed from Lower Higham Road	0.705	6.358	11.1	Low
GRP330	Multiple parcels of pasture land accessed from Queen's Farm Road	7.830	158.998	4.9	High

Holding ID (see figure 13.5)	Description	Landholding area within the Order Limits (ha)	Total landholding area (approx.) (ha)	Percentage of landholding within the Order Limits	Sensitivity to change
GRP151	Pasture land accessed from Brewers Road	0.362	52.640	0.7	High
GRP056	Pasture land accessed from Queen's Farm Road	7.830	25.477	30.7	High
CON10035438	Pasture land accessed from Henhurst Road	0.155	0.936	16.6	High
GRP058	Pasture land accessed from Henhurst Road	0.808	19.270	4.2	High
GRP112	Multiple parcels of pasture land accessed from Henhurst Road	5.989	147.107	4.1	High
GRP016	Pasture land accessed from Thong lane	0.174	0.502	34.7	High
GRP002	Multiple parcels of arable land accessed from Shorne Ifield Road	52.115	84.899	61.4	Low
GRP124	Pasture land accessed from Thong lane	3.259	3.259	100.0	High
GRP304	Woodland accessed from Thong Lane	3.266	3.266	100.0	Low
GRP184	Arable land accessed from Park Pale	7.620	7.620	100.0	Low
GRP047	Pasture land accessed from Thong Lane	9.791	11.571	84.6	High

13.4.91 In relation to the sensitivity stated, it has been assumed that access to arable land areas is required on an infrequent basis and the spatial relationship of land to key infrastructure is not critical to the operation. For pasture land, it appears that the majority of this land is generally being used for low intensity /discontinuous grazing, so while there may be periods where access to the land is required on a daily basis, this will not be for lengthy or continuous periods of time. However, as there will be periods of more continuous use a high sensitivity for this land use has been proposed.

North of the River Thames

13.4.92 Agricultural land use north of the River Thames is predominantly arable with small areas used for grazing or woodland. There are 36 identifiable agricultural landholdings north of the River Thames as detailed in Table 13.21. These range from very small landholdings (single fields) to a landholding more than 1,845ha in size. Generally, the larger landholdings comprise arable land. In total, the landholdings cover approximately 3700ha, with approximately 1280ha (35%) falling within the Order Limits. The total landholding areas presented in Table 13.20 relate to the extent of land parcels that overlap or intersect with/are adjacent to the order limits. It should be recognised that this may not describe the full extent of the landholding where land parcels are owned which are distant from the Project, but this will result in the stated percentage of landholding within the order limits being a worst case scenario where such a situation arises.

Table 13.21 Details of agricultural land holdings affected within the Order Limits – north of the River Thames

Holding ID (see figure 13.5)	Description	Landholding area within the Order Limits (ha)	Total landholding area (approx.) (ha)	Percentage of landholding within the Order Limits	Sensitivity to change
CON10058775	Pasture land accessed from Stifford Clays Road	0.353	2.282	15.5	High
GRP036	Pasture land accessed from St. Marys Lane	2.662	5.728	46.5	High
GRP152	Pasture land accessed from Clay Tye Road	8.159	8.159	100.0	High
GRP023	Multiple parcels of arable land accessed from the local highway network and farm access tracks	117.868	332.822	35.4	Low
GRP054	Pasture land accessed from St. Marys Lane	3.596	19.179	18.7	High
GRP331	Pasture land accessed from the B186 North Road	1.633	12.785	12.8	High

Holding ID (see figure 13.5)	Description	Landholding area within the Order Limits (ha)	Total landholding area (approx.) (ha)	Percentage of landholding within the Order Limits	Sensitivity to change
GRP109	Woodland area accessed from B1421	1.111	1.111	100.0	Low
GRP335	Arable land accessed from Fen Lane	3.044	126.520	2.4	Low
GRP035	Arable land accessed from Ockendon Road	8.049	11.512	69.9	Low
CON10039643 CON10039678	Arable land accessed from Fen Lane	0.029	9.107	0.3	Low
GRP040	Arable land accessed from Warley Street	1.158	16.581	7.0	Low
GRP329	Pasture land accessed from Folkes lane	5.564	7.233	76.9	High
ORG20001466	Pasture land accessed from Fen Lane	2.631	7.848	33.5	High
GRP001	Multiple parcels of arable land accessed from the local highway network and farm access tracks	643.437	1845.558	34.9	Low
GRP133	Arable land accessed from Muckingford Road	38.566	41.023	94.0	Low
GRP042	Arable land accessed from the Princess Margaret Road and Station Road	88.765	116.565	76.2	Low
GRP045	Arable land accessed from Princess Margaret Road	18.148	20.967	86.6	Low

Holding ID (see figure 13.5)	Description	Landholding area within the Order Limits (ha)	Total landholding area (approx.) (ha)	Percentage of landholding within the Order Limits	Sensitivity to change
GRP106	Arable land accessed from West Road and Dennis Road	2.143	54.857	3.9	Low
GRP322	Pasture land accessed from Heath Road	0.149	0.149	100.0	High
CON10057184	Pasture land accessed from Linford Road and Turnpike Lane	0.268	3.229	8.3	High
GRP027	Arable land accessed from Walton's Hall Road and Butts Lane	5.530	89.364	6.2	Low
GRP087	Arable land accessed from Long Lane and farm access tracks	12.036	24.422	49.3	Low
CON10056526 CON10056530	Pasture land accessed from Mill lane	0.652	1.971	33.1	High
CON10030124	Pasture land accessed from Stanford Road	0.265	1.996	13.3	High
GRP022	Arable land accessed from Helipad Road and North Road	32.561	169.447	19.2	Low
GRP019	Arable land and landfill accessed from Princess Margaret Road	12.169	123.757	9.8	Low
GRP006	Pasture land accessed from Baker Street and farm access tracks	0.949	2.864	33.1	High

Holding ID (see figure 13.5)	Description	Landholding area within the Order Limits (ha)	Total landholding area (approx.) (ha)	Percentage of landholding within the Order Limits	Sensitivity to change
GRP317	Arable Land accessed from Princess Margaret Road	6.883	50.939	13.5	Low
GRP114	Arable land accessed from Baker Street and via farm access tracks	98.782	102.253	96.6	Low
ORG10000019	Pasture land accessed from Baker Street	2.632	3.876	67.9	High
GRP024	Arable land accessed from Stanford Road	30.559	112.686	27.1	Low
GRP041	Multiple arable land parcels accessed from Fen Lane and via farm access tracks	70.596	227.365	31.0	Low
ORG20001529	Arable land accessed from Dennis Road	0.030	1.129	2.6	Low
ORG20001561 ORG20001562 ORG20001563	Arable land accessed from Fort Road	1.012	38.084	2.7	Low
GRP272	Arable land accessed from Heath Road and Hornsby Lane	8.197	8.514	96.3	Low
GRP142	Arable land accessed from Green Lane	53.369	95.078	56.1	Low

13.4.93 In relation to the sensitivity stated, it has been assumed that access to arable land areas is required on an infrequent basis and the spatial relationship of land to key infrastructure is not critical to the operation. For pasture land, it appears that the majority of this land is generally being used for low intensity /discontinuous grazing, so while there may be periods where access to the land is required on a daily basis, this will not be for lengthy or continuous periods of time. However, as there will be periods of more continuous use a high sensitivity for this land use has been proposed.

Walkers, cyclists and horse riders (WCH)

- 13.4.94 This section describes baseline data relating to WCH within the study area. This includes the type, location and extent of WCH provision, including PRowS, cycle routes and bridleways together with routes regularly used by people to access services and facilities.
- 13.4.95 Data relating to frequency of use are provided where this is known, as informed by walkover surveys, user counts and visitor surveys undertaken variously in April 2018 (walkover survey), August/September 2019 (user counts of PRowS routes) and September 2021 (visitor surveys at Thames Chase Forest Centre).

South of the River Thames

- 13.4.96 Kent County Council manages a network of 7,000km of PRowS. Much of the network provides motor-vehicle-free access to schools, public transport hubs and local amenities. The Local Transport Plan for Kent, Delivering Growth without Gridlock (Kent County Council, 2016), highlights the corporate objective to make active travel an attractive and realistic choice for short journeys in Kent.
- 13.4.97 Kent County Council's Rights of Way Improvement Plan (ROWIP) 2018-2028 (Kent County Council, 2018) has a vision to *'provide a high quality, well maintained PRowS network, that is well-used and enjoyed. The use of the network will support the Kent economy, encourage active lifestyles and sustainable travel choices that support health and wellbeing, and contribute to making Kent a great place to live, work and visit'*. Key themes include promoting active lifestyles, particularly in deprived areas where existing access is low and where there are poor health outcomes.
- 13.4.98 The nine North Kent Green Cluster Studies (Greening the Gateway Kent and Medway and Department for Communities and Local Government, 2011) set out visions for environmental enhancements to improve people's quality of life in addition to boosting biodiversity and protecting wildlife habitats. The Shorne to Shore study (Greening the Gateway Kent and Medway and Department for Communities and Local Government, 2011) identified opportunities for promoting WCH use in the area, for example routes connecting the Thames Estuary Marshes with the Kent Downs AONB, and routes encouraging access to facilities such as Shorne Woods Country Park from adjacent urban areas.
- 13.4.99 The England Coast Path is a major project with committed Government funding to define a walkable route around the full coastline of England and is estimated to cover 4,500km when complete. The England Coast Path is opening in sections and, when finished, will be one of the longest coastal walking routes in the world. Natural England is investigating how to improve coastal access along a 78km stretch of the Kent coast between Grain and Woolwich. The end point of this stretch was changed in April 2017 from Gravesend in Kent to Woolwich in London, to join the capital to the England Coast Path along the Thames Estuary (National Trails, 2019).
- 13.4.100 The Saxon Shore Way follows the shoreline of the River Thames along Gravesend's historic promenade and out along the shoreline of the Shorne Marshes. The route turns inland across the centre of the Cliffe Pools Royal Society for the Protection of Birds Nature Reserve and into Cliffe village.
- 13.4.101 The Timeball and Telegraph Trail is a long-distance path which runs from Timeball Tower near Deal in Kent to the Royal Observatory in Greenwich. The route runs in an east-west direction on the southern side of the River Thames, passing directly through Shorne Woods Country Park.

- 13.4.102 The Darnley Trail is a 10.5km route which links the Jeskyns Community Woodland with the wider countryside, including to sites such as Shorne Woods Country Park and Ashenbank Wood.
- 13.4.103 National Cycle Route (NCR) 177 heads south from Northfleet in Kent, via Rochester, Maidstone and Ashford, to join NCR 2 on the south coast. The route appears very well used for commuting and leisure purposes alike. NCR 1 runs along the northern towpath of the disused Thames and Medway Canal, linking Gravesend and Higham stations.
- 13.4.104 To the south of the A2 there are many cycle tracks in close proximity, forming part of the Jeskyns Community Woodland network. The cycle tracks are near Henhurst Road and Jeskyns Road.
- 13.4.105 Table 13.22 lists PRowS crossed or potentially affected by activities associated with the construction or operation of the Project; these routes are also shown on Figure 13.2 (Application Document 6.2). In a similar way, Table 13.23 details minor roads that would be crossed or potentially affected by activities associated with the Project. Both tables provide a brief description of the routes, including services and facilities potentially accessed. Table 13.24 sets out findings from user count surveys for PRowS and minor roads included in the surveys undertaken in August and September 2019. As stated in the methodology section, not all PRowS and minor roads were included in the user count surveys, as a result of findings of the walkover survey undertaken in April 2018 regarding condition and likely level of use.

Table 13.22 PRowS affected by the Project – south of the River Thames

Route potentially affected	Description and linkages
National Cycle Route 177	This route runs south from Northfleet in Kent, terminating in Strood. From this location it connects with NCRs 1 and 17 towards the coast. The route runs parallel to the A2, on the northern side, at the southern extent of the Development Boundary, in an east west direction. This route is well used for informal recreational and commuting purposes.
The Darnley Trail	The Darnley Trail is a circular route of approximately 10.7km in length. This forms a circular route which is dissected in its centre by the A2. The route has a number of connections with other routes which provides good access to Shorne Country Park, Cobham Park, Cobham Wood, Cobham, Jeskyns Community Woodland and Thong Lane/A2.
NS/175A	This route is located within the Singlewell area of Gravesend which connects from an access track south of Hever Court Road, passing across the footbridge over the A2 and HS1 rail line before connecting into Church Road. The route is approximately 320m in length and connects with NS/365 and NS/359, allowing for pedestrian access over the highway and towards villages to the south of Gravesend.
NG/2	This footpath connects both NS/177 and NS/317 which run in an east to west direction along the northern side of the railway line, close to the Thames and Medway Canal.
KT/NS/195	This byway runs in a north-south direction from Thong Lane (south of the A2) towards Cobham and links with a number of

Route potentially affected	Description and linkages
	PRoW found in the area, including Byway 311 and Footpath 177. The Byway connects with Cobham at Holly Lodge, just west of the junction at Battle Street and Scotland Lane.
KT/NS/311	NS311 is a byway running in a north-south direction starting at the connection with byway NS195, north of Cobham, south of the A2. The byway runs through Chambers Hill Wood and Well Shaw, before following Sole Street south, along the same path as the Darnley Trail. This route connects with a number of footpaths in the area, including Footpath 177, 177A and the Timeball & Telegraph Trail.
KT/NS/175	NS175 is approximately 500m in length running in a north-south (diagonal) direction across an agricultural field between Church Road, south of the A2, ending at the connection with Henhurst Road, Gravesend. The path links directly with KT/NS/176 at Henhurst Hill. There is also an indirect link with KT/NS/177 and 177A, which heads east off Henhurst Road. The footpath also passes through the Henhurst Hill proposed nitrogen deposition compensation site.
KT/NS/176	This footpath runs in an east-west direction off Henhurst Road, approximately 150m north of the centre of Henhurst village. The route runs for approximately 950m, crossing Church Road at Hever Court Farm before connecting onto KT/NU/32. The footpath also passes through the Henhurst Hill proposed nitrogen deposition compensation site.
Time Ball & Telegraph Trail	Time Ball & Telegraph Trail is a vast route, passing between Deal on the east coast and Greenwich in London. The section linked to this project runs from north of the A289 in Great Crabbles Wood heading west towards the south of Gravesend.
KT/NS/177	Footpath NS/177 runs east off Henhurst Road, to the north of Winstead Hill and Jeskyns Community Woodland, heading south-east through a network of fields before connecting to byway NS/195 at Holly Lodge, just to the west of the junction at Battle Street and Scotland Lane. This footpath is approximately 1.9km in length from start to finish.
KT/NS/177A	Footpath NS/177A is approximately 820m in length, connecting the villages of Henhurst and Cobham for pedestrians. This footpath crosses through the Jeskyns Community Woodland site before connecting onto Footpath NS/177 which leads to Cobham. This path appears to follow an existing farm access road, therefore providing a defined path for pedestrians to use.
Footpath NG7	Footpath NG7 runs for approximately 1.5km in an east-west direction from Thong Lane, and links with Footpath NS164, continuing to Shorne. This is a well-defined footpath which appears to have good accessibility. The footpath is intersected by footpath NG8 and NG9/165. An observational site visit undertaken in 2018 identified that the path appeared to be well-used by local people for informal recreation purposes, although this was not affirmed by user counts undertaken in 2019 which identified only two walkers.

Route potentially affected	Description and linkages
Footpath NG8	Starting at Thong Lane at its western extent, the footpath crosses the northern extent of the Southern Valley Golf Course in a north-east direction to Rochester Road (A226). The footpath links with Muggins Lane (NG9/NS165) and NG7/NG164. Surveys conducted in 2019 suggested that there was good use of this route, with the majority of users being walkers.
Footpath NG9	NG9 is a short section of footpath approximately 250m in length, running in a north-west to south-east direction. This is a well-connected route linking NG7 and NG8 which then go on to connect with the wider network of footpaths within the locality and offer connectivity between Shorne/Upper Ifield and Gravesend.
Footpath NS169/1 and NS169/2	Footpath NS169/2 runs in a north-west to south-east direction from Michael Gardens, within the Riverview Park area of Gravesham, towards Thong Lane, south of Thong village. The footpath is approximately 850m in length. At the north western end of the route, it connects with NS169/1 which leads onto Michael Gardens. This route was subject to frequent use during the 2019 survey, with 75 user counts of walkers, and six cyclists during the survey period.
Footpath NS367/1	Footpath of approximately 250m in length, linking Henhurst Road to the southern side of the A2. Site visits did not identify a useable path in this location and no further survey work was deemed necessary.
NU48	NU48 is a Bridleway located on the western extent of the Order Limits to the east of Northfleet Green. The route at its western end connects with Gravesend, near to Painters Ash Primary School, passing along Hog Lane and crossing the A2, before heading east on the southern side of the railway line, connecting to NU/27 at its eastern extent. This footpath allows for connectivity between Instead Rise and Gravesend.
NS/161	This route connects Shorne Ridgeway at its northern end with Norwood Grove. The route is approximately 2.4km long, crossing the A2 before ending at Norwood Grove.
Footpaths NS163	Located to the north-west of the village of Shorne, NS163 provides a link from Crown Lane to Shorne Ifield Road (north of Upper Ifield) via NS165, and connects to NG9 to the north. This footpath connects with the NS163A after approximately 250m west of Shorne. The 2019 survey outlined infrequent use of this route.
NS163A	Footpath NS163A runs in a north south direction for approximately 670m. It connects with NS163 at its southern end, and the A226 cycle route to the north at Silvester House. Pedestrian access continues along the A226, with a footpath on the northern side.
NS164	Footpath NS164 runs in a northwest-southeast direction for approximately 640m. This connects with NS163 at its southern end, west of Shorne, and the NG7 to the north, just east of the Southern Valley Golf Course. The 2019 survey outlined infrequent use of this route.

Route potentially affected	Description and linkages
NS165	This footpath is approximately 900m in length, running in a north-west to south-east direction. This is a well connected route which starts at Upper Ifield, and which provides a variety of connections with other paths, providing links to both Shorne and Gravesend. This path interacts with NS/163 and NG/9 directly.
Footpath NS174/1	The footpath is located to the north of the A2, connecting the National Cycle Network Route 177 to links with Footpath NS167 and passing in a north-east to south-west direction through Claylane Woods. The 2019 survey outlined that there were 40 pedestrian users of the route, along with two cyclists.
KT/NS/167	NS167 is connected to NS174/1 at its western extent, on the boundary of Claylane Woods. The footpath runs diagonally in a north-easterly direction running on the southern side of a farm access track, leading to Thong Lane. The footpath continues in an easterly direction passing through Randall Bottom before finishing at Cats Wood, east of Upper Ifield. NS/167 is approximately 2.2km in length.
KT/NS/168	Starting in Shorne Ridgeway, the footpath crosses the development boundary in an east-west direction and is approximately 900m in length. The footpath passes through Randall Wood at its northern spur before connecting with Shorne Ifield Road, just east of Upper Ifield.
KT/NG/3	This footpath runs in a north-south direction connecting users of the Thames and Medway Canal to Lower Higham Road in the Chalk area of Gravesend (approximately 800m in length). The footpath follows the eastern side of a watercourse for its duration, along the boundaries of agricultural fields and connects to footpath NG2.
NG17/1	This is a short section of route which provides a connection between Watling Street (the A2) and Valley Drive to the north of the A2. This is linked with the Sustrans Route 177, heading west, and bridleway NS174 and footpath NS/167 which heads east.
NS161	Footpath NS161 runs in a south-north direction from Park Pale Lane connecting to NCR 177 up to Bowensden Lane at Shorne Ridgeway.
KT/MR/432	This route is approximately 450m in length, running in an east-west direction through the southern edge of Frith Wood, east of Blue Bell Hill. This route connects with KT/KH/86 which continues through the proposed Blue Bell Hill nitrogen deposition compensation site.
KT/KH/30	This route is approximately 1.6km in length, passing in diagonal direction through Westfield Wood. At its southern extent, this connects with KT/KH/64 heading towards the A229. This route connects with KT/KH/31, KT/KH/86 and KT/KH/29. This route provides connection to the proposed Blue Bell Hill nitrogen deposition compensation site.
KT/KH/86	This route is approximately 350m in length, passing along Bell Lane. The route runs through the proposed Blue Bell Hill nitrogen

Route potentially affected	Description and linkages
	deposition compensation site, connecting with KT/KH/31 allowing access to the north.
KT/KH/31	This route passes through the proposed Blue Bell Hill nitrogen deposition compensation site, in a north-south direction. The route is 610m in length approximately and connects with KT/KH/32 at its northern end which allows for access from the Coal Bottom area to the north. The path also connects with KT/KH/86 and KT/KH/30 which allow for connectivity to the south.
KT/MR/438A	This route is approximately 1km in length connecting Poakin Wood to the west with the proposed Blue Bell Hill nitrogen deposition compensation site to the east. The route passes parallel in large parts to the southern side of the M2 before connecting with KT/KH/31.
KT/MR/25	This path is approximately 150m in length connecting with Pilgrims Way / Rochester Road to the west and linking with KT/MR/22 to the east. The network of connected paths allows for links between the southern end of Burham and Blue Bell Hill. The footpath runs adjacent to the proposed Burham nitrogen deposition compensation site.
KT/MR/26	This route runs for approximately 225m in length, running along the south westerly edge of the proposed Burham nitrogen deposition compensation site. For the works to develop this site, it is understood that there will be no impact to the route. The route connects with KT/MR/24, KT/MR/25 and KT/MR/22.
KT/MR/24	This route is approximately 1.2 km in length, running from near Cutland Cottages, south of Burham. This runs in a northerly direction before connecting with KT MR 599 to the west of the A229. The footpath runs adjacent to the proposed Burham nitrogen deposition compensation site.
KT/MR/22	This route is approximately 885m in length running north-south from the southern edge of Burham past Rose Cottage and connecting with KT MR 23 at its northern end, linking with Common Road. The footpath runs adjacent to the proposed Burham nitrogen deposition compensation site.

Table 13.23 Minor roads and other WCH routes affected by the Project – south of the River Thames

Route	Description and linkages
Thong Lane	<p>Thong Lane starts at Brewers Road roundabout and extends to the junction with the A226 in the north. The road skirts the urban fringe of Gravesend for much of its length. Facilities accessed off Thong Lane include the Southern Valley Golf Club and the Cascades Leisure Centre. Thong Lane is rural in nature, passing through the small village of Thong. There is no footway, cycle provision or street lighting until the road reaches the more urban area of Riverview Park, to the north of the village. WCH surveys were undertaken at two locations – at the southern end of Thong Lane near Watling Street and between Vigilant Way and Shorne Ifield Road (Riverview Park area).</p>
Brewers Road	<p>Brewers Road extends from the roundabout with Halfpence Lane and Thong Lane to the south of the A2 Watling Street in a north-easterly direction towards Shorne Ridgeway. The road passes through Shorne Woods Country Park and is used to access car park facilities there. The road has footway and cycle provision from the point at which it passes over the A2 to its junction with Woodlands Lane and The Ridgeway. The road is not lit, in keeping with its rural surroundings.</p>
A226 Gravesend Road	<p>The A226 Gravesend Road stretches from its junction with the A229 at Higham in a north-westerly direction towards the village of Chalk and Gravesend. The road has footway and on-road cycle provision along much of its length and is lit along sections through residential areas. Facilities accessed via Gravesend Road include the Thames View Crematorium and Cemetery and St Mary's Church, Chalk.</p>
Park Pale	<p>Park Pale runs in an easterly direction from its junction with Brewers Road immediately to the north of the A2. The route then passes over the A2 in a southerly direction providing access to Rochester & Cobham Park Golf Club. The road appears to be used for informal parking, potentially as an informal overflow to Shorne Woods Country Park car park.</p>
Park Pale Cycle Track	<p>An informal pedestrian/cycle track runs in a westerly direction immediately to the north of the A2 and M2. The route connects with various other informal paths found close to Higham and Shorne Ridgeway.</p>

Table 13.24 WCH counts (PRoW and minor roads) – south of the River Thames

PRoW / minor road	Walkers (no.)	Cyclists (no.)	Horse riders (no.)	Day of survey
NG7	2	0	0	Sunday
NG8	24	1	0	Sunday
NS169	75	6	0	Sunday
NS163 / NS164	5	0	0	Sunday
NS174	40	2	0	Sunday
Thong Lane (Vigilant Way)	13	24	0	Friday
Thong Lane (Watling Street)	3	9	0	Sunday
Brewers Road (Halfpence Lane to A2 slip road)	16	99	0	Friday
A226 Gravesend Road (Crutches Lane to Forge Lane)	65	44	0	Friday

North of the River Thames

- 13.4.106 Essex County Council’s Transport Plan (Essex County Council, 2011) states that the council will promote walking and use of the PRoW network by:
- promoting the benefits of walking
 - facilitating a safe and pleasant walking environment that is accessible to all
 - improving the signage of walking routes
 - ensuring that the PRoW network is well maintained and easy to use by WCH.
- 13.4.107 Thurrock has just over 170km of PRoWs, including footpaths, byways and bridleways. PRoWs provide valuable access within Thurrock to the countryside, local parks and open spaces, helping to promote healthier lifestyles and wellbeing among Thurrock residents.
- 13.4.108 Extensive work has been undertaken by Thurrock Council in relation to Green Infrastructure, including the Thurrock Greengrid Strategy 2006-2011 (Thurrock Council, 2006). The South Essex Strategic Green and Blue Infrastructure Study was published in 2020 on behalf of the Association of South Essex Local Authorities (ASELA), which includes Thurrock Council (ASELA, 2020). These studies aim to create a network of multi-functional green space and links within Thurrock’s towns and countryside, helping to improve the area’s visual environment. This includes strategic green links comprising a network of footpaths, cycle paths and green transport corridors that encourage healthier living through promoting exercise and wellbeing by means of better access to open and green space.
- 13.4.109 The London Borough of Havering’s Infrastructure Delivery Plan (London Borough of Havering, 2018) includes walking and cycling projects and priorities, highlighting the need across the borough for improved accessibility and safety

for walkers and cyclists to facilitate safer and more convenient active travel choices. Existing partnerships identified in the Infrastructure Delivery Plan include The All London Green Grid (identifying a pan-London strategy for Green Infrastructure), the Thames Chase Community Forest and the Land of the Fanns Landscape Partnership (focusing on key heritage components). Projects detailed in the Infrastructure Delivery Plan are scheduled to take place in the short term (2016–2021) and the medium term (2016–2026).

- 13.4.110 The section of England Coast Path between Tilbury and Southend-on-Sea (a 70km stretch of coastline to the north of the River Thames) was approved by the Secretary of State in November 2020. At the time of writing, the route is not available for public use.
- 13.4.111 The Thames Estuary Path is an approximately 46km path through the South Essex marshes, connecting Tilbury with Leigh-on-Sea. The route connects places of interest including Coalhouse and Tilbury Forts, Thurrock Thameside Nature Park and areas of wildlife interest.
- 13.4.112 The Two Forts Way is a walk of approximately 6km between Coalhouse and Tilbury Forts along the north shore of the River Thames.
- 13.4.113 The Mardyke Way (Bridleway 219) is an approximately 11km trail along the side of the Mardyke from Ship Lane in Aveley to Bulphan. The trail was opened in 2007 as part of the Thames Chase Community Forest. It passes through the Davy Down Riverside Park (a 13ha site forming part of the Thames Chase Community Forest and which is owned by Essex and Suffolk Water and Thurrock Council). All footpaths in the riverside park are suitable for wheelchair users.
- 13.4.114 The Land of the Fanns Landscape Partnership Scheme has been part-funded by the National Lottery Heritage Fund (formerly the Heritage Lottery Fund) and is a five-year project designed to '*reunify and discover the landscape, strengthen attachment and create a sense of enjoyment of landscape area for local people and visitors*' (Thames Chase Trust, 2016).
- 13.4.115 The Land of the Fanns scheme includes 26 separate projects, including Project D1.1, 'Walking the Fanns', which is currently being delivered by the Thames Chase Trust. The project has two components: a programme of targeted path improvements and a volunteer-led walking programme relating to heritage, nature and health. The purpose of the project is to connect more people with the history of the built and natural environment throughout the Land of the Fanns area and beyond, building on a Thames Chase programme of mapped walks that encourages all ages and abilities to explore the natural environment.
- 13.4.116 Table 13.25 lists PRowWs that would be affected by activities associated with the construction or operation of the Project; these routes are also shown on Figure 13.2 (Application Document 6.2). PRowWs have been identified from definitive mapping accessed via local authority websites. Table 13.26 provides similar information for minor roads and other WCH routes potentially affected. Both tables provide a description of the routes, including services and facilities potentially accessed and any relevant findings from site visits. Table 13.27 provides details relating to WCH usage levels obtained from survey work.

Table 13.25 PRowS affected by the Project – north of the River Thames

Route potentially affected	Description and linkages
Footpath 95	Runs in a westerly direction from Brentwood Road towards Footpath 107, connecting into Greyhound Lane, south of Orsett Heath and intersected by Footpath 79. The footpath passes through Old House Wood, and provides local recreation opportunities for residents of Chadwell St Mary.
Footpath 93	Runs in a south easterly direction from Mill Lane, to the south of Orsett running diagonally across an agricultural field towards the A13, where it connects with Rectory Road. The footpath is well-used as a local recreation route. The footpath connects with Footpaths 96, 94, and 82 in a network of paths within the area, allowing for good connectivity to the south of Orsett.
Footpath 107	This footpath is 350m in length and runs in a north-south direction from Hornsby Lane, Orsett Heath to Greyhound Lane, Chadwell St. Mary. At this location, the route connects with Footpath 95 heading east towards Old House Wood.
Footpath 94	Footpath 94 is a short section of public footpath, approximately 200m in length which is located to the south of Orsett, and immediately north of the A13. This is a south west to north east running route connecting Bridleway 206, Footpath 82 and 93.
Footpath 104	This route runs from the south-eastern edge of Orsett, at Rectory Lane, in a south easterly direction before connecting with the A13 at the Stanford-Le-Hope Bypass. It connects with Footpath 104 and allows access between Orsett and Southfields to the south of the A13.
Footpath 82	Runs in a north-south direction from School Lane, Orsett towards the A13 in the south. The footpath passes adjacent to Orsett Church of England Primary School. The footpath links with Footpath 93 and 94, as well as Bridleway 206 running west at the A13. The PRow surveys show the footpath to be well-used as a local recreation route.
Bridleway 206	Bridleway 206 is a route located to the south of Orsett, running along Mill Lane before heading west to the north of the A13, towards Baker Street. The route passes along a woodland along the northern side of the A13, offering visual protection from the highway. The route is approximately 1.4km in length and connects with Footpaths 93, 96 and 94. The 2019 WCH survey outlined low user counts. There was a single count of horse riding along this route.
Footpath 90	Footpath 90 runs immediately north from Poplars Farm, Baker Street. The route follows Fen Lane, continuing north for 2.7km before stopping up south of Judd's Farm, Harrow Lane. Access to links with Bridleway 219 and Footpath 136 are gained further north along Harrow Lane for access to the west.
Footpath 135	FP135 links North Road (B186) to Fen Lane by the Top Meadow Golf Course. The footpath initially heads east from North Road, running adjacent to the highway for 1.6km before heading north for the final 500m and connecting onto Fen Lane.
Footpath 136	The footpath runs in a southwest-northeast direction from The Green, South Ockendon towards Harrow Road at its eastern extent, at Stone Hall. South Ockendon has several community facilities and a railway station. The footpath is approximately 4.5km long and follows Hall Lane before

Route potentially affected	Description and linkages
	passing along agricultural access tracks and fields, heading east. The 2019 WCH survey outlined that this route was infrequently used at the time of the survey.
Footpath 105	The footpath runs in a north-south direction linking from Stanford Road (A1013) in the north to Brentwood Road, opposite Orsett Golf Course. The route crosses agricultural fields for approximately 700m. The route connects with Footpath 79.
Footpath 61	Linked with Bridleway 63, 58 and 60, Footpath 61 runs in an east-west direction towards East Tilbury from Low Station Lane. The footpath provides a link into East Tilbury and access to East Tilbury Railway Station. This footpath is approximately 1.2 km in length. Footpaths 63 and 58 at the western end continue on to allow access to Chadwell St Mary, and Orchard House, respectively.
Footpath 200	<p>This footpath is approximately 2.2km in length running in an east-west direction. The western end of the footpath joins Station Road, at Gravelpit Farm, to the east of Low Street, West Tilbury. The footpath initially heads in a south westerly direction before looping to the east, connecting with the village of Buckland, north of the quarry. At this point, the footpath continues east towards the southern end of Princess Margaret Road, immediately to the north of Coalhouse Fort.</p> <p>WCH surveys conducted in 2019 identified that this is an infrequently used route.</p>
Bridleway 219	This bridleway is approximately 6.6km long in its entirety, and runs roughly in a southwest-northeast direction from Bridge Meadow Farm, Stifford Hill, South Ockendon. The route runs parallel to the Mardyke watercourse for the majority of the route, before connecting with Harrow Road at its eastern extent, at Stone Hall. The bridleway links with Footpath 136, which provides a direct link to South Ockendon and Ockendon Railway Station to the west. The bridleway also links with Footpath 131 at North Stifford, which connects the village with the northern end of South Ockendon. The 2019 WCH survey outlined that this route was infrequently used at the time of the survey.
Bridleway 161	This bridleway is approximately 1.3km in length and connects with Stifford Clays Road near Grays. At the north-eastern end, the route runs adjacent to Green Lane, starting near Hobletts Nursery, north of Baker Street. The 2019 WCH survey outlined low user counts.
Bridleway 58	Bridleway 58 runs southeast-northwest starting at Love Lane at Orchard House, northeast of Buckland, following the line of Coal Road before crossing the railway line. The bridleway continues to join Low Street Lane, where it connects with Footpath 61 and 63. Footpath 61 provides a link to East Tilbury and East Tilbury Railway Station. The 2019 WCH survey outlined low user counts.
Footpath 110	Footpath 110 runs in a generally west-east direction, with the western extent starting at the footbridge crossing the M25, east of Folkes Lane Woodland. The footpath runs adjacent to Coombe Wood before connecting with Hole Farm to the east. To the west, this route connects with Bridleway 119 and 146 allowing access to Tomkyns Lane.

Route potentially affected	Description and linkages
Footpath 146	This is a short section of footpath with runs in a north-south direction from its connection with BR119, and ending at Tomkyns Lane, to the east of Upminster Lodge Farm. The route is approximately 540m in length.
Footpath 251	Runs in an east west direction from Church Lane towards the M25. Footpath 231 then provides a connection to Ockendon Road (B1421) and provides a link to Saint Mary Magdalene Church in North Ockendon, Footpaths 252, 253, 254 and Bridleway 272.
Footpath 176	Runs in an east-west direction from Fairholme Gardens, Cranham in the west towards the M25 in the east, connecting with Bridleway 183. The footpath provides a link from a housing estate in Upminster into the wider footpath network and Franks Wood. Site visits have shown that the path appears to be well used for informal recreation purposes.
Footpath 177	The footpath links with St. Mary's Lane at its southern extent, north of Clay Tye Wood, before running north for 560m before connecting with Footpath 180 and 179.
Footpath 179	Runs for 750m in an east-west direction from the east of the M25 towards Warley Street (B186), south of Gladstone Cottages. This footpath is linked with footpath 180, footpath 177 and Bridleway 183.
Footpath 180	The footpath connects Footpaths 179 and 177 to the east of the M25 at Gladstone Cottages (B186).
Bridleway 183	This is a 3.2km long bridleway which runs in a north-south direction alongside the M25. The route commences north of Codham Hall Cottages, north of the A127, before heading west, past Codham Hall Wood. The path then continues in a south easterly direction, running parallel to the A127 before crossing under this road. The path then heads west before following the route of the M25 at junction 29. The footpath runs adjacent to the motorway on its eastern side, before crossing underneath the motorway on an agricultural track within a field, connecting with Footpath 176 to the west of the M25. This route links with Footpaths 176,179,177, and 176.
Footpath 252	This footpath is approximately 850m in length, running in an east west direction from the south of Church Lane, North Ockendon towards the M25. The footpath ends at Dennis Road which crosses the M25 at this location. The footpath connects with Footpath 253 and 251 south of St. Mary Magdalene Church.
Footpath 253	This is an 'L' shaped footpath located to the south of St. Mary Magdalene Church, North Ockendon, connecting Footpath 254, 252,251 and Bridleway 272.
Footpath 230	<p>The footpath passes in a north-south direction from Ockendon Road (B1421) through Thames Chase Community Forest towards Cranham Golf Course. The footpath provides links to the Thames Chase Forest Centre and connects with Footpath 227 and 228 on Pike Lane. The footpath is approximately 1.5km in length.</p> <p>The 2019 WCH survey identified this route to be frequently used by walkers (171) and cyclists (42) and therefore is a significant route used by the public.</p>

Route potentially affected	Description and linkages
Thames Chase Culvert	Access to the eastern side of the Thames Chase Forest Centre site is currently via a culvert beneath the M25. This is not a route designed for public access, however it is well used. This is dark, with low headroom, is prone to flooding and has steep access to the eastern side especially. Despite this, the route is very well used by walkers and cyclists, accessing the two sections of Thames Chase separated by the M25.
Bridleway 289	The footpath runs in a north-south direction, located between the Cranham Golf Course and the adjacent solar farm. The footpath runs for approximately 440m in length, ending at St Mary's Lane.
Footpath 231	The footpath starts at Church Lane, runs parallel to the M25 and ties into Ockendon Road. During the 2019 WCH survey there were few counts of pedestrian use, however there were three counts of horse riders during the survey period.
Footpath 96	Runs in an east-west direction from Baker Street (B188) directly through the Foxhound Riding School towards Mill Lane in the east. At the western end, the path connects with FP207; and at the eastern end the footpath connects directly with Bridleway 206 and Footpath 93 to the south of Orsett.
Footpath 97	This route runs in a south-west to north-east direction from Long Lane, adjacent to a residential estate in Grays, Little Thurrock. The footpath is approximately 700m in length. Site visits confirm that the path appears well used by local residents for informal recreation purposes, although the 2019 WCH survey highlighted few users. The route is currently severed by the A13.
Footpath 144	Runs in a north-south direction from Fort Road towards residential areas at the south of Tilbury. Site visits confirm that the path appears well used by local residents for informal recreation purposes.
Bridleway 63	Bridleway 63 connects Blue Anchor Lane in the west of the study area with Low Street Lane in the east. This Bridleway is 850m in length and is dissected by Footpath 66 at Coal Road.
Footpath 151	This is a short section of footpath, approximately 500m in length, running in an east-west direction. The footpath starts at North Road, adjacent to Groves Farm Cottages, connecting with Footpath 254 which connects users to St. Mary Magdalene Church, North Ockendon.
Footpath 254	This footpath runs north to south, allowing access from St. Mary Magdalene Church, North Ockendon. The footpath connects with Footpath 151 (heading east) and 253 (heading west).
Footpath 42	This footpath runs west-east connecting Orsett Golf Course to Buckingham Hill Road to the east. The route is linked with Footpaths 45, 46 and 41 allowing a wider connection of footpaths between Orsett and Mucking.
Footpath 60	Footpath 60 is approximately 300m in length running north-south from Muckingford Road connecting to Footpath 61, which continues on to East Tilbury Railway Station.
Footpath 64	This route of approximately 320m in length, passes in a west-east direction, from High House Lane, to Hoford Road.

Route potentially affected	Description and linkages
Footpath 66	Footpath 66 is a short section of PRow (approximately 320m long) which allows for a link between Blue Anchor Lane and Muckingford Road, east of Chadwell St Mary. The footpath goes on to connect with Footpath 70 to the west (off Blue Anchor Lane), which allows for access to Turnpike Lane and West Tilbury village.
Footpath 78	Footpath 78 is approximately 420m in length, connecting High House Lane with Brentwood Road, leading into Chadwell St Mary. The footpath allows for access to continue along Footpath 95, heading northwest through Old House Wood, and stopping up at Greyhound Lane, northeast of Chadwell Recreational Ground.
Footpath 79	The footpath runs in a north-south direction linking from Stanford Road (A1013) in the north into more residential areas of Chadwell St Mary in the south. There are bus stops and a church located near the southern end of the footpath. This intersects Footpath 95 within Old House Wood, north of Godman Road, Chadwell St Mary. The footpath is approximately 1.4km in length, allowing for users to connect between Chadwell St Mary and Orsett.
Bridleway 223	Bridleway 223 is a very short section of route running in a north-south direction to the west of the A1089 northbound. The route connects with Long Lane, enabling pedestrians to travel west along Long Lane and link up with Footpath 97 heading north.
Footpath 207	Footpath 207 is a short section of route which runs between the B188 Baker Street and the link road between the A13 and the A1089. From this location, there is no ongoing link.
Bridleway 119	Bridleway 119 runs in a generally east-west direction, with its western extent joining Tonkyns Lane, north of Upminster Lodge Farm. The route heads east before crossing the M25, and connection with FP110 near Coombe Wood. The route is approximately 1.5km in length. FP110 then continues to pass through the proposed Hole Farm East nitrogen deposition compensation site.

Table 13.26 Minor roads and other WCH routes affected by the Project – north of the River Thames

Route	Description and linkages
B188 Baker Street	Baker Street extends from Stanford Road in the south to the crossroads of Stifford Clays Road and Fen Lane in the north. Facilities accessed from Baker Street include the Foxhound Riding School. To the south, Baker Street is a single carriageway road, along which are located several residential properties. Further to the north, the road passes under the A13. The road has street lighting and footways along its length.
Long Lane	Long Lane runs from Treacle Mine Roundabout, south of the A13 to the west, heading east for approximately 2.6km before reaching its junction with Gammonfields Way.
Hornsby Lane	Hornsby Lane extends from Heath Road in the west to Stanford Road in the north. To the west, the road is fronted by a number of residential properties on each side of the road. Further to the east, the road becomes more rural in nature, with isolated residential properties.

Route	Description and linkages
	To the west, the road is single carriageway with a narrow footway and street lighting. Further to the east, the road is a single carriageway road with no footpath or cycle provision and no street lighting.
Fort Road	Fort Road runs from the London Cruise Terminal next to Tilbury Docks in the south, towards Coopers Shaw Road and Gun Hill to the south-west of West Tilbury. Facilities accessed from Fort Road include Tilbury Fort and Footpaths 193 and 146, which are both part of the established Thames Estuary Path and proposed England Coast Path. To the south, the road is single carriageway, with a footway and street lighting. Further to the north, the road becomes more rural in nature, has no footpath or cycle provision and no street lighting.
Muckingford Road	Muckingford Road extends in an east–west direction, linking Linford and East Tilbury in the east and Chadwell St Mary in the west. The road is largely rural in nature for most of its length, with residential properties and farm holdings in isolated clusters. The road is single carriageway for its entire length, with no formal footway or cycle provision, except for where the road enters the village of Linford. The road is not lit. A number of PRowWs connect with Muckingford Road.
Low Street Lane	Low Street Lane is a single carriageway road which runs from Muckingford Road in the north towards Station Road/Church Road in the south. Low Street Lane is not accessible to cars or motorbikes from Muckingford Road. The road provides access to a number of residential properties at its southern extent. A barrier is located across the road just beyond housing to prevent access by vehicles from the south. A number of PRowWs connect with Low Street Lane.
Brentwood Road	Brentwood Road connects Chadwell St Mary and the A13 before heading north to the village of Bulphan, passing to the east of the village of Orsett. Orsett Golf Club is to the east of Brentwood Road. The road is single carriageway, with no formal footway or cycle provision and it is not lit.
Rectory Road	Rectory Road extends from the A1013 in the south towards School Lane in Orsett. Facilities accessed off Rectory Road include Orsett Showground and Rectory Road allotments. The road is single carriageway, with a footway and cycle provision along its length.
A1013 Stanford Road	Stanford Road runs parallel to the south of the A13 from Southfields in the west to Stanford-le-Hope and Corringham in the east. Facilities accessed off Stanford Road include Orsett Fire Station, the Whitecroft Care Home and businesses including Recycled in Orsett. The road is single carriageway, with a footway and street lighting along its length.
Stifford Clays Road	Stifford Clays Road runs from the A13 in the east to Baker Street in the west. Facilities accessed off Stifford Clays Road include William Edwards School and East Thurrock Badminton Club. To the west, the road is fronted by residential properties, with the road becoming more rural in nature further to the east. The road is single carriageway, with a footway and street lighting.
Ockendon Road	Ockendon Road runs from Clay Tye Road in the east, towards Upminster in the west. Facilities accessed off Ockendon Road include Stubbers Adventure Centre, Manor Farm shop, Upminster Cemetery and Cranham Marsh Nature Reserve. To the east, the road is of a rural nature, with

Route	Description and linkages
	isolated residential properties and farm holdings. Further to the west in Upminster, it becomes more urban in nature, with residential properties fronting both sides of Ockendon Road. The road is single carriageway. Towards the east, the road has no formal footway or street lighting, although as the road enters more urban areas, these are provided.
Dennis Road / Dennises Lane	Dennis Road stretches from West Road in South Ockendon and heads in a northerly direction towards the M25. On passing under the M25, Dennis Road becomes Dennises Lane and heads in a westerly direction towards Bramble Road/Sunnings Lane. Both Dennis Road and Dennises Lane are rural single carriageway roads, with no footway or lighting facilities.
B186 North Road	North Road runs in a north–south direction from North Ockendon towards South Ockendon. The road is single carriageway. Where the road enters the villages of North and South Ockendon, there is both footway and street lighting provision; the remainder of the road is more rural in nature.
Hoford Road	Hoford Road runs in a south-west direction from Buckingham Hill Road towards Muckingford Road. The road is only accessible to vehicles for a short stretch at its junction with Muckingford Road; the remainder of the road is access only.
High House Lane	High House Lane runs in a south-east direction from Brentwood Road towards Muckingford Road. It is a single lane road along its entire length; the only property accessed directly from High House Lane is Mill House Farm.
Gammonfields Way	Gammonfields Way is accessed from Stanford Road (A1013) and provides access to the Gammonfields Way travellers' site.

Table 13.27 WCH counts (PRoWs and minor roads) – north of the River Thames

PRoW / minor road	Walkers (no.)	Cyclists (no.)	Horse riders (no.)	Day of survey
FP200	1	0	0	Sunday
FP161 and BR58 (Coal Road)	2	0	0	Sunday
BR206	4	0	1	Sunday
FP231	8	0	3	Saturday
FP230	171	42	0	Saturday
FP119	3	1	8	Saturday
FP72	0	0	0	Sunday
BR161 (Green Lane)	7	1	0	Saturday
BR219	1	1	0	Saturday
FP136	1	0	0	Saturday
FP146/NCR13	40	36	0	Sunday
FP97	2	0	0	Saturday
Baker Street (B188) between Stifford Clays Road and Woolings Close	43	32	0	Friday

PRoW / minor road	Walkers (no.)	Cyclists (no.)	Horse riders (no.)	Day of survey
Baker Street (B188) between Stifford Clays Road and Woolings Close	55	47	0	Saturday
Hornsby Lane between A1013 Stanford Road and Gowers Lane	32	15	0	Friday
Hornsby Lane between A1013 Stanford Road and Gowers Lane	29	18	0	Saturday
Fort Road between entrance to Tilbury Sewage Treatment Works and Fort Road	2	8	0	Friday
Muckingford Road between Low Street Lane and Hoford Road	5	28	0	Friday
Low Street Lane between Muckingford Road and Station Road	0	0	0	Friday
Brentwood Road between High House Lane and Sleepers Farm Road	0	6	0	Friday
Rectory Road between A1013 Stanford Road and School Lane	39	20	0	Friday
Rectory Road between A1013 Stanford Road and School Lane	52	13	0	Saturday
A1013 Stanford Road between Rectory Road and Hornsby Lane	19	13	0	Friday
A1013 Stanford Road between Rectory Road and Hornsby Lane	52	52	0	Saturday
Stifford Clays Road between Green Lane and Stifford Clays Road	1	26	0	Friday
Ockendon Road between Pea Lane and Church Lane	5	43	0	Friday
Dennis Road between Pea Lane and West Road	0	19	0	Friday
B186 North Road between Nelson Road and West Road	0	16	0	Friday

Use of the River

- 13.4.117 The baseline data used in this topic assessment include information relating to existing vessel movements on the River Thames. This has been described qualitatively as part of Section 4 of this chapter in relation to passenger and recreational vessel movements along the River Thames, associated boating events and locations of boating infrastructure such as sailing clubs. Further assessment is also included within the Preliminary Navigational Risk Assessment (Application Document 7.15).
- 13.4.118 Based on the predicted vessel movements associated with the construction of the Project, as outlined in chapter 4, a qualitative assessment of the use of the river has been carried out. Whilst there would be additional vessel movements

on the River Thames, it is not considered that these would result in impacts to existing river users, as the number of additional movements would be very low and would be handled by existing port facilities. As such it is not considered that there would be any significant effects on river users as a result of construction activities.

Human health

- 13.4.119 A comprehensive baseline for human health has been prepared as part of the combined HEqIA (Application Document 7.10). The baseline is informed by data sources including the 2011 and 2021 Census, the Office for Health Improvement and Disparities Local Health website and information provided by stakeholders. This section sets out data relating to human health in accordance with DMRB LA 112 (Highways England, 2020b). Data is provided at ward level where available, with regional and national comparators where appropriate. Wards within 1km of the Order Limits are included in the baseline.

South of the River Thames

- 13.4.120 A baseline health profile has been prepared for communities to the south of the River Thames.
- People with increased susceptibility to health issues*
- 13.4.121 People with increased susceptibility to health issues include more vulnerable populations such as children aged under 16 and those aged over 60. Plate 13.1 and Plate 13.2 show the distribution of these age groups respectively by local authority area.

Plate 13.1 Population under 16

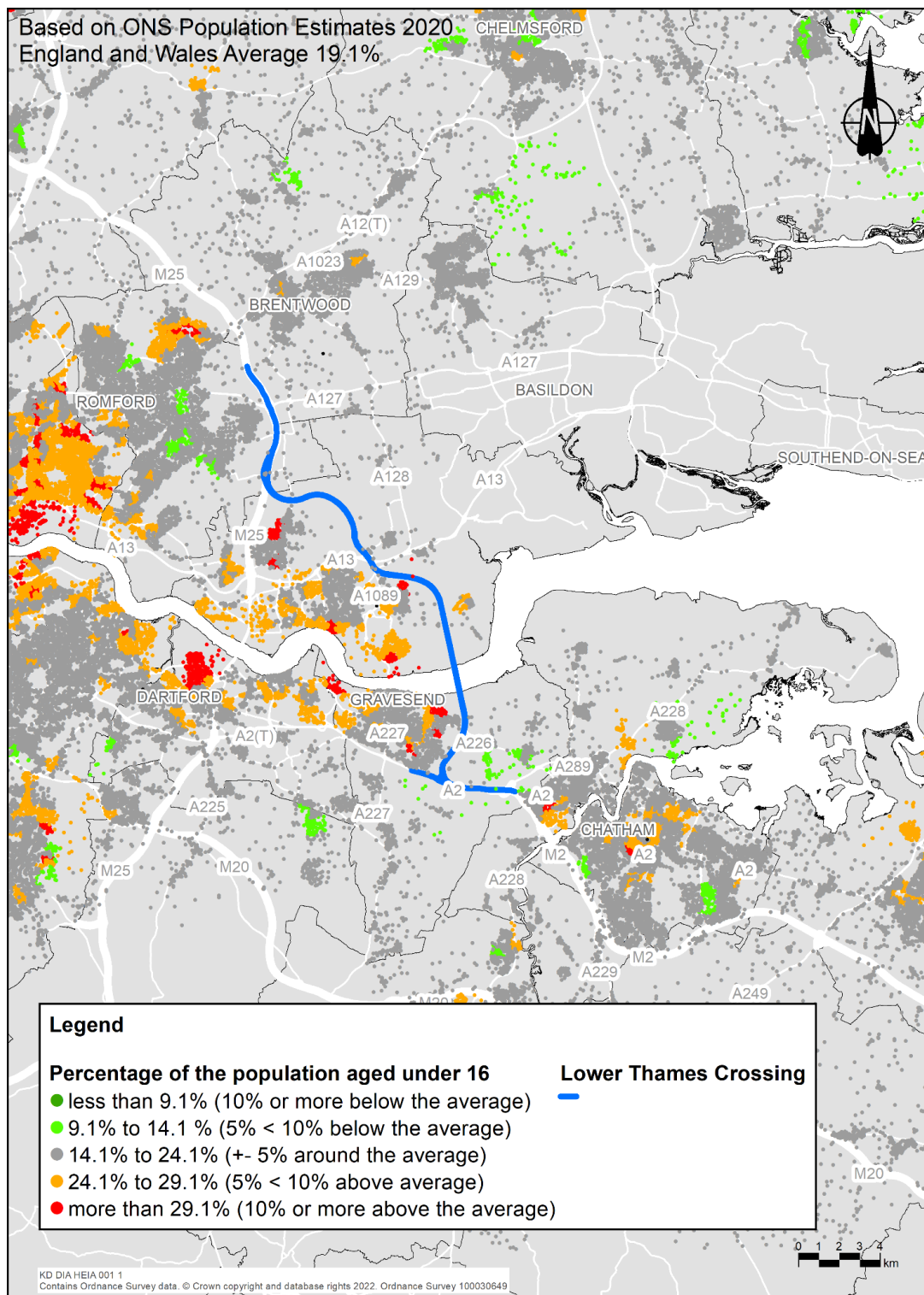
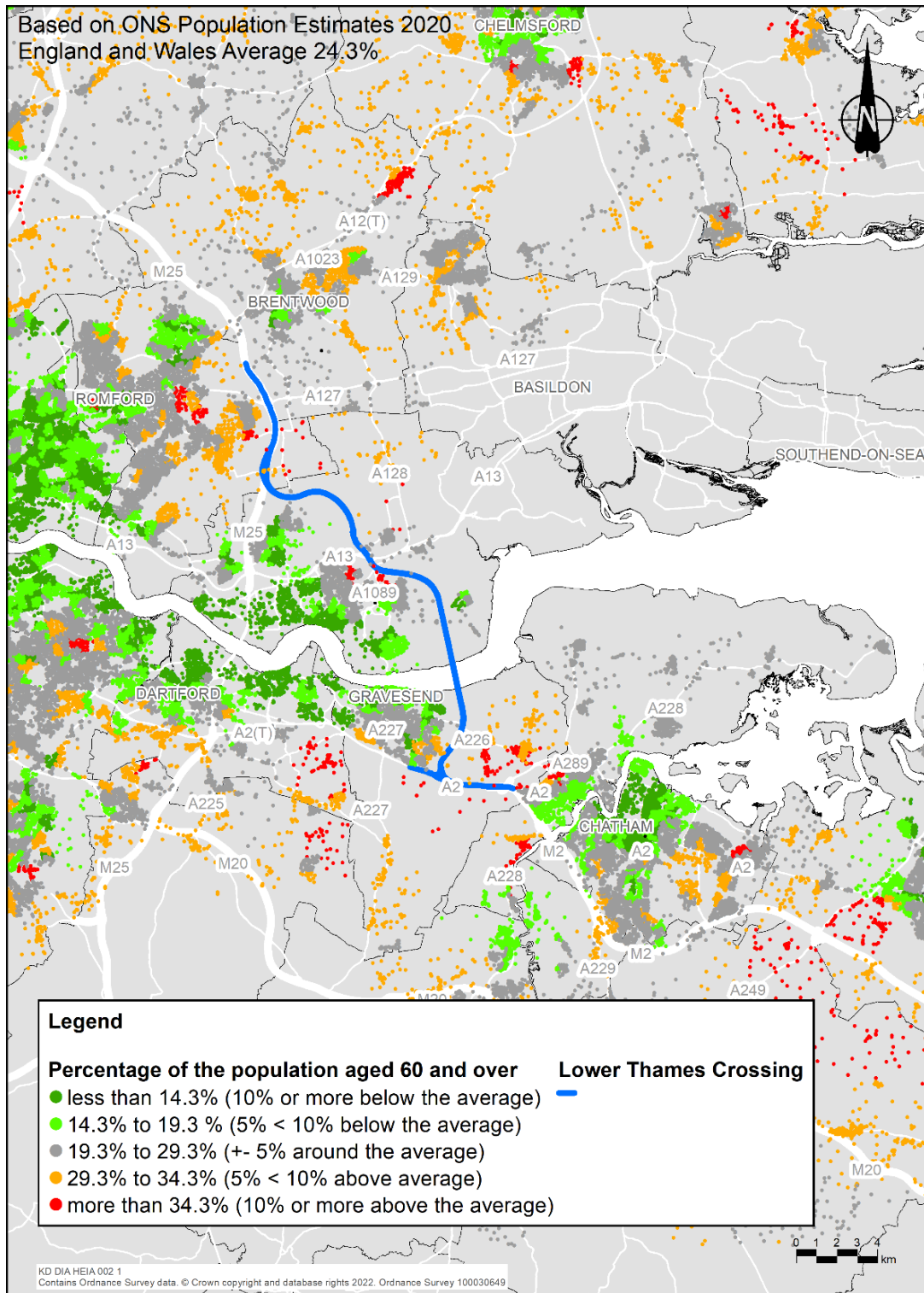


Plate 13.2 Population aged 60 plus



13.4.122 Table 13.28 outlines the age profile of residents living in wards closest to the Project to the south of the River Thames.

Table 13.28 Age profile – local authorities and wards south of the River Thames

Age group (%)				
Ward	<16	17–25	26–59	60+
Gravesham	22.6	9.5	45.2	22.7
Riverside	26.7	11.4	50.0	11.9
Riverview	19.4	8.5	41.9	30.2
Higham	17.1	9.1	40.7	33.1
Chalk	17.1	7.4	40.5	35.1
Westcourt	27.4	10.0	42.7	19.9
Singlewell	25.8	9.8	45.6	18.7
Woodlands	21.8	9.3	45.7	23.1
Shorne, Cobham and Luddesdown	18.4	9.6	37.4	34.6
Northfleet South	26.9	9.3	48.7	15.0
Istead Rise	15.9	7.6	37.6	38.9
Painters Ash	18.7	8.2	39.8	33.4
Central	18.2	10.2	51.0	20.6
Coldharbour	24.8	8.9	43.8	22.5
Medway	22.2	10.5	45.9	22.7
Cuxton and Halling	20.1	8.4	46.5	25.0
Strood South	25.3	9.7	46.6	18.4
Strood North	21.4	9.5	47.7	21.5
Strood Rural	21.8	8.7	45.6	24.0
Dartford	23.6	9.0	48.7	18.7
Newtown	23.2	10.2	52.8	13.8
Stone Castle	23.3	9.3	56.3	11.1
Stone House	25.6	8.9	49.6	15.9
Bridge	37.2	4.8	55.1	3.0
Temple Hill	28.3	9.3	49.3	13.1
Longfield, New Barn and Southfleet	18.6	6.2	39.4	35.8
Tonbridge and Malling	21.7	8.9	44.7	24.7
Snodland East	22.9	10.0	48.9	18.2
Kent	20.6	10.0	43.5	26.0
England	20.3	10.8	45.0	23.9

Source: Mid-Year Population Estimates 2020 (ONS, 2021)

- 13.4.123 At a local level, the data shows that there is a higher proportion of children aged under 16 concentrated within urban areas to the south of the River Thames (for example within the wards of Westcourt and Riverside to the east of Gravesend and Northfleet South to the west; the wards of Bridge, Temple Hill and Stone House within Dartford and the Strood South ward within Medway). Conversely, there are much lower proportions of children under 16 living in the more rural areas (for example the wards of Chalk, Higham and Istead Rise within Gravesham and the Cuxton and Halling ward within Medway).
- 13.4.124 Older population groups (people aged over 60) are typically concentrated outside of the urban centres, in more rural areas to the south of Dartford and Gravesham, and villages located in open countryside separating Gravesend and the Medway towns. There are higher than average concentrations of older people in the wards of Istead Rise, Higham, Chalk and Shorne, Cobham and Luddesdown within Gravesham, in the ward of Cuxton and Halling within Medway and the Longfield, Newbarn and Southfleet ward in Dartford
- 13.4.125 Table 13.29 shows the percentage of people aged 65 and over who are living alone, within local authorities and wards located closest to the Order Limits to the south of the River Thames. Older people living alone typically have more long-term health conditions.

Table 13.29 Percentage of older people living alone – south of the River Thames

Area	People aged 65+ and living alone (%)
England	31.5
Kent	30.2
Gravesham	30.2
Riverside	42.2
Riverview	21.4
Higham	28.0
Chalk	29.0
Westcourt	31.4
Singlewell	35.4
Woodlands	31.5
Shorne, Cobham and Luddesdown	22.6
Northfleet South	35.7
Istead Rise	20.1
Painters Ash	27.1
Central	33.1
Coldharbour	39.9
Medway	32.1
Cuxton and Halling	29.7

Area	People aged 65+ and living alone (%)
Strood South	33.5
Strood North	28.8
Strood Rural	28.4
Dartford	29.5
Newtown	38.9
Stone Castle	32.9
Stone House	30.3
Bridge	10.0
Temple Hill	41.9
Longfield, New Barn and Southfleet	20.3
Tonbridge and Malling	27.6
Snodland East	32.5

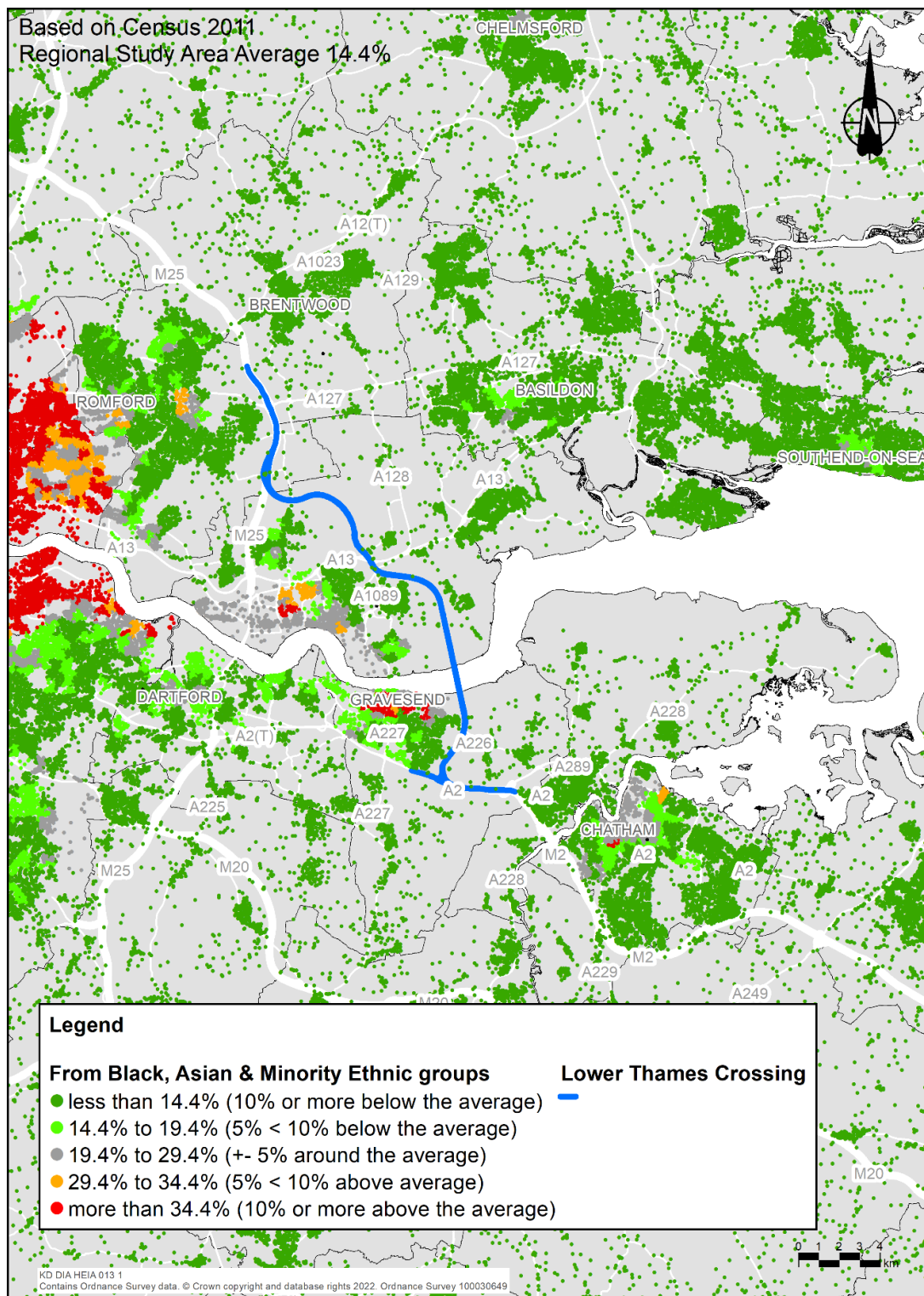
Source: 2011 Census (ONS, 2011)

13.4.126 Wards where there are higher proportions of older people living alone include:

- a. Riverside, Coldharbour and Singlewell in Gravesham (42.2%, 39.9% and 35.4% respectively)
- b. Strood South and Cuxton and Halling in Medway (33.5% and 29.7% respectively)
- c. Temple Hill and Newtown in Dartford (41.9% and 38.9% respectively)

13.4.127 Research has shown that health patterns differ significantly between ethnic minority groups and the white population, and between different minority groups, reflecting diversity of demographic, socio-economic, behavioural and cultural characteristics (Raleigh and Holmes, 2021). Plate 13.3 shows the distribution of people from ethnic minority backgrounds across the study areas to the north and south of the River Thames.

Plate 13.3 Ethnicity



13.4.128 Plate 13.3 highlights the higher proportion of people from ethnic minority backgrounds concentrated in areas around Gravesend, for example the town centre and areas to the north and east. Rural villages to the south of the main centres show a predominantly white population.

13.4.129 Table 13.30 shows the proportions of people from different ethnic backgrounds across the study area. The data shows that there is significant variation within and across wards; for example, Riverside has a much higher population of people from ethnic minority backgrounds (29.6% compared to 17.1% for Gravesham and 14.6% for England). Wards within Dartford have higher proportions of people from ethnic minority backgrounds than is the case nationally. Within Medway, the ward of Cuxton and Halling has a significantly higher proportion of white residents when compared to the England average (96.5% compared to 85.4%).

Table 13.30 Ethnicity – south of the River Thames

Geographical Area	Ethnicity (%)				
	White	Mixed	Asian	Black	Other
Gravesham	82.8	2.0	10.4	2.8	1.9
Riverside	70.5	2.7	17.3	6.1	3.5
Riverview	89.5	1.3	6.7	1.9	0.6
Higham	93.1	1.4	4.1	0.5	1.0
Chalk	92.6	1.5	4.2	1.4	0.3
Westcourt	87.2	2.1	5.4	4.4	0.9
Singlewell	89.8	2.6	3.5	3.4	0.7
Woodlands	82.4	2.0	12.1	2.1	1.5
Shorne, Cobham and Luddesdown	92.9	0.8	5.0	0.8	0.5
Northfleet South	77.2	2.1	15.3	3.4	1.9
Istead Rise	96.3	1.2	2.2	0.1	0.3
Painters Ash	84.8	1.4	10.4	2.0	1.4
Central	74.8	2.1	15.7	2.8	4.5
Coldharbour	86.9	2.1	8.2	2.0	0.8
Medway	89.6	2.0	5.2	2.5	0.7
Cuxton and Halling	96.5	1.1	1.3	0.5	0.6
Strood South	91.9	2.0	2.4	3.2	0.5
Strood North	88.9	1.8	6.9	2.0	0.4
Strood Rural	94.0	1.2	3.2	1.3	0.3
Dartford*	87.4	2.2	6.0	3.7	0.8
Littlebrook	83.2	3.1	6.7	6.5	0.5
Newtown	83.3	2.5	8.1	4.1	2.0
Stone	88.2	2.4	4.5	4.4	0.6
Joyce Green	83.6	3.2	4.3	8.2	0.7
Longfield, New Barn and Southfleet	95.0	0.9	3.5	0.5	0.1

Geographical Area	Ethnicity (%)				
	White	Mixed	Asian	Black	Other
Tonbridge and Malling	95.9	1.4	2.0	0.3	0.3
Snodland East	97.7	0.9	1.0	0.3	0.1
Kent	93.7	1.5	3.3	1.1	0.5
England	85.4	2.3	7.8	3.5	1.0

**Note, data is from the 2011 Census. New electoral wards were agreed upon in 2018, for which data on ethnicity is not currently available*

Source: 2011 Census (ONS, 2011)

Pre-existing health issues

- 13.4.130 Pre-existing health issues considered within this section include respiratory disease and Chronic Obstructive Pulmonary Disease (COPD). Data from the Office for Health Improvement and Disparities (2021b) relates to emergency hospital admissions for COPD and deaths from respiratory disease at ward level.
- 13.4.131 Table 13.31 highlights variations in emergency hospital admissions for COPD for wards located closest to the Project. The table uses Standardised Admission Ratios; these relate to the ratio of observed number of admissions in an area to the number expected if the area had the same age-specific rates as England (the value for England is given as 100). Key findings from the data are as follows:
- There are significant variations between wards in Gravesham, with Riverside and Westcourt having the highest rates per 100 of the population and Riverview the lowest, at 165.6, 159.5 and 32.5 respectively.
 - For Medway, Strood South has the highest rate and Cuxton and Halling the lowest, at 144.3 and 66.1 respectively.
 - The Snodland East ward in Tonbridge and Malling has a rate of 157.3 which is significantly worse than for England.
 - For wards within Dartford found close to the Project, the Standardised Admission Ratio for emergency hospital admissions for COPD in both Temple Hill and Stone House wards are significantly worse than for England (211.1 and 174.7 respectively).

Table 13.31 Emergency hospital admissions for COPD by ward – south of the River Thames

Geographical Area	Emergency hospital admissions for Chronic Obstructive Pulmonary Disease (COPD) (Standardised Admission Ratios)
Gravesham	90.6
Riverside	165.6
Riverview	32.5
Higham	43.3
Chalk	43.6
Westcourt	159.5
Singlewell	119.7
Woodlands	56.0
Shorne, Cobham and Luddesdown	54.6
Northfleet South	86.5
Istead Rise	63.5
Painters Ash	96.1
Central	93.6
Coldharbour	136.9
Medway	117.3
Cuxton and Halling	66.1
Strood South	144.3
Strood North	80.5
Strood Rural	107.5
Dartford	100.9
Newtown	104.8
Stone Castle	141.2
Stone House	174.7
Bridge	*
Temple Hill	211.1
Longfield, New Barn and Southfleet	47.3
Tonbridge and Malling	76.3
Snodland East	157.3
Kent	86.5
England	100.0

Source: Office for Health Improvement and Disparities (2016/17 to 2020/21)

* Value missing in source data

13.4.132 Data relating to respiratory disease is only available at the level of the former Clinical Commissioning Groups (CCGs). Table 13.32 summarises data for the NHS CCGs to the south of the River Thames, including Quality and Outcomes Framework (QOF) prevalence data for asthma.

Table 13.32 Lung conditions – CCGs to the south of the River Thames

Lung conditions	NHS Kent and Medway CCG	England
Emergency hospital admissions for asthma in adults (aged 19 and over) (directly standardised rate per 100,000)	38.1	44.4
Hospital admissions for asthma (under 19 years) (crude rate per 100,000)	60.3	73.1
Asthma QOF prevalence (6+ years) (%)	6.0%	6.4%
Emergency hospital admissions for COPD (all ages)	115.5	133.5

Source: *Inhale – Interactive Health Atlas of Lung Conditions in England* (Office for Health Improvement and Disparities, 2021)

Deaths from respiratory disease

13.4.133 Table 13.33 shows deaths from respiratory disease for wards to the south of the River Thames. The table uses Standardised Mortality Ratios (SMRs), which allow data to be compared across areas. The table shows that there are significant variations in deaths from respiratory disease for each local authority area (for example, Painters Ash ward when compared to Shorne, Cobham and Luddesdown ward within Gravesham (171.0 SMR and 40.9 SMR respectively) and Strood South ward when compared to Cuxton and Halling ward within Medway (showing SMRs of 143.5 and 89.5 respectively).

Table 13.33 Deaths from respiratory diseases 2016-2020 – south of the River Thames

Geographical area	Deaths from respiratory diseases, all ages, all persons (SMR)
Gravesham	101.8
Riverside	166.2
Riverview	65.4
Higham	99.7
Chalk	84.9
Westcourt	114.9
Singlewell	111.6
Woodlands	84.2
Shorne, Cobham and Luddesdown	40.9
Northfleet South	73.8
Istead Rise	96.1
Painters Ash	171.0

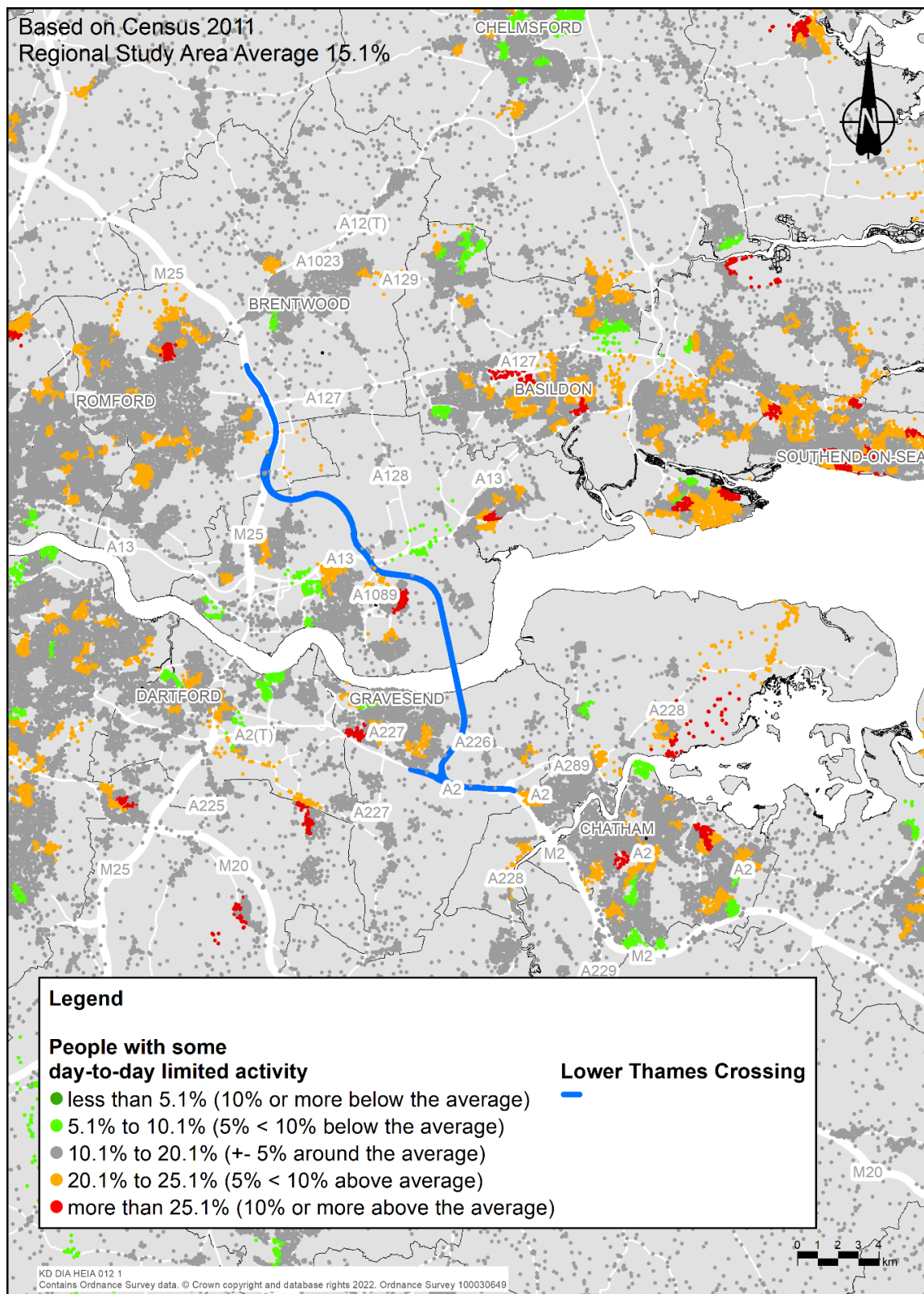
Geographical area	Deaths from respiratory diseases, all ages, all persons (SMR)
Central	98.2
Coldharbour	142.4
Medway	122.3
Cuxton and Halling	89.5
Strood South	143.5
Strood North	101.8
Strood Rural	128.9
Dartford	102.3
Newtown	111.2
Stone Castle	79.6
Stone House	178.0
Bridge	141.2
Temple Hill	105.9
Longfield, New Barn and Southfleet	92.8
Tonbridge and Malling	88.0
Snodland East	154.9
Kent	102.3
England	100.0

Source: Office for Health Improvement and Disparities (2021a)

Long-term illness or disability

13.4.134 Plate 13.4 shows the distribution of people with some limited day-to-day activity, based on 2011 Census data. The plate shows that there are slightly higher proportions of people with some limits to day-to-day activities within central and western areas of Gravesham and in western areas of Strood.

Plate 13.4 People with some limits to day-to-day activities



13.4.135 Table 13.34 shows the proportion of residents who suffer from a long-term health problem or disability that limits their day-to-day activities.

Table 13.34 Percentage of people who reported having a long-term illness or disability – local authorities and wards to the south of the River Thames

Geographic area	Day-to-day activities limited a lot (%)	Day-to-day activities limited a little (%)	Day-to-day activities not limited (%)
Gravesham	7.7	9.4	83.0
Riverside	6.7	8.1	85.2
Riverview	5.5	8.6	85.9
Higham	7.7	10.7	81.6
Chalk	7.4	11.0	81.6
Westcourt	9.3	10.2	80.5
Singlewell	8.6	10.2	81.2
Woodlands	6.3	8.6	85.1
Shorne, Cobham and Luddesdown	6.6	9.3	84.1
Northfleet South	6.6	8.4	84.9
Istead Rise	7.3	11.1	81.6
Painters Ash	10.7	11.0	78.3
Central	8.1	9.2	82.7
Coldharbour	11.0	10.2	78.8
Medway	7.5	8.9	83.6
Cuxton and Halling	8.0	9.0	83.0
Strood South	6.8	8.8	84.4
Strood North	7.5	10.2	82.3
Strood Rural	7.0	8.4	84.6
Dartford¹	6.8	8.3	84.9
Stone	6.7	8.1	85.2
Littlebrook	7.5	8.7	83.8
Joyce Green	5.5	8.6	85.9
Newtown	8.7	8.9	82.5
Longfield, New Barn and Southfleet	7.6	10.7	81.7

¹ Please note that ward boundaries for Dartford changed in 2019. Data preceding this time (e.g. 2011 Census data) is based on the former ward boundaries.

Geographic area	Day-to-day activities limited a lot (%)	Day-to-day activities limited a little (%)	Day-to-day activities not limited (%)
Tonbridge and Malling	6.3	8.6	85.1
Snodland East	7.9	8.8	83.2
Kent	8.0	9.6	82.4
England	8.3	9.3	82.4

Source: 2011 Census

13.4.136 Table 13.34 shows significant variations between wards found in Gravesham. For example, 21.7% of residents in Painters Ash report having a limiting long-term illness or disability, compared to 14.1% in Riverview. Within Medway, Strood North (17.7%) has a slightly higher proportion of residents who report having a limiting long-term illness or disability compared to Cuxton and Halling and Strood South (17.0% and 15.6% respectively). Within Dartford, Longfield, New Barn and Southfleet ward and Newtown ward show highest proportions of residents reporting having a limiting long-term illness or disability (18.3% and 17.6% respectively).

General health

13.4.137 Table 13.35 shows self-reported health status for wards closest to the Project.

Table 13.35 Health status – south of the River Thames

Geographical area	Very good health (%)	Good health (%)	Fair health (%)	Bad health (%)	Very bad health (%)
Gravesham	46.5	35.0	13.4	4.0	1.1
Riverside	48.1	35.2	11.7	3.8	1.2
Riverview	48.4	36.4	11.6	2.9	0.8
Higham	46.2	34.8	14.4	4.0	0.6
Chalk	41.0	39.5	14.8	4.2	0.5
Westcourt	44.5	34.2	15.0	4.9	1.5
Singlewell	44.9	34.8	14.3	4.7	1.3
Woodlands	49.4	34.6	12.2	3.0	0.8
Shorne, Cobham and Luddesdown	49.2	34.2	12.2	3.5	0.9
Northfleet South	47.0	35.8	12.6	3.6	1.0
Istead Rise	46.1	36.0	14.3	2.6	1.0
Painters Ash	42.6	33.6	17.3	5.2	1.2
Central	48.6	32.9	13.5	3.9	1.1
Coldharbour	41.5	35.1	16.1	5.8	1.5
Medway	45.7	36.3	13.0	3.9	1.1
Cuxton and Halling	44.1	37.1	13.2	4.3	1.2

Geographical area	Very good health (%)	Good health (%)	Fair health (%)	Bad health (%)	Very bad health (%)
Strood South	45.7	37.5	12.2	3.6	1.0
Strood North	45.3	34.9	14.2	4.5	1.1
Strood Rural	48.2	35.4	12.2	3.3	1.0
Dartford	48.6	34.9	12.2	3.4	1.0
Littlebrook	46.4	35.6	12.8	4.1	1.1
Newtown	47.6	33.3	13.0	5.1	1.0
Stone	48.1	35.2	11.7	3.8	1.2
Joyce Green	48.4	36.4	11.6	2.9	0.8
Longfield, New Barn and Southfleet	46.9	34.9	13.0	3.5	1.7
Tonbridge and Malling	49.2	34.3	11.8	3.1	0.9
Snodland East	44.5	36.1	14.1	4.0	1.3
Kent	46.9	34.9	13.3	4.0	1.1
England	47.2	34.2	13.1	4.2	1.2

Source: 2011 Census

13.4.138 For Gravesham, Riverview ward has the highest proportion of residents who report very good or good health, while Painters Ash and Westcourt ward have the lowest (76.2% and 78.7% respectively). Wards with the highest percentage of residents reporting bad and very bad health include Westcourt and Painters Ash (both at 6.4%). Similar patterns are shown in other local authority areas – for example with Strood North and South wards in Medway and the Littlebrook and Newtown wards in Dartford.

Life expectancy

13.4.139 Table 13.36 looks in more detail at life expectancy at birth in wards to the south of the River Thames. There are stark contrasts in life expectancy rates between wards. For example, in Gravesham, life expectancy for males within Riverview ward is 84.5 years, compared to 75.0 for Riverside.

Table 13.36 Life expectancy at birth 2016-2020 – south of the River Thames

Geographical area	Life expectancy at birth (male)	Life expectancy at birth (female)
Gravesham	79.4	83.4
Riverside	75.0	82.4
Riverview	84.5	85.5
Higham	80.6	85.3
Chalk	82.7	86.1
Westcourt	77.8	80.9

Geographical area	Life expectancy at birth (male)	Life expectancy at birth (female)
Singlewell	76.1	83.9
Woodlands	81.6	82.8
Shorne, Cobham and Luddesdown	83.3	88.7
Northfleet South	80.7	82.7
Istead Rise	83.2	86.5
Painters Ash	76.8	80.2
Central	77.8	82.9
Coldharbour	77.0	81.3
Medway	78.6	82.5
Cuxton and Halling	83.9	83.8
Strood South	77.4	81.4
Strood North	79.2	82.7
Strood Rural	80.5	83.7
Dartford	79.3	82.4
Newtown	82.5	84.8
Stone Castle	76.4	83.7
Stone House	74.7	77.2
Bridge	75.2	*
Temple Hill	78.3	82.0
Longfield, New Barn and Southfleet	82.0	84.0
Tonbridge and Malling	80.4	84.6
Snodland East	78.6	79.1
Kent	79.7	83.3
England	79.5	83.2

Source: Office for Health Improvement and Disparities (2021a)

* Value cannot be calculated as number of cases is too small

Deprivation

- 13.4.140 The Indices of Deprivation measure relative levels of deprivation across Lower Layer Super Output Areas in England. The Indices of Deprivation are based on 39 separate indicators organised against seven distinct domains of deprivation (income, employment, health deprivation and disability, crime, barriers to housing and services, living environment, and education and skills training). The seven domains are combined and weighted to calculate an Index of Multiple Deprivation (IMD) which shows levels of deprivation at local level. The most recent Indices of Deprivation statistics were released in 2019 (Ministry of Housing, Communities and Local Government, 2019), and statistics can be compared to the previous release in 2015 (Ministry of Housing, Communities

and Local Government, 2015). Plate 13.5 and Plate 13.6 show deprivation by income and health domains respectively, with Plate 13.7 showing results of the IMD.

Plate 13.5 Indices of Deprivation – income domain

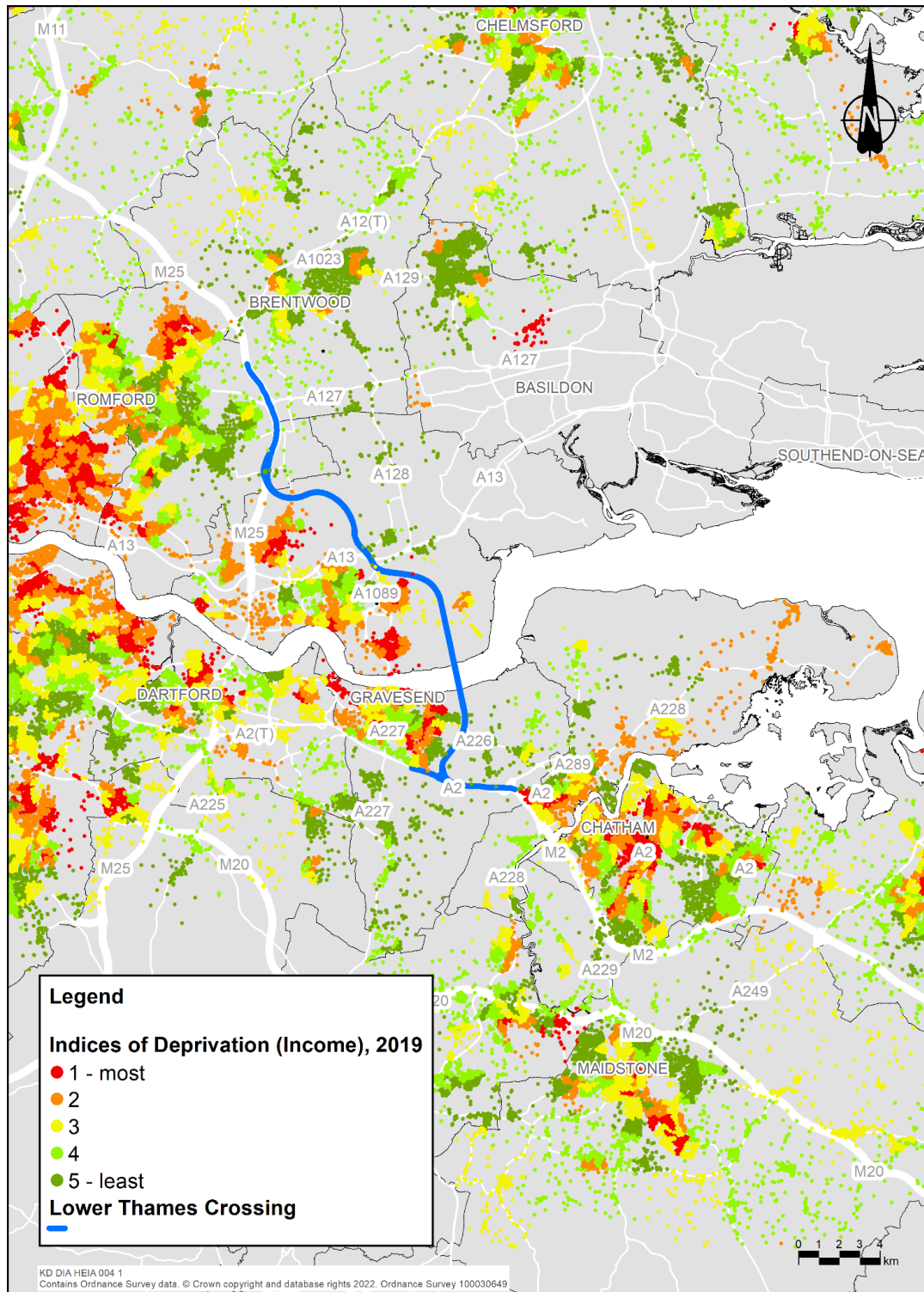


Plate 13.6 Indices of Deprivation – health deprivation and disability

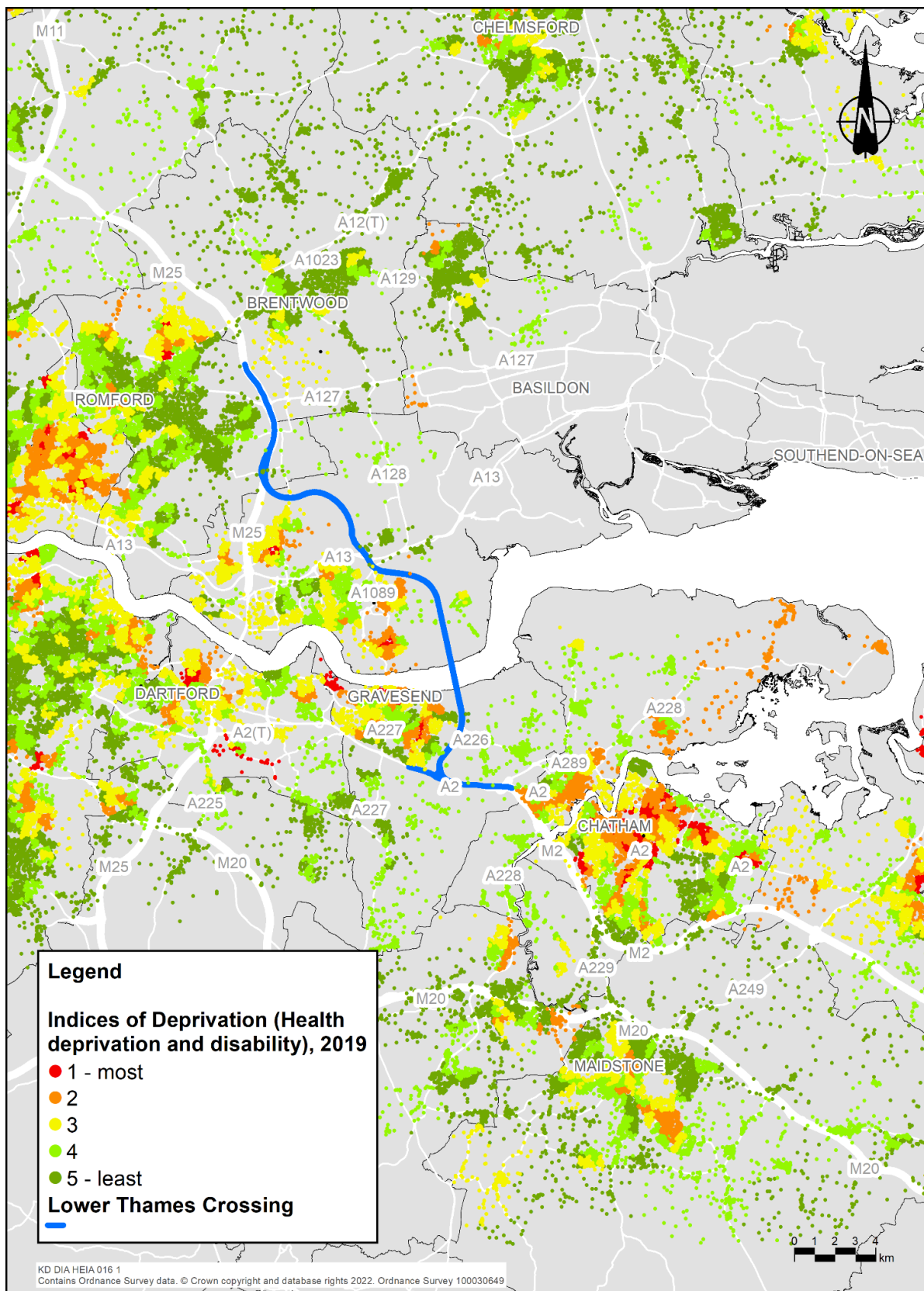
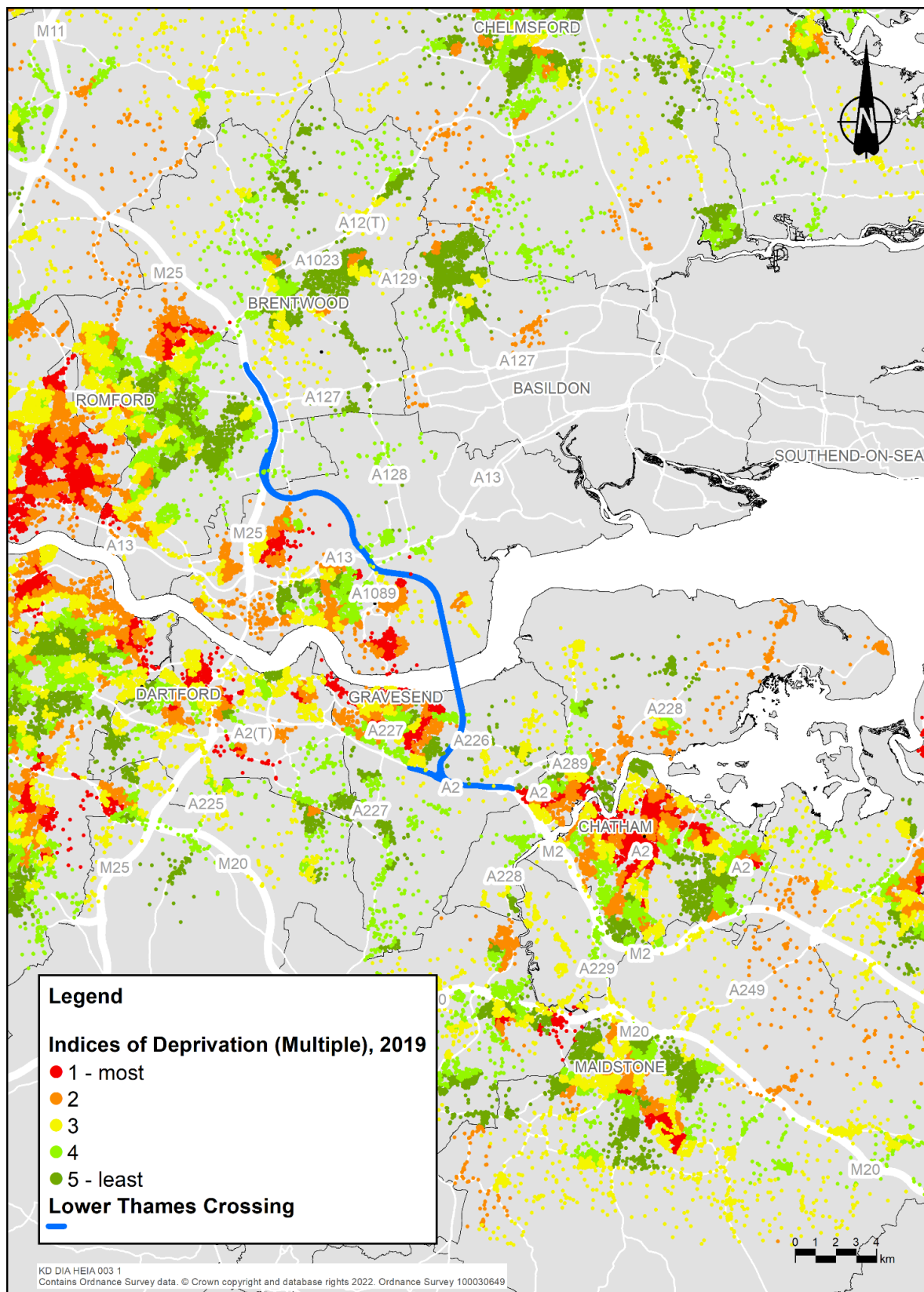


Plate 13.7 Index of Multiple Deprivation



- 13.4.141 The plates show areas of deprivation within the Riverside and Westcourt wards of Gravesham, Strood South ward in Medway and Joyce Green ward in Dartford. Relative to other areas of the UK, the area to the south of the River Thames has become comparably less deprived between 2015 and 2019, which supports other evidence that shows how employment rates, income and house prices have all improved in the local area. Local improvements are particularly notable in the riverside towns of Gravesham and Dartford. However, not all areas have seen improvement. Areas to the south and south-east have generally declined further, with Rochester and Chatham fairing particularly badly.
- 13.4.142 Closer examination of the specific indices in Gravesham reveals improvements have been driven by strong increases in employment, income, housing and services. Rochester has seen a general decline in the IMD; all individual deprivation domains have seen a decline except for the income and education domains, which have remained broadly flat with pockets improving and others declining.
- 13.4.143 Dartford has seen one of the largest improvements in the IMD, yet remains in the lowest quintile in 2019. The increase is the result of strong improvements in income, education and housing, but these are still poor compared to other areas of the UK. Crime is a particular issue, and there has also been a deterioration in the living environment domain.
- 13.4.144 Other specific domains, such as income, reveal people in the highest quintile live close to people in the lowest quintile in places such as Gravesham and Rochester.

North of the River Thames

- 13.4.145 A baseline health profile has been prepared for communities to the north of the River Thames.

People with increased susceptibility to health issues

- 13.4.146 Plate 13.1 and Plate 13.2 show the distribution of younger and older populations across the area to the north of the River Thames. Table 13.37 summarises the age profile of residents living in wards found closest to the Project.

Table 13.37 Age – north of the River Thames

Geographical area	Age group (%)			
	<16	17–25	26–59	60+
Thurrock	24.5	9.6	47.5	18.4
Ockendon	25.0	9.2	48.3	17.5
Belhus	25.3	10.4	48.4	15.9
Orsett	18.4	8.5	44.7	28.5
Stifford Clays	21.7	10.0	42.0	26.3
Little Thurrock Rectory	20.6	8.5	47.3	23.6
Little Thurrock Blackshots	22.9	8.1	42.5	26.5

Geographical area	Age group (%)			
	<16	17–25	26–59	60+
Chadwell St Mary	25.3	9.6	42.0	23.1
Tilbury St Chads	28.8	11.2	45.3	14.7
Tilbury Riverside and Thurrock Park	31.5	10.3	44.2	14.0
East Tilbury	25.2	9.3	46.5	19.0
Aveley and Uplands	25.4	9.1	48.4	17.1
West Thurrock and South Stifford	27.8	9.8	53.9	8.5
Chafford and North Stifford	26.7	10.3	51.5	11.0
Stanford-le-Hope West	23.5	10.2	46.9	19.4
Stanford East and Corringham Town	20.4	9.8	41.5	28.4
The Homesteads	19.2	9.3	42.4	29.1
Corringham and Fobbing	17.8	8.4	40.5	33.3
Havering	21.4	10.0	45.3	23.3
Upminster	18.1	9.4	41.4	31.1
Cranham	19.7	9.2	42.1	29.1
Harold Wood	20.1	9.3	48.5	22.1
Rainham and Wennington	22.4	10.0	44.5	23.1
Gooshays	28.8	9.5	46.0	15.7
Brentwood	19.9	9.1	45.1	26.0
Warley	19.7	8.0	48.4	23.9
South Weald	19.7	9.3	44.1	26.9
Herongate, Ingrave and West Horndon	16.7	10.3	44.0	29.1
Essex	20.0	9.6	43.9	26.5
England	20.3	10.8	45.0	23.9

Source: ONS Mid-Year Population Estimates (2020b)

- 13.4.147 The data shows that the proportion of children aged under 16 within urban areas to the north of the River Thames, for example in Tilbury Riverside and Thurrock Park, and Tilbury St Chads, is higher than for other areas. In Havering, communities such as Gooshays and Rainham and Wennington have a higher proportion of children under 16 compared to Harold Wood or Upminster (28.8%, 22.4%, 20.1% and 18.1% respectively).
- 13.4.148 Within Thurrock, Brentwood and Havering, older population groups (people aged 60 and over) are typically concentrated outside of urban centres, and clustered around more rural settlements. This is shown by higher proportions of older people within the ward of Corringham and Fobbing, and Orsett in Thurrock, wards of Cranham and Upminster in Havering and the Herongate, Ingrave and West Horndon ward in Brentwood.

13.4.149 Table 13.38 shows the percentage of people aged 65 and over who are living alone, within wards located closest to the Order Limits to the north of the River Thames.

Table 13.38 Percentage of older people living alone – north of the River Thames

Geographical area	People aged 65+ and living alone (%)
England	31.5
Essex	29.9
Thurrock	31.9
Ockendon	38.0
Belhus	34.9
Orsett	19.5
Stifford Clays	35.9
Little Thurrock Rectory	36.7
Little Thurrock Blackshots	29.4
Chadwell St Mary	32.1
Tilbury St Chads	32.1
Tilbury Riverside and Thurrock Park	39.1
East Tilbury	22.2
Aveley and Uplands	38.8
West Thurrock and South Stifford	36.1
Chafford and North Stifford	23.0
Stanford-le-Hope West	34.3
Stanford East and Corringham Town	32.3
The Homesteads	19.8
Corringham and Fobbing	23.0
Haverling	31.9
Upminster	26.3
Cranham	32.1
Rainham and Wennington	30.3
Gooshays	40.4
Brentwood	29.7
Warley	29.4
South Weald	30.4
Herongate, Ingrave and West Horndon	27.5

Source: 2011 Census

- 13.4.150 Wards where there are higher proportions of older people living alone include:
- Tilbury Riverside & Thurrock Park, Aveley and Uplands, and Ockendon in Thurrock (39.1%, 38.8% and 38.0% respectively)
 - Gooshays in Havering (40.4%)
 - South Weald in Brentwood (30.4%)
- 13.4.151 Plate 13.3 shows the distribution of people from ethnic minority backgrounds across the study areas to the north and south of the River Thames. Table 13.39 shows the proportion of people from different ethnic backgrounds by local authority and ward for the study area to the north of the River Thames. It highlights that there are higher concentrations of people from ethnic minority backgrounds in and around Grays, notably within the Chafford Hundred area. Within Havering, there is increased ethnic diversity in and around the Romford town centre area.
- 13.4.152 Within Thurrock, the wards of Stanford East and Corringham Town, The Homesteads and Corringham and Fobbing have significantly higher proportions of white residents compared to the England average. The Chafford and North Stifford ward has one of the highest proportions of BAME residents (26%). Within Havering, the wards of Upminster and Cranham have particularly high proportions of white residents when compared to the England average. The ward of Rainham and Wennington has a higher proportion of people from black ethnic backgrounds. The wards within Brentwood have lower proportions of people from ethnic minority backgrounds compared to the England average.

Table 13.39 Ethnicity – north of the River Thames

Geographical area	Ethnicity (%)				
	White	Mixed	Asian	Black	Other
Thurrock	85.9	2.0	3.8	7.8	0.6
Ockendon	88.6	1.7	2.4	6.9	0.3
Belhus	85.4	2.1	2.4	9.6	0.5
Orsett	94.6	1.7	1.8	1.4	0.5
Stifford Clays	91.3	1.2	4.0	3.2	0.3
Little Thurrock Rectory	87.4	2.3	5.0	4.7	0.5
Little Thurrock Blackshots	92.3	1.0	3.8	2.4	0.5
Chadwell St Mary	89.7	1.9	1.3	6.9	0.2
Tilbury St Chads	84.3	1.3	1.9	12.1	0.3
Tilbury Riverside and Thurrock Park	82.3	1.5	1.8	13.9	0.5
East Tilbury	94.6	1.2	0.7	3.3	0.2
Aveley and Uplands	89.3	2.1	1.3	6.8	0.5

Geographical area	Ethnicity (%)				
	White	Mixed	Asian	Black	Other
West Thurrock and South Stifford	75.0	2.8	4.9	16.6	0.7
Chafford and North Stifford	74.0	3.4	7.5	13.7	1.4
Stanford-le-Hope West	94.2	1.3	2.5	1.7	0.3
Stanford East and Corringham Town	95.7	1.3	0.7	1.9	0.3
The Homesteads	95.5	1.1	1.5	1.8	0.2
Corringham and Fobbing	97.5	0.9	0.7	0.7	0.2
Havering	87.7	2.1	4.9	4.8	0.6
Upminster	95.2	1.3	2.3	1.0	0.3
Cranham	94.4	1.5	2.8	1.0	0.4
Harold Wood	89.9	1.7	4.0	3.8	0.5
Rainham and Wennington	84.3	2.6	4.9	7.6	0.6
Gooshays	87.2	2.3	2.7	7.4	0.4
Brentwood	93.6	1.6	3.2	1.2	0.4
Warley	90.7	2.1	4.9	1.8	0.5
South Weald	91.6	1.9	4.4	2.0	0.2
Herongate, Ingrave and West Horndon	96.4	1.6	1.3	0.2	0.4
Essex	94.3	1.5	2.5	1.3	0.4
England	85.4	2.3	7.8	3.5	1.0

Source: 2011 Census

Pre-existing health issues

13.4.153 Pre-existing health issues considered within this section include respiratory disease and COPD. Data from the Office for Health Improvement and Disparities (2021b) relates to emergency hospital admissions for COPD and deaths from respiratory disease at ward level. Table 13.40 highlights variations in emergency hospital admissions for COPD for wards located closest to the Project.

Table 13.40 Emergency hospital admissions for COPD by ward 2016-2020 – north of the River Thames

Geographical area	Emergency hospital admissions for Chronic Obstructive Pulmonary Disease (COPD), Standardised Admission Ratio
Thurrock	123.5
Ockendon	127.4
Belhus	187.4
Orsett	67.9
Stifford Clays	149.3
Little Thurrock Rectory	94.0
Little Thurrock Blackshots	82.0
Chadwell St Mary	180.5
Tilbury St Chads	220.4
Tilbury Riverside and Thurrock Park	203.6
East Tilbury	90.2
Aveley and Uplands	151.2
West Thurrock and South Stifford	116.10
Chafford and North Stifford	29.4
Stanford-le-Hope West	147.8
Stanford East and Corringham Town	158.3
The Homesteads	57.9
Corringham and Fobbing	88.3
Havering	99.0
Upminster	38.0
Cranham	69.9
Harold Wood	127.2
Rainham and Wennington	88.8
Gooshays	225.3
Brentwood	57.9
Warley	49.2
South Weald	60.3
Herongate, Ingrave and West Horndon	93.1
Essex	84.6
England	100.0

Source: Office for Health Improvement and Disparities (2021b)

13.4.154 Table 13.41 summarises data for the former CCGs to the north of the River Thames. For the Thurrock CCG and Basildon and Brentwood CCG, trend data suggests that the prevalence of asthma is decreasing; for the Havering CCG, trend data suggests no significant change.

Table 13.41 Lung conditions – CCGs to the north of the River Thames

Lung conditions	NHS Thurrock CCG	NHS North East London CCG	NHS Basildon and Brentwood CCG	England
Emergency hospital admissions for asthma in adults (aged 19 and over) (directly standardised rate per 100,000)	28.4	43.4	31.3	44.4
Hospital admissions for asthma (under 19 years) (crude rate per 100,000)	85.7	89.2	84.6	73.1
6.4%Asthma QOF prevalence (6+ years) (%)	5.6%	4.8%	6.2%	6.4%
Emergency hospital admissions for COPD (all ages)	149.8	120.7	112.2	133.5

Source: *Inhale – Interactive Health Atlas of Lung Conditions in England (Office for Health Improvement and Disparities, 2021b)*

Deaths from respiratory diseases

13.4.155 Table 13.42 shows deaths from respiratory disease (all ages) across wards to the north of the River Thames (Office for Health Improvement and Disparities, 2021a). West Thurrock and South Stifford, Tilbury St Chads, Aveley and Uplands, and Belhus wards are shown to be performing significantly worse than England as a whole.

Table 13.42 Deaths from respiratory diseases 2016-2020 – north of the River Thames

Geographical area	Deaths from respiratory diseases, all ages, all persons (SMR)
Thurrock	119.0
Ockendon	139.2
Belhus	154.5
Orsett	92.6
Stifford Clays	132.9
Little Thurrock Rectory	118.0
Little Thurrock Blackshots	107.6
Chadwell St Mary	120.2
Tilbury St Chads	187.6
Tilbury Riverside and Thurrock Park	111.0

Geographical area	Deaths from respiratory diseases, all ages, all persons (SMR)
East Tilbury	110.5
Aveley and Uplands	160.4
West Thurrock and South Stifford	150.2
Chafford and North Stifford	88.9
Stanford-le-Hope West	125.1
Stanford East and Corringham Town	112.3
The Homesteads	58.8
Corringham and Fobbing	80.3
Haverling	104.6
Upminster	82.8
Cranham	78.4
Harold Wood	104.8
Rainham and Wennington	128.5
Gooshays	134.4
Brentwood	85.4
Warley	85.8
South Weald	63.1
Herongate, Ingrave and West Horndon	93.6
Essex	98.3
England	100.0

Source: Office for Health Improvement and Disparities (2021a)

Long-term illness or disability

13.4.156 Plate 13.4 shows distributions of people with some limited day-to-day activity against the average for England and Wales, using 2011 Census data. Table 13.43 shows the proportion of residents who suffer from a long-term health problem or disability that limits their day-to-day activities. Several wards within Thurrock have high proportions of residents falling into the ‘limited a lot’ and ‘limited a little’ categories – for example, the wards of Chadwell St Mary, Stanford East and Corringham Town, and Stifford Clays have 21.9%, 21.4% and 20.4% of residents in these two categories combined, compared to 15.5% for Thurrock as a whole. The Herongate, Ingrave and West Horndon ward in Brentwood has a combined proportion of 18.1% of residents in these two categories, compared to 15.6% for the local authority. Within Haverling, Gooshays ward (19.9%) has a higher proportion of residents who report having a limiting long-term illness or disability compared to Rainham & Wennington and Upminster (16.5% and 16.3% respectively).

Table 13.43 Percentage of people who reported having a long-term illness or disability – north of the River Thames

Geographic area	Day-to-day activities limited a lot (%)	Day-to-day activities limited a little (%)	Day-to-day activities not limited (%)
Thurrock	7.2	8.3	84.4
Ockendon	9.1	9.0	81.9
Belhus	9.3	9.6	81.1
Orsett	6.8	7.5	85.8
Stifford Clays	9.9	10.5	79.6
Little Thurrock Rectory	6.4	8.4	85.2
Little Thurrock Blackshots	8.1	10.4	81.6
Chadwell St Mary	10.9	11.0	78.1
Tilbury St Chads	8.8	9.6	81.6
Tilbury Riverside and Thurrock Park	7.6	8.1	84.3
East Tilbury	6.2	7.7	86.2
Aveley and Uplands	8.5	9.4	82.1
West Thurrock and South Stifford	4.9	6.2	88.8
Chafford and North Stifford	2.9	4.2	92.8
Stanford-le-Hope West	7.4	9.0	83.5
Stanford East and Corringham Town	10.4	11.0	78.6
The Homesteads	5.2	7.9	87.0
Corringham and Fobbing	7.4	9.9	82.6
Havering	8.2	9.1	82.7
Upminster	7.2	9.1	83.7
Cranham	7.6	9.7	82.7
Rainham and Wennington	7.9	8.6	83.5
Harold Wood	8.4	9.5	82.0
Gooshays	10.4	9.5	80.1
Brentwood	6.8	8.7	84.4
Warley	6.9	9.5	83.6
Herongate, Ingrave and West Horndon	9.1	9.0	81.9

Geographic area	Day-to-day activities limited a lot (%)	Day-to-day activities limited a little (%)	Day-to-day activities not limited (%)
South Weald	4.8	8.0	87.1
Essex	7.4	9.4	82.9
England	8.3	9.3	82.4

Source: Census 2011

General health

13.4.157 Table 13.44 shows self-reported health status for wards closest to the Project. The table shows that overall, Brentwood has the highest proportion of residents who report that they have ‘very good health’, higher than the England average. The proportion of residents reporting bad or very bad health is lower than or equivalent to the average for England in Thurrock and Brentwood. Wards within Thurrock that experience a high proportion of residents reporting bad or very bad levels of health include Chadwell St Mary (7.4%), Tilbury St Chads (6.7%), Belhus and Ockendon (both 6.5%), compared to the overall figure for Thurrock of 4.7%.

Table 13.44 Health status – north of the River Thames

Geographical area	Very good health (%)	Good health (%)	Fair health (%)	Bad health (%)	Very bad health (%)
Thurrock	48.2	34.7	12.3	3.7	1.0
Ockendon	45.5	34.3	13.6	4.9	1.6
Belhus	45.9	33.8	13.8	4.8	1.7
Orsett	51.2	33.3	11.5	3.0	1.0
Stifford Clays	43.9	35.3	14.8	4.6	1.4
Little Thurrock Rectory	49.8	34.2	12.1	3.1	0.9
Little Thurrock Blackshots	45.2	36.8	13.4	3.5	1.1
Chadwell St Mary	42.0	34.6	16.0	5.8	1.6
Tilbury St Chads	44.9	34.7	13.6	5.3	1.4
Tilbury Riverside and Thurrock Park	47.4	34.3	12.8	4.5	1.0
East Tilbury	45.9	38.0	11.9	3.3	0.9
Aveley and Uplands	45.6	34.5	14.3	4.6	1.0
West Thurrock and South Stifford	50.5	35.5	10.5	2.9	0.6
Chafford and North Stifford	60.1	31.7	6.3	1.4	0.5
Stanford-le-Hope West	47.0	35.8	12.8	3.5	1.0
Stanford East and Corringham Town	41.7	35.7	16.3	4.9	1.3
The Homesteads	48.9	37.3	10.6	2.6	0.6
Corringham and Fobbing	45.7	36.5	13.5	3.3	1.0

Geographical area	Very good health (%)	Good health (%)	Fair health (%)	Bad health (%)	Very bad health (%)
Havering	46.0	35.6	13.3	4.0	1.2
Upminster	49.0	34.2	12.7	3.0	1.1
Cranham	47.5	34.6	13.0	3.8	1.0
Rainham and Wennington	44.9	36.4	13.5	4.0	1.2
Harold Wood	45.5	35.6	13.3	4.4	1.2
Gooshays	42.3	35.4	15.2	5.5	1.6
Brentwood	51.0	33.3	11.6	3.1	0.9
Warley	48.9	34.1	13.3	2.9	0.9
Herongate, Ingrave and West Horndon	49.0	34.2	12.7	3.0	1.1
South Weald	53.2	33.2	10.9	2.2	0.5
Essex	47.1	34.9	13.1	3.7	1.1
England	47.2	34.2	13.1	4.2	1.2

Source: 2011 Census

Life expectancy

13.4.158 Life expectancy within local authorities to the north of the River Thames is broadly similar to that for England as a whole. For males, life expectancy is 81.2 years (Brentwood), 80.0 years (Havering) and 79.2 years (Thurrock), compared to 79.2 years for England as a whole. For females, average life expectancy is 84.6 years (Brentwood), 84.1 years (Havering) and 82.5 years (Thurrock) compared to 83.2 years for England.

Table 13.45 Life expectancy at birth 2016-2020 – north of the River Thames

Geographical area	Life expectancy at birth (male)	Life expectancy at birth (female)
Thurrock	78.6	82.4
Ockendon	77.8	81.8
Belhus	75.6	80.7
Orsett	80.5	82.6
Stifford Clays	79.7	83.2
Little Thurrock Rectory	80.7	84.6
Little Thurrock Blackshots	80.4	85.4
Chadwell St Mary	77.3	82.0
Tilbury St Chads	76.1	80.8
Tilbury Riverside and Thurrock Park	74.1	80.8
East Tilbury	79.3	82.0

Geographical area	Life expectancy at birth (male)	Life expectancy at birth (female)
Aveley and Uplands	78.0	82.0
West Thurrock and South Stifford	75.5	81.3
Chafford and North Stifford	*	82.5
Stanford-le-Hope West	79.1	82.6
Stanford East and Corringham Town	77.4	81.8
The Homesteads	83.4	86.4
Corringham and Fobbing	82.4	86.0
Havering	79.5	83.7
Upminster	80.2	85.2
Cranham	83.0	87.2
Harold Wood	80.3	84.7
Rainham and Wennington	79.7	83.1
Gooshays	76.9	80.5
Brentwood	81.0	84.6
Warley	78.9	83.8
Herongate, Ingrave and West Horndon	82.9	81.7
South Weald	*	*
Essex	80.2	83.5
England	79.5	83.2

Deprivation

- 13.4.159 Plate 13.5 and Plate 13.6 show deprivation by income and health domains, with Plate 13.7 showing results of the IMD. The area to the north of the River Thames includes areas that fall into the most and least deprived quintiles – for example, Upminster is largely in the least deprived quintiles, as are areas to the east of Romford and much of Brentwood; the areas closer to the River Thames, such as Grays, show a higher proportion falling into the most deprived quintile.
- 13.4.160 Little has changed in Tilbury between IMD releases in 2015 and 2019, with the IMD information showing communities generally in the lowest quintile. However, the living environment domain has increased, indicating that the quality of the local environment has improved. Grays has seen an improvement over time, driven by improvements in education, the living environment and a significant reduction in crime. Employment, health and housing have all deteriorated slightly.

Sensitivity assessment by ward

- 13.4.161 The sensitivity of communities has been assessed in line with DMRB LA 112 (Highways England, 2020b) as high, medium or low, according to supporting evidence. A series of indicators has been reviewed for wards located within 1km of the Project, namely:
- a. Percentage of community with increased susceptibility to health issues (people aged 60+)
 - b. Percentage of children (aged <16 years)
 - c. Emergency hospital admissions for Chronic Obstructive Pulmonary Disease (COPD) standardised admission ratio – 2015/16 to 2019/20 indirectly standardised ratio per 100 (standardised admission ratio is a summary of admission rates relative to the national pattern of admissions and taking into account differences in population characteristics (for example age, sex, socio-economic deprivation))
 - d. Deaths from respiratory diseases
 - e. Percentage of people who reported having a limited long-term illness or disability (2011)
 - f. General health – percentage of residents who report ‘bad health’ or ‘very bad health’
 - g. Life expectancy – male
 - h. Life expectancy – female
 - i. Income deprivation
- 13.4.162 For each indicator, data has been compared against that for England as a whole and categorised according to whether the ward is performing ‘better than England’ (coloured green), ‘similar to England’ (coloured orange) or ‘worse than England’ (coloured red). This information is presented in Appendix 13.2: Ward Sensitivities.
- 13.4.163 The sensitivity of individual wards has been identified as high, medium or low based on professional judgement as follows:
- a. High sensitivity – wards where more than two datasets are categorised as being ‘worse than England’
 - b. Medium sensitivity – wards where up to two datasets are categorised as being ‘worse than England’
 - c. Low sensitivity – wards where all datasets are either ‘similar to England’ or ‘better than England’.

13.4.164 Table 13.46 summarises the sensitivity of individual wards based on the above approach.

Table 13.46 Assessment of sensitivity by ward

South of the River Thames			
Ward	Sensitivity	Ward	Sensitivity
Gravesham			
Riverside	High	Singlewell	High
Riverview	Medium	Woodlands	Medium
Higham	Medium	Northfleet South	Medium
Chalk	Medium	Istead Rise	Medium
Westcourt	High	Painters Ash	High
Shorne, Cobham & Luddesdown	Medium	Central	Medium
Coldharbour	High		
Dartford			
Newtown	High	Bridge	High
Stone Castle	High	Temple Hill	High
Stone House	High	Longfield, New Barn and Southfleet	Medium
Medway			
Cuxton and Halling	Low	Strood North	Low
Strood South	High	Strood Rural	Medium
Tonbridge and Malling			
Snodland East	High		
North of the River Thames			
Thurrock			
Ockendon	High	Tilbury St Chads	High
Belhus	High	Chadwell St Mary	High
Orsett	Medium	East Tilbury	Medium
Stifford Clays	High	Aveley and Uplands	High
Little Thurrock Rectory	Low	West Thurrock and South Stifford	High
Little Thurrock Blackshots	High	Chafford and North Stifford	Medium
Tilbury Riverside and Thurrock Park	High	Stanford-le-Hope West	Medium

Stanford East and Corringham Town	High	The Homesteads	Low
Corringham and Fobbing	Low		
North of the River Thames			
Brentwood			
Warley	Low	South Weald	High
Herongate, Ingrave and West Horndon	Medium		
Havering			
Upminster	Medium	Harold Wood	Medium
Cranham	Medium	Rainham and Wennington	Low
Gooshays	High		

Future baseline ('Without Scheme' scenario)

- 13.4.165 The future baseline identifies anticipated changes to the existing baseline over time in the absence of the Project and is used as a basis against which to predict the potential impacts of the Project. A description of how the future baseline has been considered within the assessment is provided in Chapter 4: EIA methodology.
- 13.4.166 The future baseline has been predicted for population, housing and employment using regional and borough level population forecasts (ONS, 2020a), and housing and employment growth projections (East of England Forecasting Model (Cambridgeshire Insight, 2019) and the London Datastore (London Datastore, 2017 and 2020).
- 13.4.167 ONS datasets show projected population increases between 2018 and 2043. Table 13.47 shows projections for each local authority area within the study area, as well as for London and England.

Table 13.47 Population projections by area

Area	2018	2043	Percentage growth (-/+)
Gravesham	106,385	111,743	+5.05%
Medway	277,855	292,918	+5.42%
Dartford	109,709	141,502	+28.98%
Tonbridge and Malling	130,508	154,347	+18.27%
Havering	257,810	295,195	+14.50%
Thurrock	172,525	205,470	+19.10%
Brentwood	76,550	78,573	+2.64%
Kent	1,568,623	1,812,170	+15.53%
Essex	1,477,764	1,667,768	+12.86%

Area	2018	2043	Percentage growth (-/+)
London	8,908,081	9,814,027	+10.17%
England	55,977,178	61,744,098	+10.30%

Source: ONS Population Projections, 2020a

13.4.168 Analysis shows that the number of people aged 65 and over would be expected to increase. In 2018, the proportion of residents aged 65 and over across the combined local authority areas of Gravesham, Medway, Dartford, Tonbridge and Malling, Thurrock, Havering and Brentwood made up 16.7% of the total population; this is forecast to rise to 20.3% by 2043. This change is reflective of wider society and ageing populations – for England as a whole, the change is predicted to be from 18.2% to 23.9% between 2018 and 2043.

13.4.169 ONS household projections forecast the increase in households, by region and local authority, between mid-2018 and mid-2043, as shown in Table 13.48.

Table 13.48 Household projections by area

Area	2018	2043	Percentage change (-/+)
Gravesham	42,255	46,301	+9.58%
Medway	111,737	122,493	+9.63%
Dartford	44,470	59,494	+33.78%
Tonbridge and Malling	52,178	65,306	+25.16%
Havering	103,482	123,456	+19.30%
Thurrock	66,148	82,484	+24.70%
Brentwood	31,509	33,340	+5.81%
Kent	651,716	800,723	+22.86%
Essex	614,034	722,344	+17.64%
England	23,204,246	26,953,266	+16.16%

Source: ONS Household Projections (2020a)

13.4.170 The six local authorities of Brentwood, Basildon, Castle Point, Rochford, Southend and Thurrock have embarked on a process to deliver long-term growth for their combined area, setting out how growth and development will be distributed across the sub-region; this has been described as ‘The South Essex 2050 Ambition’. In January 2018 the local authorities formed ASELA, with the South Essex 2050 Ambition being taken forward through a Joint Strategic Plan (the South Essex Plan). The current estimated need for housing across South Essex is 90,000 dwellings over the next 20 years, although this could be increased if the right conditions to support growth are achieved (ASELA, 2019).

13.4.171 The Issues and Options Consultation prepared by Thurrock Council in 2018 as part of their emerging Local Plan (Thurrock Council, 2018b) refers to a need for 22,287 new homes between 2018 and 2037.

- 13.4.172 Other changes to the future baseline are expected to arise from the population growth described in Table 13.47. These include growth in the number of vehicle trips, public transport network users and the number of trips being made by other modes of transport, such as walking and cycling. With increasing demand for travel, it is likely that levels of congestion on the road network would increase (further reducing journey time reliability). There is also likely to be a need for more social infrastructure to accommodate the larger populations, for example education, healthcare and leisure facilities.
- 13.4.173 Economic forecasts are available using information from the East of England Forecasting Model (Cambridgeshire Insight, 2019), and the London Datastore (London Datastore, 2017 and 2020). Data have been provided for the wider South East Local Enterprise Partnership (SELEP) region, presented in Table 13.49. The table shows that, between 2019 and 2045, the economy of the SELEP area is expected to significantly grow and change. For example, the forecast shows that there is projected to be a 17.9% increase in people in employment across the region and a 14.7% increase in total employment.

Table 13.49 East of England forecasting model (SELEP region) – 2017 baseline results

	2019	2045	Percentage change
Employees in employment (000s)	1,643.3	1,938.1	17.9%
Self-employed (000s)	321.7	318.6	-1.0%
Total employment: jobs (000s)	1,971.4	2,262.0	14.7%
Total workplace employed people (000s)	1,859.2	2,109.4	13.5%

Source: Cambridgeshire Insight, 2019

- 13.4.174 As Havering is not part of the SELEP region, data for the borough is presented separately in Table 13.50. The table sets out total borough employment projections for Havering taken from the London Datastore, which show that between 2016 and 2050 employment is forecast to grow by 12%.

Table 13.50 Havering employment forecasts

	2016	2050	Percentage change
Total employment: jobs (Havering)	92,000	103,000	12%

Source: Borough Employment Projections, London Datastore 2017

Agricultural land holdings

- 13.4.175 The future baseline in relation to agricultural land use is not considered likely to change materially from the baseline already described.

13.5 Project design and mitigation

- 13.5.1 Environmental considerations have influenced the Project throughout the design development process, from early route options assessment through to refinement of the Project design. An iterative process has facilitated design updates and improvements, informed by environmental assessment and input from the Project engineering teams, stakeholders and public consultation.

- 13.5.2 The Project as applied for includes a range of environmental commitments. Commitments of relevance to population and human health are set out in this section under the following categories:
- a. Embedded mitigation: measures that form part of the engineering design, developed through the iterative design process summarised above.
 - b. Good practice: standard approaches and actions commonly used on infrastructure development projects to avoid or reduce environmental impacts, typically applicable across the whole Project.
 - c. Essential mitigation: any additional Project-specific measures needed to avoid, reduce or offset potential impacts that could otherwise result in effects considered significant in the context of the EIA Regulations. Essential mitigation has been identified by environmental topic specialists, taking into account the embedded and good practice mitigation.
- 13.5.3 Embedded mitigation is included within the Design Principles (Application Document 7.5) or as features presented on Figure 2.4: Environmental Masterplan (Application Document 6.2). Design Principles relevant to mitigation of effects on population and human health are described below, each with an alpha-numerical reference code (e.g. LSP.XX). Good practice and essential mitigation are included in the Register of Environmental Actions and Commitments (REAC). The REAC forms part of Appendix 2.2 the Code of Construction Practice (CoCP) (Application Document 6.3). Each entry in the REAC has an alpha-numerical reference code (e.g. REAC Ref. PH00X) to provide cross-reference to the secured commitment. Relevant good practice and essential mitigation to reduce population and human health effects are identified below.
- 13.5.4 The Design Principles, Environmental Masterplan, CoCP and REAC all form part of the Project control plan. The control plan is the framework for mitigating, monitoring and controlling the effects of the Project. It is made up of a series of 'control documents' which present the mitigation measures identified in the application that must be implemented during design, construction and operation to reduce the adverse effects of the Project. Further explanation of the control plan and the documents which it comprises is provided in the Introduction to the Application (Application Document 1.3).
- 13.5.5 Enhancement measures have been directly incorporated into the Project as part of the application of 'good design' principles. Enhancements are measures that are considered to be over and above any measures to avoid, reduce or remediate adverse impacts of the Project. Relevant beneficial effects arising as a consequence of this good design process are provided in Section 13.6.

Embedded mitigation

Construction phase

- 13.5.6 Construction phase embedded mitigation of relevance to population and human health is described below:
- a. The Order Limits have been drawn as tightly as possible so as to minimise the amount of land required to construct and operate the Project. Where temporary use is required the Project will only take this land for the period it is required and hand this back to the landowner at the earliest opportunity (Statement of Reasons, Application Document 4.1).
 - b. Reinstatement of land utilised during construction to its original use as far as technically practicable in consultation with the landowner where required, as referenced in Clause LSP.05 of the Design Principles (Application Document 7.5)
 - c. Both locally and nationally significant utilities infrastructure would be affected by the Project, including the existing road network, railway lines and multiple utility assets. The interaction with these assets has been considered as the design has been developed, seeking to reduce impacts where necessary. Modifications to energy infrastructure include four electricity transmission overhead line alignments and three distribution overhead line alignments (one of which is determined as an NSIP) and ten high pressure gas pipeline works (three of which are currently determined as NSIPs). Utilities works and main construction works would be ongoing simultaneously.
 - d. Local operating parameters during construction include that, for temporary closures, restrictions, and alterations of streets, there must be reasonable access for pedestrians going to or from premises abutting a street, or private means of access if there would otherwise be no such access. Where access to a property would be significantly affected as a result of the Project, an alternative means of access would be provided where practicable as set out in the Outline Traffic Management Plan for Construction (oTMPfC) (Application Document 7.14).
 - e. Consultation with relevant landowners, occupiers and agents remains an ongoing focus through the development of the Project. Compensation for affected parties follows the Compensation Code as set out in the Statement of Reasons (Application Document 4.1).
 - f. The oTMPfC (Application Document 7.14) states that the Traffic Management Plan for Construction (TMP) would minimise the number of traffic management changes and the closures and use of diversion routes during construction.

- g. Embedded mitigation relating specifically to WCH routes during construction includes:
- i. Design Principle S1.05 relates specifically to NCR 177. To improve the user experience, maintain east-west connectivity as both a recreational and commuter route for cyclists, and avoid the requirement for crossings through the new junction, NCR 177 would be permanently realigned south of the A2 carriageway. Connections across HS1 and the A2 carriageway between recreational areas north and south would be made at the East Gravesend, and at Thong Lane, Brewers Road and Park Pale bridges. The realigned route would be surfaced to maintain the rural character of the setting while providing a robust enough surface for frequent cycle use. During construction, the NCR177 would be temporarily diverted through Ashenbank Wood and Jeskyns Community Woodland. Existing tracks shall be temporarily resurfaced appropriate for road (cycle) use. The surface through Ashenbank Wood would be removed once the permanent route is complete, and the quality of the existing track shall be restored.
 - ii. Design Principle S3.13 relates to NG7. To maintain an inclusive and naturalistic route for the user and avoid unnecessary structures, a recreational loop that connects Gravesend with Shorne Woods Country Park shall be created for NG7. This would be re-routed north around the South Portal and would link to routes going further south at Thong Lane green bridge north. The recreational loop would cross the Project access road north of the portal structure, but access across the road shall be maintained at all times.
- h. Other embedded mitigation during construction of relevance to population and human health relates to measures to mitigate noise, air quality and visual impacts. These measures are described in Section 12.5 of Chapter 12: Noise and Vibration, Section 5.5 of Chapter 5: Air Quality, and Section 7.5 of Chapter 7: Landscape and Visual.

Operational phase

- 13.5.7 Operational phase embedded mitigation of relevance to population and human health is described below.
- 13.5.8 The Applicant has worked with local authorities to identify replacement land, or land which could mitigate the impacts identified for areas of temporary and permanent land required affecting public open space (Design Principles Application Document 7.5).
- 13.5.9 Replacement land would be equal to or greater in size than the land required for the Project and similar in terms of quality and accessibility. Replacement land is identified on Figure 2.4: Environmental Masterplan (Application Document 6.2). Further information on replacement land is provided within the Statement of Reasons (Application Document 4.1) and the Planning Statement (Application Document 7.2). A summary of sites for which replacement land, or land to mitigate impacts, has been identified is given in Table 13.51.

Table 13.51 Summary of replacement land/land to mitigate impacts identified

Site name	Area of land to be acquired/land in which permanent rights are sought	Area of land re-provided
South of the River Thames		
Claylane Woods	2.7ha (permanently acquired) 4.82ha (over which rights are permanently acquired)	8ha
Folkes Lane Wood	0.3ha (permanently acquired) 1.48ha (over which rights are permanently acquired)	2.92ha
Shorne Woods Country Park	0.44ha (permanently acquired) 1.06ha (over which rights are permanently acquired)	1.91ha
North of the River Thames		
Ron Evans Memorial Field	7.52ha (permanently acquired) 0.75ha (over which rights are permanently acquired)	9.21ha
Thames Chase Forest Centre	10.14ha (permanently acquired) 3.02ha (over which rights are permanently acquired)	15.61ha
Orsett Fen	52.31ha (permanently acquired)	61.97ha
Tilbury Green	1.25ha (permanently acquired)	1.28ha

- 13.5.10 A replacement recreational area shall be provided adjacent to Cascades Leisure Centre and shall be developed in coordination with Gravesham Borough Council (Design Principle S3.17 (Application Document 7.5) and will mitigate impacts on the Gravesend Golf Centre.
- 13.5.11 Land has been incorporated into the Project design to replace the Gammonfields Way travellers' site, which would be impacted by permanent land acquisition. The replacement site is shown on Figure 2.4: Environmental Masterplan (Application Document 6.2). The site would remain approximately 1.5ha in size, with an additional 1.5ha set aside for appropriate landscaping and access (Design Principle S11.12 Gammonfields Way Travellers' Site (Application Document 7.5)).
- 13.5.12 The Project design includes the creation of green bridges at the following locations: Brewers Road, North Road, Muckingford Road, Hoford Road, Green Lane and Thong Lane (one over the A122 and one over the A2). The purpose of the green bridges would be to maintain and enhance connectivity for WCH, to create habitat corridors and to allow for a better and more pleasant environment for those using, crossing and living near the Project (Design Principle STR.08 (Application Document 7.5)).
- 13.5.13 Where the Project affects existing PRowS, these would be reinstated with provision of under- or overbridges, or a suitable alternative provision would be made. The Project proposes a number of new, diverted, upgraded and

reinstated routes for walkers, cyclists and horse riders as described in Part E of the Project Design Report (Application Document 7.4). Consideration has been given to repairing existing PRoW severance, in addition to maintaining and, where practicable, improving existing access.

- 13.5.14 Project-wide design principles PEO.01 to PEO.04 and PEO.06 relate to design of WCH routes to facilitate user experience, as follows:
- a. PEO.01 – all PRoWs crossing the Project route shall have a detailed design that is safe and considers the convenience of the users and appropriateness to the context of the adjacent landscape character, with changes in level minimised
 - b. PEO.02 – in order to allow users to recognise and appreciate their whereabouts, WCH routes across and adjacent the Project within the Order Limits shall include appropriate clear and informative signage to provide wayfinding for the users
 - c. PEO.03 – surfacing, signage, boundary treatments and access controls shall be designed with the intent of being efficient and integrated, appropriate to the type of usage permitted and appropriate to its surrounding context as much as is reasonably practicable
 - d. PEO.04 – WCH routes shall be designed in accordance with listed standards and guidance, including relevant DMRB, Sustrans (Local Transport Note 1/20 Cycle infrastructure design (Department for Transport, 2020)) and British Horse Society guidance.
 - e. PEO.06 – improve access to the existing PRoW network and for travel and outdoor recreation, considering the use of robust design elements to prevent and mitigate the potential for misuse of the WCH network by unauthorised vehicles and to prevent and deter anti-social behaviour and unauthorised access to third-party land.
- 13.5.15 Embedded mitigation relating specifically to WCH routes affected by the Project are summarised in Table 13.52, together with the relevant Design Principle to which they relate.

Table 13.52 Embedded mitigation (operation) – WCH routes

Design Principle	Embedded mitigation – WCH routes
S2.02	Looping walks connecting recreational areas – in order to restore PRoWs severed by the Project and to create an enhanced user experience, PRoWs NS167 and NS169 shall be integrated into the new looping WCH route connecting around the A2 junction. Between Claylane Wood and Shorne Woods Country Park, this shall be via the Thong Lane green bridge north. NS167 shall not cross the junction.
S9.17	Diversion of FP200 – the existing alignment of FP200 is through common land and the realigned route shall be through replacement common land. The quality of the route shall not be inferior to the existing route, and

Design Principle	Embedded mitigation – WCH routes
	areas of tree planting will screen this route from the road. The area of common land will not be diminished.
S12.04	BR219: Mardyke Trail – to minimise the impact on users of BR219 and retain the open views across the fen, the viaduct shall be designed to seek to maximise space and clearance underneath.
S14.04	Thames Chase WCH bridge - to create a connected network of links and accessible vibrant green spaces, the Project shall connect the Thames Chase Community Forest across the M25 with a new WCH bridge.

- 13.5.16 The Project seeks to generate a positive legacy of green infrastructure, and the design proposal includes provision of a recreational landscape for north-eastern Gravesend and Chalk, currently an area of limited public open space provision. Design Principle S3.04 (Application Document 7.5) secures the provision of a new recreational landscape (named as Chalk Park), which would both provide open space of over 35ha and create a desirable separation between the South Portal and the edge of Gravesend. A wooded hilltop would be provided in a manner characteristic of the setting of nearby settlements at Thong and Shorne to soften the exposed urban edge of Gravesend, as defined in the Environmental Masterplan (Application Document 6.2, Figure 2.4).
- 13.5.17 Design Principle S9.02 describes the creation of a new public park, known as Tilbury Fields, at Goshems Farm. The park would be over 35 hectares in size, be designed with elevated areas to create vistas (above the surrounding landfill) across the Thames Estuary and guide views to features such as Tilbury Fort, Cliffe Fort and Coalhouse Fort that reflect the military history of the Thames. The new park would be publicly accessible, via the Two Forts Way in the south and from FP200 in the north. It would incorporate accessible permissive routes through the landforms and allow users to reach the elevated areas.
- 13.5.18 Other embedded mitigation of relevance to the operation stage includes the following:
- a. Design principle S14.14 relates to the provision of dense shrub planting at Hobb’s Hole to prevent members of the public approaching this private fishing lake.
 - b. Design principle S14.19 relates to the design of proposed temporary construction and permanent maintenance access for the Project from the western side of the B186, opposite Upminster Trading Park, to the M25 structure over the railway and drainage pond so as to connect to the proposed Brentwood Enterprise Park B186 access, subject to specified conditions.
 - c. Design principle S14.22 allows for the delivery of an alternative WCH solution relating to the A127 East WCH bridge should the BEP proposals be developed.

Good practice mitigation

Construction phase

13.5.19 Construction phase good practice of relevance to the population and human health topic is set out in Table 13.53.

Table 13.53 Population and human health – construction phase good practice measures

Mitigation measure	CoCP/REAC reference
Procedures for the management of soil resources during construction	GS009 to GS010
Procedures relating to soil reinstatement and aftercare	GS011 to GS014
The Contractors would have in place an agricultural liaison officer or named deputy who shall be contactable by telephone 24 hours a day, seven days a week during construction activities on agricultural land	GS015
Site-specific security risk assessments carried out by the Contractors will determine the type of perimeter fencing or hoarding to be installed. This will be compliant with DCO Schedule 2, Part 1, Requirement 12, which references the Manual of Contracts Documents for Highways Works. The form of fencing and hoarding will be fit for purpose, taking into consideration the location, construction activities and surrounding landscape.	Paragraph 6.7.3 of the CoCP
Invasive species would be identified prior to construction and would be removed or treated to prevent their spread, following the Construction Industry Research and Information Association's guidance in Wade et al. (Invasive Species Management for Infrastructure Managers and the Construction Industry, 2008).	TB005
In the event of a disease outbreak, advice and guidance from Defra would be followed to minimise biosecurity risk associated with works continuation.	N/A
Consideration of the location of construction compound facilities greater than 6m in height to maximise distance from residential properties at compounds including Marling Cross, A2 compound, Southern Tunnel Entrance compound, A226 Gravesend Road, Station Road, Brentwood Road, Stifford Clays Road, Mardyke compound, M25 compound, Ockendon Road and Warley Street compound.	LV006, LV007, LV010, LV012, LV016, LV018, LV019, LV020, LV022, LV025, LV027
Construction works would be planned to reduce the durations that footpaths, cycleways and bridleways would need to be closed. For such PRow, identified in ES Tables 13.66 and 13.69 the following mitigation measures would be adopted: a) Early engagement with members of the public and relevant stakeholders (for example, local walking groups), to ensure they are fully appraised of any closures and diversions as far in advance as reasonably practicable. b) Clear and concise signposting would be used to clearly outline any temporary diversions as and when they are necessary. This would be carried out in consultation with the local highways	PH001

Mitigation measure	CoCP/REAC reference
authorities, PRow officers and other relevant stakeholders. c) Social media would be used to update members of the public of any closures and diversions that are in place	
Proposals for engagement and communications with stakeholders, local authorities, local residents and communities are described in the CoCP. This includes proposals for a community helpline and the establishment of Community Liaison Groups.	Section 5 of the CoCP
Working hours relating to various construction activities are set out. Activities outside normal working hours that could give rise to disturbance will be kept to a reasonably practicable minimum.	Section 6.4 of the CoCP
Mitigation measures aimed at reducing the impact of the Project on the amenity of local residents by virtue of noise and dust.	E.g. NV008, AQ002 and AQ003
Compliance with the Considerate Constructors Scheme's (CCS) Code of Considerate Practice.	Section 2.4 of the CoCP

- 13.5.20 The oTMPfC (Application Document 7.14) provides outline concepts and principles that will be applied for the design and management of construction traffic management and transport logistics for the Project. Temporary diversion routes for PRow, where required, would be subject to engagement with the relevant highway authority.
- 13.5.21 The Framework Construction Travel Plan (FCTP) (Application Document 7.13) has been produced to provide a framework with regard to the implementation of travel planning for the movement of personnel to and from the construction areas and compounds during the construction phase of the Project. The key aim of the FCTP is to minimise adverse local disruption or traffic impacts on the highway network from worker and visitor travel to and from construction areas and compounds, by reducing the number of single-occupancy vehicle trips and encouraging the uptake of sustainable and active modes of travel.
- 13.5.22 The Applicant has engaged with all directly affected landowners and occupiers with a view to acquiring their land interest by agreement. Freeholders, leaseholders and tenants can claim several types of compensation when their land or property is being compulsorily purchased, including for example the market value of the land, disturbance compensation and injurious affection compensation (where the construction or use of the Project has reduced the value of the remaining land).
- 13.5.23 Access to community facilities and assets would be maintained during the construction phase, with mitigation measures relating to construction traffic management and community engagement as set out in the CoCP (Application Document 6.3, Appendix 2.2) and oTMPfC (Application Document 7.14).
- 13.5.24 The Applicant proposes the following pro-active measures to monitor and manage the uptake of accommodation. These are secured via the Framework Construction Travel Plan (FCTP, Application Document 7.13):
- a. Accommodation Helpdesk – this would be operated by the Applicant and would be a tool to assist workers with finding suitable and available accommodation near the Project. The Helpdesk would support prospective providers of accommodation in understanding the Project and its workforce

and managing tenancies safely and legally. Workers would not be mandated to use accommodation registered on the Accommodation Helpdesk. The Helpdesk would also oversee collation of monthly data from the Contractors and produce accommodation monitoring reports which would in turn inform where workers could be directed/recommended via the Helpdesk.

- b. Accommodation database – the Contractors would be required to create and maintain a live database that monitors the accommodation being used by the workforce in terms of the type of accommodation (onsite project accommodation, private rented, spare rooms/latent, owner-occupied or tourist/visitor) and the location of this accommodation (via a postcode). The Contractors would mandate that its workforce, and those of its suppliers, regularly update their information related to the database for every worker. This database would be reported on a monthly basis to members of the Workforce Accommodation Working Group (WAWG).
- c. WAWG – this would include representatives from the Applicant, its Contractors, and local authorities. The WAWG would receive monthly workforce accommodation monitoring reports from the Helpdesk, and regular updates and information from the Project including ‘look-ahead’ for potential workforce implications over a 12-month period led by the Applicant and Contractors. The findings of the workforce accommodation monitoring report would be considered alongside other information, such as other monitoring secured by the Project (e.g., via the Framework Construction Travel Plan (Application Document 7.13) and SEE Strategy (appended to Section 106 Agreements – Heads of Term (Application Document 7.3)) and information provided by local authorities on market conditions and other developments in the local area.

13.5.25 Contractors would also be required to propose further reasonably practicable measures which encourage a higher proportion of locally employed workers (thereby reducing demand for accommodation) and incentivise workers to live in areas which have higher capacity. Measures would be presented to the WAWG, and the Applicant would have due regard to comments raised at that group on the measures to be undertaken.

13.5.26 The early creation of an effective Accommodation Helpdesk would not only identify and direct workers to appropriate accommodation but would be a key mechanism, together with the accommodation monitoring reports, to monitor impacts on the local accommodation market.

13.5.27 The Helpdesk would also signpost potential landlords and businesses to assist and encourage bringing forward of latent beds to the market. The Applicant would continue to monitor the combined impacts of accommodation and work with local authorities to assess impacts on local accommodation through the WAWG.

- 13.5.28 Further detail in relation to good practice mitigation measures associated with air quality and noise are set out in Chapter 5: Air Quality and Chapter 12: Noise and Vibration. A Best Practicable Means (BPM) approach would determine and plan daytime and night-time construction works to reduce noise, vibration and dust disposal impacts at sensitive residential receptors.
- 13.5.29 Mitigation secured in the Stakeholder Actions and Commitments Register (Application Document 7.21) includes measures relating to farm access during construction, including:
- Where access to a significant area of a landowner's farmland is severed by construction works the Main Works Contractor shall ensure that the farmer is provided with controlled access to their retained land (SACR-005)
 - Measures specifically relating to the maintenance of controlled access for farm vehicles across the route of the A122 in the immediate vicinity of Green Lane during construction (SACR-003)
 - Measures to establish the farm access track from Brentwood Road to the north of the Brentwood Road compound prior to the severance of any existing access (SACR-004).

Operational phase

- 13.5.30 Operational phase good practice of relevance to population and human health is described below:
- 13.5.31 The road would be designed, delivered, operated and maintained with the aim of being one of the best highways projects in terms of health, safety, security and the wellbeing of workforce, employees, road users and local communities. Measures would include, but not be limited to, behavioural safety techniques, training, physical measures such as lane closures, speed restrictions and enforcement, and planning for and provision of adequate time, space and resources to deliver the required works safely.
- 13.5.32 Operational phase mitigation measures to reduce noise and visual impacts would be designed during the construction phase, with examples including the provision of noise barriers, low noise surfacing and additional planting. Actions in case of noise monitoring exceedances are secured in the REAC (Ref. NV015).

Essential mitigation

Potentially significant effects

- 13.5.33 An iterative appraisal of the Project design, taking into account the design principles and good practice, was undertaken to identify any potentially significant effects that would require essential mitigation. Effects on population and human health that could be significant and therefore required further consideration for essential mitigation were identified as follows:
- Neighbourhood amenity during the construction phase, as a result of a combination of effects arising from changes in air quality, changes in noise levels and visual impacts

- b. Potential negative effects on the capacity of primary healthcare services to cope with the influx of construction workers
- c. Negative health outcomes for communities (including sensitive populations such as older people and children) associated with construction and operational noise impacts and mental health and wellbeing (arising from anxieties around construction activities) / quality of life
- d. Negative health outcomes arising from traffic-related severance effects.

Construction phase

- 13.5.34 Essential mitigation measures set out in relation to other environmental topics (air quality, landscape and visual, and noise and vibration) are of relevance to the population and human health topic and measures have been taken into account in the assessment within these chapters. Further detail in relation to essential mitigation measures associated with these topics are set out in Chapter 5: Air Quality, Chapter 7: Landscape and Visual and Chapter 12: Noise and Vibration (Application Document 6.1).
- 13.5.35 A commitment in the REAC relates to the provision of healthcare services for the construction workforce. REAC Reference PH002 states that *‘the Contractor will provide an appropriate range of medical and occupational healthcare services (including on-site facilities) to meet the physical and mental health needs of the construction workforce. The range of services will be agreed with National Highways, following engagement with Integrated Care Partnerships’*.
- 13.5.36 Proposals for engagement and communication with local residents and communities are described in the CoCP as part of the good practice mitigation measures. These measures have an important role to play in terms of managing community anxieties and uncertainties about construction activities and associated environmental effects (for example providing information about timing of particularly noisy activities).

Operational phase

- 13.5.37 Significant negative health outcomes have been identified associated with operational noise impacts. Further discussion relating to potential mitigation measures can be found in ES Chapter 12: Noise and Vibration (Application Document 6.1).
- 13.5.38 Taking into account committed design principles and best practice measures, no further potentially significant effects were identified on population and human health during operation, and as such, no additional essential mitigation measures are required.

Enhancement

- 13.5.39 Enhancements of relevance to population and human health are described below:
- a. The provision of a new car park area to the west of Thong Lane to provide recreational access to the PRow network and open spaces within the wider area (Design Principle S2.11). Facilities at the car park area shall include provision for buildings including a kiosk, toilets, changing and storage facility, and provide an area for cycle hire and cycle wash facility. The car

park area shall also include provision for horsebox parking with suitable surfaced parking for 10-12 horseboxes, located away from the main car park circulation.

- b. The Project design incorporates provision of new routes for WCH, designed to improve access to the existing network, to increase access for users (including those with limited mobility) while considering and mitigating potential impacts from misuse and anti-social behaviour through good design. Total additional and improved provision equates to 64km of routes. New and improved routes which do not form part of the embedded mitigation for the Project, together with associated improvements to user experience, are summarised in Table 13.54, together with the Design Principle to which they relate.

Table 13.54 Enhancements – WCH routes and improvements

Design Principle	Description of enhancement
S9.05	Heritage interpretation along Two Forts Way.
S9.18	Tilbury interpretation boards – along footpaths and publicly accessible areas, interpretation boards shall be provided to explain the heritage of the area and the importance of the Thames Estuary for bird and nature conservation
S9.19	Two Forts Way – the existing route to be upgraded to be appropriate for pedestrians and cyclists. Designs shall be developed in coordination with the Port of Tilbury and Thurrock Council. From the Two Forts Way, there will be secondary and tertiary footpaths within Tilbury Fields.
S9.20	Routes between heritage assets – permissive footpaths shall be provided across open mosaic habitat that connect Coalhouse Fort with Tilbury Battery, Bowaters Battery and FP200.
S10.09	WCH Requirements – a bridleway connection shall be made between the A1013 and High House Lane by the re-designation of Footpath 79, part of FP95 (between FP79 and Brentwood Road) and the realigned Footpath 78 to bridleway.
S11.13	Stifford Clays Road shared walking/cycle track – to improve the connection between the Baker Street area to William Edwards School, the existing shared walking/cycling track adjacent to Stifford Clays Road shall be extended from its present end at Springfield Farm as far as 6 Stifford Clays Road.
S11.14	A1013 shared walking/cycle track – to improve the cycle connection along the A1013, the existing adjacent shared pedestrian-cycle route facility shall be re-established where the A1013 is realigned, and replaced where it is not, following the requisite design standards on width and separation from the highway. This new/replacement facility shall extend between Orsett Cock roundabout to 44 Stanford Road. A Pegasus crossing shall be provided in order to allow safe crossing from the south side of the A1013 to Rectory Road. Between this crossing and Footpath 79, a separate equestrian route shall also be provided parallel to the pedestrian-cycle track on the A1013.

Design Principle	Description of enhancement
S11.15	Baker Street shared walking/cycle track – to promote active travel on Baker Street, where it is being realigned between the A1013 and the A13 underpass, a shared use pedestrian-cycle route shall be provided adjacent to the highway.
S12.08	North Road WCH route – a segregated pedestrian, cycle and equestrian track shall be provided parallel to North Road between the eastern end of Footpath 151 and the junction of Wilsman Road and North Road in South Ockendon. This shared track shall be to the east of North Road and connect Footpath 151 with Footpath 135 and with South Ockendon in order to facilitate east-west WCH links that are prevented by the level of traffic on North Road. By linking the western end of Footpath 135 to South Ockendon, and the creation of a link between Footpaths 135 and 136, a circular route shall be formed. In conjunction with other improvements, this track shall further improve access to the PRow network for the residents of South Ockendon by providing access to Thames Chase Forest Centre via Footpath 151. A Pegasus crossing shall be provided where Footpath 151 terminates at North Road in order to allow PRow users to safely cross North Road directly onto this new track.
S12.09	Mardyke River Link – the Project shall include enhancements to surfaces and signage of Mardyke trail within the Order Limits and its connection into the PRow network, in accordance with 3.07 of The Thames Chase Plan (Thames Chase Trust, 2014).
S12.15	Mardyke Trail Interpretation – interpretation boards shall be provided along the Mardyke Trail adjacent to both existing and proposed common land areas.
S14.11	Dennis Road WCH track – a shared track for WCH shall be provided to the north of Dennises Lane and Dennis Road from the junction of Pea Lane and Dennises Lane to the junction of Arisdale Avenue and West Road in South Ockendon. This new route shall connect residents of South Ockendon to Little Belhus Country Park, a new country park. In conjunction with other improvements, this route shall also link Little Belhus Country Park to the Thames Chase Forest Centre.

13.6 Assessment of likely significant effects

- 13.6.1 This section presents the assessment of likely significant effects on population and human health receptors resulting from the construction and operational phases of the Project. This is based on the design of the Project and takes into account the mitigation as presented in Section 13.5.
- 13.6.2 The assessment takes into account the value/sensitivity and impact magnitude criteria as presented in Table 13.3 and Table 13.4 respectively, and the significance of effects has been determined in accordance with the matrix provided in Table 4.3 of Chapter 4: EIA Methodology (for land-use and accessibility effects) and through the use of professional judgement (for human health effects).

Construction phase

Private property and housing

- 13.6.3 This section assesses the likely effects of the Project on private property and housing in relation to demolition, temporary possession and permanent acquisition of land. Further detail relating to specific parcels of land (in terms of area of land and purpose for which it is required) can be found in the Book of Reference (Application Document 4.2) and Statement of Reasons (Application Document 4.1).

South of the River Thames

- 13.6.4 The sensitivity of private property and housing receptors has been determined in accordance with DMRB LA 112 (Highways England, 2020b). This requires an assessment of the likely percentage increase in households within a local authority by 2041, using ONS data. All properties identified for demolition or permanent acquisition to the south of the River Thames are within the authority area of Gravesham Borough Council. Household projections described as part of the future baseline show that the borough of Gravesham has a projected increase in households of 9.5%, thus placing the local authority in a medium sensitivity category.
- 13.6.5 Table 13.55 identifies properties at risk of demolition as part of construction of the Project. Properties are also shown on Figure 13.3 (Application Document 6.2). The direct acquisition and demolition of buildings is classified as a major magnitude adverse impact in line with DMRB LA 112 (Highways England, 2020b). Categorisation as to whether the significance of effect is recorded as moderate or large adverse has taken into account current ownership, with properties already in the ownership of National Highways being accorded a lower significance of effect. Mitigation measures comprise financial compensation; however, it is acknowledged that there are wider implications for local residents associated with the loss of private property (for example in relation to anxiety, or loss of community) and these issues are considered in more detail in the HEqIA (Application Document 7.10).

Table 13.55 Residential properties subject to demolition – south of River Thames

Receptor	Sensitivity	Magnitude of impact	Significance of effect
1 Longview, Henhurst Road	Medium	Major adverse	Moderate adverse
2 Longview, Henhurst Road	Medium	Major adverse	Large adverse
White House, Henhurst Road	Medium	Major adverse	Moderate adverse
Marling Cross Lodge, Watling Street	Medium	Major adverse	Moderate adverse

- 13.6.6 In addition to the above, two properties would be affected by the permanent acquisition of land for the Project. Although Park Farm House is located outside of the Order Limits, the garden of the property is located within the Order Limits and is required as part of environmental mitigation measures (tree planting). This equates to 1.3ha of land (approximately 14% of the land holding). Similarly, Cheneys Farm on Thong Lane is impacted as a result of part of the

garden being required for permanent earthworks at the A2 junction. Both receptors are classified as being of medium sensitivity. The magnitude of impact is considered to be minor, in that there would be loss of part of a key characteristic of each property, but not such that the overall viability of the property would be compromised. As the impacts relate to a proportion of the landholding and there is no direct impact on the property itself, the resultant effect at both properties is considered to be **slight adverse**, which is not **significant**.

- 13.6.7 A further property, Marling Manor on Watling Street, would experience temporary loss of part of its garden as a result of construction activities. The property is in the ownership of the Applicant. The receptor is classified as being of medium sensitivity and the magnitude of impact is considered to be negligible in that the property would experience a very minor and reversible impact on one of its characteristics. The resultant effect is considered to be **neutral**.
- 13.6.8 In respect of the traveller sites listed in paragraph 13.4.18, while there would be no direct impact on these sites, there may be some temporary disruption to access as a result of construction activities, although access to individual properties would be maintained at all times as set out in the oTMPfC (Application Document 7.14).
- 13.6.9 A number of properties would be temporarily affected by changes to access as a result of construction of the Project. These properties are listed below:
- a. Properties along Watling Street – Highview, The Anchorage, Marling Manor, Winslow, St Theresa, Oakdene and The Lodge
 - b. Numbers 1–7 Sheldon Heights
 - c. The Nook, Scalers Hill House
 - d. 37 Thong Lane, Thong
 - e. Hartshill Bungalow, Thong Lane, Shorne
 - f. Boughurst Cottage, Brewers Road, Shorne
- 13.6.10 Each of these properties is defined as being of medium sensitivity by virtue of their location within Gravesham borough. For all properties listed, there may be some temporary disruption to access as a result of construction activities, but access to individual properties would be maintained at all times as set out in Section 5 of this Chapter and in the oTMPfC (Application Document 7.14). The magnitude of impact is therefore minor, resulting in a **slight adverse** effect, which is **not significant**.

Residential development land

- 13.6.11 The residential development site at Albion Waterside, located on the southern bank of the River Thames, is currently an undetermined planning application for up to 1,500 homes and up to 4,500sqm of commercial floorspace. No observable impact has been identified in relation to either of these uses as a result of construction of the Project and accordingly the significance of effect is recorded as **neutral** and **not significant**.

Marine and riparian assets

- 13.6.12 No impacts have been identified on marine or riparian assets to the south of the River Thames. The likely effect has therefore been assessed as **neutral** and **not significant**.

North of the River Thames

- 13.6.13 Household projections described as part of the future baseline show that both Thurrock Council and the London Borough of Havering (in which property demolition effects have been identified) have high rates of predicted household growth, 24.6% and 19.6% respectively; private property within these areas is therefore classified as high sensitivity.
- 13.6.14 Table 13.56 identifies properties that would be subject to demolition to enable construction of the Project. Properties are also shown on Figure 13.3 (Application Document 6.2). The table includes properties located in clusters around Baker Street and clusters along Ockendon Road. The direct acquisition and demolition of buildings is classified as a major magnitude adverse impact in line with DMRB LA 112 (Highways England, 2020b). Categorisation as to whether the significance of effect is recorded as large or very large adverse has taken into account current ownership, with properties already in the ownership of the Applicant being accorded a lower significance of effect. Mitigation measures comprise financial compensation; however, it is acknowledged that there are wider implications for local residents associated with the loss of private property (for example in relation to anxiety, or loss of community) and these issues are considered in more detail in the HEqIA (Application Document 7.10). Given that all of the properties subject to full demolition are residential, it is considered that this would result in **large** and **very large adverse** impacts, which are **significant**.

Table 13.56 Residential properties subject to demolition – north of River Thames

Receptor	Sensitivity	Magnitude of impact	Significance of effect
7 Woolings Close, Baker Street	High	Major adverse	Large adverse
8 Woolings Close, Baker Street	High	Major adverse	Large adverse
9 Woolings Close, Baker Street	High	Major adverse	Large adverse
10 Woolings Close, Baker Street	High	Major adverse	Very large adverse
5 Woolings Row, Baker Street	High	Major adverse	Large adverse
6 Woolings Row, Baker Street	High	Major adverse	Very large adverse
Murrells Cottage, Stanford Road	High	Major adverse	Very large adverse
Thatched Cottage, Baker Street	High	Major adverse	Large adverse
Gammon Staples Farmhouse, Baker Street	High	Major adverse	Very large adverse
The Thatches, Stanford Road	High	Major adverse	Large adverse
1 and 2 Grays Corner, Baker Street	High	Major adverse	Very large adverse

Receptor	Sensitivity	Magnitude of impact	Significance of effect
1-2 Whitfield Cottages, Stifford Clays Road	High	Major adverse	Very large adverse
1-3 Bridge Cottages, Ockendon Road	High	Major adverse	Very large adverse
4 Bridge Cottages, Ockendon Road	High	Major adverse	Large adverse
Larwood Cottage, Ockendon Road	High	Major adverse	Large adverse
The Rosary, Ockendon Road	High	Major adverse	Large adverse
Yellow Stock Mews, Ockendon Road	High	Major adverse	Very large adverse
Estate House, Ockendon Road	High	Major adverse	Very large adverse
1-2 Cherry Orchard Cottages, Ockendon Road	High	Major adverse	Very large adverse
Alde Cottage	High	Major adverse	Very large adverse
Welcome Service Station (residential)	High	Major adverse	Large adverse

- 13.6.15 The Gammonfields Way travellers' site would be affected as a result of land being permanently acquired for the Project. The travellers' site has been assessed as high sensitivity because it covers an area of 1.6ha (between 1ha and 5ha threshold). In consultation with stakeholders, a replacement site has been identified directly to the west of the existing site; the replacement site would be equivalent to the existing in terms of size, quality and access arrangements from Long Lane. Engagement with residents of the travellers' site has helped to inform the layout and design of the replacement site. The replacement travellers' site would be complete prior to the demolition of the existing site to ensure minimal disruption for the travelling community and remove the need to move multiple times. This has been secured by Requirement 12 of the draft DCO (Application Document 3.1) and by Design Principle S11.12 as described in Section 13.5 of this Chapter and set out in Design Principles (Application Document 7.5).
- 13.6.16 Construction impacts on the travellers' site relate to changes in quality / amenity as a result of the proximity of construction activities. The travellers would remain at their existing site during enabling works for the Project, which include utilities diversions. A Utilities Logistics Hub (ULH) (Long Lane Utility Hub) would be located approximately 550m to the west of the existing site. Once utilities diversions are complete, the ULH would be removed, allowing work to continue on the replacement travellers site and main works Project construction activities. Two construction compounds (Long Lane Compounds A and B) would be created in the vicinity of the travellers site to support construction activities associated with the proposed A122/A13 junction. Long Lane Compound A would be located immediately west of the replacement site; the main purpose of the compound would be to provide space for earthwork stockpiles. These would provide a level of acoustic separation for the new site

from the rest of the compound. A main works construction access route runs to the east and north of the replacement site. The magnitude of impact associated with these changes has been assessed as **minor**, resulting in effects that would be **slight adverse** and therefore **not significant**. Mitigation measures include those described in other ES Chapters relating to air quality and noise and vibration (ES Chapters 5 and 12) (Application Document 6.1).

- 13.6.17 Other privately owned travellers' sites that may experience potential impacts during the construction phase are a site at the western end of Lower Crescent, Linford, where there are approximately seven caravans located. The site overlaps with the Order Limits. The site is affected as a result of the acquisition of rights required for overhead lines diversion works and the rights and restrictive covenants to construct, protect, operate, access and maintain those overhead lines diversion works. The magnitude of impact associated with these works has been assessed as negligible, in that works would not directly affect the use of the land, resulting in effects that would be **slight adverse** and **not significant**.
- 13.6.18 The travellers' site known as Railway Sidings, located to the west of the M25 and Ockendon branch railway line in Havering, would itself not be affected by works. However the access to the site and land to the west is required for water diversion works. Access to the site would be maintained at all times. Any impacts are therefore likely to be **negligible** in magnitude and **not significant**.
- 13.6.19 Two properties – 242 and 246 Heath Road – would be affected as a result of land required permanently for the Project. In each instance, change to the land would be required for the realignment of a private means of access and impacts relate to the permanent loss of areas of gardens for the re-provision of accesses to the properties. Each of these properties is defined as being of high sensitivity by virtue of their location within Thurrock. The magnitude of impact is assessed as minor, resulting in a **slight adverse** effect which is not significant.
- 13.6.20 A number of properties would be affected by changes to access as a result of construction of the Project. For all properties listed below, there may be some temporary disruption to access as a result of construction activities, although it is noted that access to individual properties would be maintained at all times, as secured in the oTMPfC (Application Document 7.14):
- a. Baker Street – properties along Stifford Clays Road (Baker Street Mills and Wayside Cottage) and properties in Woolings Close (Nos.11–20, 22, 23 and 24)
 - b. East Tilbury – numbers 1–2 Gravel Pit Cottages; Orchard House and Stables, Love Lane; properties along Station Road (Pleasant View and Willows)
 - c. Orsett – properties along Stanford Road (Nos. 1–4 Five Chimney Cottages, Nos. 1–2 Potash Cottages)
 - d. Orsett Heath – numbers 202–224 Heath Road (even nos. only), Rose Cottage, Hornsby Lane
 - e. Muckingford Road – three properties (High Ash, Ash Lea and Juorei)

- f. South Ockendon – properties along North Road (Nos. 1–3 Townfield Cottages)
- g. North Ockendon – properties along Ockendon Road (Grafton, Bankes House, Farm Chalet, Cranham Place, The Old Coach House)
- h. Nos. 1–2 Brook Farm Cottages, High House Lane

13.6.21 All properties listed are defined as being of very high sensitivity by virtue of their location within Thurrock. The magnitude of impact is negligible, as there would be a minor introduction of severance with ample accessibility provision. For the above listed properties, this would result in a **slight adverse** effect, which is **not significant**.

Residential development land

13.6.22 No observable impact has been identified in relation to the residential development land as a result of construction of the Project, and accordingly the significance of effect is recorded as **neutral** and **not significant**.

Marine and riparian assets

13.6.23 No impacts have been identified on marine or riparian assets to the north of the River Thames. The likely effect has therefore been assessed as **neutral** and **not significant**.

Community land and assets

13.6.24 This section describes the likely effects of the Project on community land and assets to the south and north of the River Thames. Additional information relating to impacts on open space and private recreation facilities can be found in Appendix D: Open Space and Appendix G: Private Recreational Facilities of the Planning Statement (Application Document 7.2).

South of the River Thames

Community land

13.6.25 Effects on community land include temporary possession and permanent land acquisition, impacts associated with construction activities (such as utilities diversions) and associated changes to community access. The sensitivity of receptors has been determined using criteria set out in Table 13.3.

13.6.26 Table 13.57 summarises the significance of effect for all community land receptors to the south of the River Thames. Where there are significant effects, where receptors identified in the baseline are considered to be of particularly high value, or where there are specific points of interest, these are described in the following paragraphs. Where adverse impacts on receptors are described, these predominantly relate to temporary effects on amenity during construction.

Shorne Woods Country Park

13.6.27 Shorne Woods Country Park is located immediately to the north of the A2, with access off Brewers Road. Temporary disruption to the Country Park would result from work associated with proposed utilities diversions along the north side of the A2. The main access to the Country Park would not be impacted, and direct access to the site from the central carpark within the Country Park

would be retained. However there would be disruption to routes leading to the Country Park from the south, when Brewers Road is to be closed for up to 18 months.

- 13.6.28 Replacement land is located to the east of Brewers Wood, which forms part of Shorne Woods Country Park. This would be landscaped to match the existing site and allow for the spaces to link together and function as one. The new area of woodland to the east of Brewers Wood would link Shorne Woods with Great Crabbles Wood. The replacement land is proposed to be open space for dual uses, including compensatory woodland planting and recreational use. Excluding the compensatory woodland planting, the land is still no smaller in area and no less advantageous than that being lost. The open space would be capable of being used for walking, cycling and horse riding purposes. This would provide both environmental and community benefits, plus additional links between isolated parcels of woodland, adding benefits to the wider community and Shorne Woods Country Park users.
- 13.6.29 The works affecting the existing open space at Shorne Woods Country Park are anticipated to last for six years; the replacement land would require a period of up to five years without public use for it to establish. The duration has therefore been assessed as long-term (more than two years).
- 13.6.30 The partial loss of key characteristics of the Country Park is assessed as negligible (due to the proportion of land impacted in relation to the rest of the site). The resultant significance of effect has been assessed as **slight adverse** and **not significant** due to the re-provision of land which will be more accessible through PRoW connections and which will be comparable with the current setting.

Jeskyns Community Woodland

- 13.6.31 Jeskyns Community Woodland is located immediately to the south of the A2. Although a relatively new area of community woodland (and consequently parts of the site are quite open), it is already a popular family destination for informal recreation purposes. Temporary use of the land would be required as part of works associated with utilities diversions, notably the restringing of an existing National Grid overhead line. These works would result in some short-term disruption to the use of the Jeskyns car park (in terms of available space rather than closure) and may therefore restrict the number of visitors to the site arriving by car during this time. The construction period for this work is estimated to require two periods of two months. The duration has therefore been assessed as short-term (i.e. less than six months in duration). Access to Jeskyns Community Woodland by walking and cycling would not be restricted. New permissive paths would be established through the woodland as part of proposals to create a temporary diversion of NCR 177. Impacts are therefore considered to be **negligible**, resulting in a **slight adverse** significance of effect.

Cascades Leisure Centre

- 13.6.32 The Applicant does not propose to permanently acquire any land forming part of Cascades Leisure Centre. However, there may be potential effects on the operational aspects of the leisure centre during construction, such as drainage of the playing fields, or disruption arising from changes in boundary fencing.
- 13.6.33 The Applicant is proposing to relocate the par 3 golf facility from the Gravesend Golf Centre, located to the north of the leisure centre to facilitate the delivery of the Project and has allocated an area of the Order Limits to the east of Cascades Leisure Centre, on part of the site of the existing Southern Valley Golf Course, to provide a replacement recreational facility. This would be developed in consultation with Gravesham Borough Council, as set out in Design Principle S3.17 (Application Document 7.5).
- 13.6.34 Separately, and without prejudice to the proposals which form part of the DCO application, the Applicant is engaging with Gravesham Borough Council and the operator of the golf facility regarding a potential alternative configuration of the facility, as part of the Council's broader proposals for the redevelopment of Cascades Leisure Centre. If an alternative location for the par 3 facility were identified and progressed as a result of ongoing discussions, it would be delivered separately to the Project.
- 13.6.35 Cascades Leisure Centre is attributed a very high level of sensitivity due to daily use by members of the community. Potential effects on operational aspects of the leisure centre during construction would be negligible; access to and from the leisure centre may be temporarily impacted as a result of traffic management measures however access for users would be maintained at all times during the construction phase. This would result in a **slight adverse** significance of effect on users.

Private Recreational Facilities

- 13.6.36 The following receptors, although falling under the heading of community land for the purposes of this assessment by virtue of their type of use, are defined as private recreational facilities. Relevant points for each are described below.

Gravesend Golf Centre

- 13.6.37 The Gravesend Golf Centre is accessed from Thong Lane and is immediately north of the Cascades Leisure Centre on land owned by Gravesham Borough Council. The site is leased to Swing Rite Golf Limited, who operate the golf centre as a private business. The driving range and pitch and putt facility are located to the east of the leisure centre and are operated on a pay-and-play basis. The par 3 facility is currently closed and has been for several months. The Centre has been categorised as being of medium sensitivity by virtue of its use (as opposed to private golf courses which, through their more exclusive nature, have been attributed a low sensitivity).
- 13.6.38 Part of the site (the pitch and putt element) would be required temporarily as part of the Southern Tunnel Entrance construction compound; this area (approximately 6.3ha in area) would also be required on a permanent basis as part of landscape mitigation measures and the creation of Chalk Park following construction. To enable this, the pitch and putt facility is proposed to be relocated on land adjacent to the Cascades Leisure Centre, within the Order

Limits. The relocated site is greater in area than the original pitch and putt facility, would be equally accessible to the current provision and be of an equal or improved quality in terms of setting. The potential effect on the Gravesend Golf Centre is considered to be negligible, resulting in a **slight adverse** significance of effect.

Southern Valley Golf Course (SVGC)

- 13.6.39 SVGC has been closed since 2021. The site of the golf course would be directly impacted by the Project, which necessitates the permanent acquisition of both the 18-hole course and clubhouse. Residents in Gravesham have higher than average levels of inactivity in sport and a lower propensity to take part in sport and physical activity, including competitive sport (compared to regional and national figures). Golf is identified as the eighth most popular sport/activity in Gravesham, with 2.1% of the population indicating that they take part at least once per month. This is commensurate with national figures but lower than the average in the South East (2.7%). There are 12 golf facilities within, or just outside of, a 20-minute drive time of SVGC, including the Mid Kent Golf Club, the Rochester & Cobham Park Golf Club and Pedham Place Golf Course. Of further note is that a municipal golf course based in Medway closed in April 2018 (Deangate Ridge Golf Course) due to concerns around its financial sustainability.
- 13.6.40 The owner of the golf course has previously made a submission to Gravesham Borough Council for the golf course to be considered as a potential housing site as part of the local authority's 'Call for Sites' to inform a Strategic Land Availability Assessment.
- 13.6.41 The SVGC site would be required in its entirety to facilitate construction works associated with the South Portal and main alignment of the new road. Following construction, the site would form part of the Chalk Park public open space provision in line with design principles set out within the Project Design Report (Application Document 7.4) and Figure 2.4: Environmental Masterplan (Application Document 6.2) and described in the project design and mitigation section of this chapter.
- 13.6.42 The SVGC has been attributed a low sensitivity by virtue of its role as a private recreational community, alternative golf courses available in the wider area and level of use by members of the community. The magnitude of impact on the SVGC would be major adverse, due to the loss of the resource as a result of the Project. This results in a **moderate adverse** effect, which is significant.
- 13.6.43 Table 13.57 provides a summary of the effects on community land to the south of the River Thames.

Table 13.57 Effects on community land – south of River Thames

Receptor	Nature of impact	Sensitivity	Magnitude of impact	Significance of effect
Shorne Woods Country Park	<p>Land is required to be permanently acquired (4,408m²) to construct and operate the new A2/Lower Thames Crossing local collector roads and for the extension and realignment of Thong Lane with the new green bridge over the A2.</p> <p>Temporary possession of land and permanent acquisition of rights for the diversion of a medium pressure gas main and the installation and diversion of underground utilities (10,626m²).</p> <p>Temporary possession of land and permanent acquisition of rights is also needed for the management of a proposed receptor site for protected species and a new habitat site for relocated species (12,690m²). Public access to this area would be retained.</p> <p>Temporary possession of land (1,030m²) at the peripheral edges of the park would be needed during the construction period to allow working room for construction activities.</p> <p>There would also be temporary disruption to access to the park during construction of the Brewers Road green bridge. Principal areas of impact relate to the potential disturbance to the amenity of users.</p>	Very high	Negligible	Slight adverse
Jeskyns Community Woodland	<p>Temporary impacts would be around the existing National Grid overhead lines and pylons. The land would be returned to the owners and there are no proposed additional permanent rights over the land, as the works can be accommodated within the corridor of the existing rights.</p> <p>It is proposed to upgrade an existing footpath, which would connect into a wider WCH network. The land would be returned to its existing land use as public open space as part of Jeskyns Community Woodland.</p>	Very high	Negligible	Slight adverse
Ashenbank Woods	Construction impacts relate to the temporary possession of land along	Very high	Negligible	Slight adverse

Receptor	Nature of impact	Sensitivity	Magnitude of impact	Significance of effect
	the northern and western edge of Ashenbank Woods to upgrade the currently unsurfaced, naturally made permissive path (known as the Darnley Trail) to enable users of National Cycle Network 177 (NCN177) to be diverted. The upgraded route would be open to walkers, cyclists and horse riders during the construction of the Project only and once the construction is complete, the upgrading work would be reversed to allow the route to revert to its original unsurfaced, naturally made route. There may be short-term and temporary potential disturbance to the amenity of users. The impact on this very high sensitivity community land would be of negligible magnitude.			
Cascades Leisure Centre	Temporary construction impacts would be likely to relate to traffic management measures on Thong Lane. As well as very minor potential effects on the operational aspects of the leisure centre such as disruption arising from changes in boundary fencing. The impact on this very high sensitivity asset would be of negligible magnitude.	Very high	Negligible	Slight adverse
Mackenzie Way Open Space	No direct impact likely during construction.	Very high	No change	Neutral
Michael Gardens Play Area	The Project seeks temporary possession of land for the purposes of upgrading the existing footpath, offering improved access to the wider footpath network. Once completed, the path and play area would be returned to its existing land use as public open space.	Very high	Negligible	Slight adverse
Roman Road	Permanent acquisition of an area of land at the eastern end of the site (5,241m ²) in order to widen the existing road drainage attenuation pond. The overall function of the area of open space would be unaffected.	High	Minor adverse	Slight adverse

Receptor	Nature of impact	Sensitivity	Magnitude of impact	Significance of effect
Cyclopark	<p>The works proposed involve the temporary possession of land and permanent acquisition of rights for the diversion and modification of utility works. These would take place around the periphery of the Cyclopark site and would not encroach into the site's main operational area.</p> <p>The acquisition of permanent rights is being sought in respect of the installation of underground multi-utilities. Although rights would be acquired permanently, the works themselves would last for around one month.</p> <p>Whilst the car park entrance may also be affected by works, access to the site will be maintained at all times.</p>	High	Minor adverse	Slight adverse
Cobham Village Sports Ground	No direct impact likely during construction.	High	No change	Neutral
Cobham Cricket and Tennis Club	No direct impact likely during construction.	High	No change	Neutral
North Kent College Sports Ground	No direct impact likely during construction.	High	No change	Neutral
Thames and Medway Canal Corridor	No direct impact on usage likely during construction.	High	No change	Neutral
Shorne Marshes	No direct impact likely during construction.	High	No change	Neutral
Claylane Wood	Permanent acquisition of the south-eastern part of Claylane Wood in order to construct and operate the new A2/Lower Thames Crossing slip roads (21,607m ²) together with the permanent acquisition of a strip of land on the west side of the wood to create a new bridleway (5,377m ²).	High	Minor adverse	Slight adverse

Receptor	Nature of impact	Sensitivity	Magnitude of impact	Significance of effect
	Temporary construction impacts related to utilities diversions to the south and east of the wood. Claylane Woods is private property and the part of the site within the Order Limits appears to be inaccessible.			
Gravesend Golf Centre (private recreational facility)	The par 3 golf facility is currently closed. Relocation of the pitch and putt facility is necessary due to temporary possession and permanent land acquisition during the construction phase. Temporary access restrictions are likely due to traffic management measures on Thong Lane, although access to the site will be maintained at all times.	Medium	Negligible	Slight adverse
Chalk Old Allotments	No direct impact likely during construction.	Medium	No change	Neutral
Chalk New Allotments	No direct impact likely during construction.	Medium	No change	Neutral
Southern Valley Golf Course (private recreational facility)	The golf club closed in 2021. The site of the former 18-hole golf course and associated clubhouse facilities would be permanently acquired for the Project.	Low	Major adverse	Moderate adverse
Cobham Hall Park and Garden (private recreational facility)	Part of this land is required permanently and part temporarily to establish a new bridleway connection between Brewers Road and Park Pale along the southern side of HS1. Temporary construction impacts also in relation to utilities works. Recreational access to the site is low (restricted access for members of the public).	Low	Minor adverse	Neutral
Rochester & Cobham Park Golf Club (private recreational facility)	Temporary construction impacts related to the improvement of an existing bridleway at the northern boundary of the site. Impacts on operational aspects of the golf course are likely to be minimal. Access to the golf club would be maintained at all times.	Low	Minor adverse	Slight adverse

Community assets

- 13.6.44 The Metropolitan Police Service Specialist Training Centre is a police firearms training centre and is not open to members of the public. Impacts on the rifle range would relate to subsoil easements and protection zones; there would be no physical impact on the land above the easement. The sensitivity of the facility is identified as low (there is no public access to the site) and the magnitude of effect is described as no change. The resultant significance of effect has been assessed as **neutral** and **not significant**.
- 13.6.45 No other community assets (e.g. village halls, healthcare facilities, education facilities, religious facilities) would be subject to permanent acquisition or temporary use as a result of the construction of the Project. Likely effects are instead related to changes in accessibility (journey time) or amenity as a result of construction activities.
- 13.6.46 Access to all community facilities and assets would be maintained during the construction phase, with mitigation measures relating to construction traffic management and community engagement as set out in the oTMPfC (Application Document 7.14) and CoCP (Application Document 6.3, Appendix 2.2) respectively.
- 13.6.47 Community assets identified in Table 13.14 are of very high or high sensitivity as a result of their frequency of use by the community; magnitude of impact is considered to be negligible as a result of the introduction of minor severance or minor impacts on amenity due to changes in the local noise or traffic environment. Any severance impacts on community assets are therefore assessed as **slight adverse** and **not significant**.

North of the River Thames

- 13.6.48 Where there are significant effects, where receptors identified in the baseline are considered to be of particularly high value, or where there are specific points of interest, these are described in the following paragraphs. Table 13.58 then summarises the significance of effect for all community land receptors identified to the north of the River Thames. Where adverse impacts on receptors are described, these predominantly relate to temporary effects on amenity during construction. Additional information relating to open space and private recreational facilities can be found in Appendix D: Open Space and Appendix G: Private Recreational Facilities of the Planning Statement (Application Document 7.2).

Community land

Coalhouse and Tilbury Forts

- 13.6.49 Coalhouse and Tilbury Forts are located to the east and west of the Project respectively on the northern banks of the River Thames. Coalhouse Fort is recognised as a site of high quality and value by Thurrock Council (as evidenced by the fact that the fort is a Green Flag Award site). The forts are also located along the coastal path and cycle path networks; Thurrock Council's Active Travel Strategy (Thurrock Council, 2017b) highlights the priority of addressing east–west connections for cycling and walking. Construction impacts for Coalhouse Fort relate primarily to amenity impacts for visitors (as a result of changes in noise, traffic and landscape quality). Potential disturbance

impacts from construction traffic may arise due to the use of Princess Margaret Road. Tilbury Fort may similarly experience amenity impacts for users arising from changes in noise and landscape quality.

- 13.6.50 Both Coalhouse and Tilbury Forts have been attributed a very high level of sensitivity due to the regularity of use by the local community and users of the Two Forts Way. The magnitude of impact associated with changes to amenity for visitors to the sites would be minor adverse, resulting in a **moderate adverse** effect which would be **significant**.

Thames Chase Community Forest

- 13.6.51 Permanent acquisition of land (101,426m²) would be required at Thames Chase Community Forest for construction of the Project. There would also be temporary possession of land and permanent acquisition of rights for the diversion and modification of utility works on both sides of the M25 (two areas of 30,214m² and 40,470m² respectively). Finally, temporary possession of a further 8,905m² of land would be required at the western side of the M25 during the construction period to allow working room for construction activities.
- 13.6.52 Replacement land is proposed directly to the north and to the south of the existing Thames Chase Forest Centre. The replacement land totals 156,093m² and would be designed to match the existing forest, providing new woodland and biodiversity mitigation including mixture of grassland, scrubs and trees. The layout of the replacement land is being developed in collaboration with stakeholders. The replacement land would be accessed through the existing site and internal footpath network of Thames Chase and there would be additional access from the Thames Chase WCH bridge over the M25 providing access from Ockendon Road and Clay Tye Road. There are proposals to further develop access to the north of the site from St Mary's Lane from where an existing footpath already links to Thames Chase Community Forest. Replacement land would provide equal accessibility and would be no less advantageous to the public.
- 13.6.53 The Thames Chase Community Forest has been accorded a very high level of sensitivity due to the level and frequency of use by members of the community. Impacts to the site during Project construction are likely to be negligible, due to the size of the site and alternative areas and routes that visitors can utilise, together with the provision of replacement land. This would result in a **slight adverse** significance of effect.

Folkes Lane Woodland

- 13.6.54 Permanent land acquisition (approximately 3,000m²) would be required along the eastern end of the site adjacent to the M25 for the purposes of widening the existing M25. Temporary possession with permanent rights would be required for underground utilities diversion work and translocation of protected species (newts). The utilities works are planned to take place over a period of nine months, which would limit public use of the area above the diversion.
- 13.6.55 The Project proposes replacement land directly to the east of the M25 footbridge on the eastern side of the M25, totalling 29,179m², which is an area of land (known as Hole Farm) owned by the Applicant. This would be linked to the current area by the existing bridleway bridge over the M25. The landscaping would complement the existing site and allow the spaces to link together. The

replacement land is proposed for two uses: new woodland and biodiversity mitigation. This would include the planting of a mixture of grassland, scrubs and trees. The replacement land would have equal accessibility and would be no less advantageous to the public, secured in line with the Environmental Masterplan (Application Document 6.2, Figure 2.4) and Design Principles (Application Document 7.5).

- 13.6.56 Folkes Lane Woodland is of very high sensitivity due to its level and frequency of use by members of the community. Impacts on usage of the woodland are considered to be negligible resulting in a **slight adverse** significance of effect.

Tilbury Green Common Land

- 13.6.57 The Project would pass directly through Tilbury Green Common. This site is registered as a common under the Commons Act 2006, and the public has a right of access. Tilbury Green has an area of 1.59ha. The northern part of the common is also designated as a footpath (Footpath 200).

- 13.6.58 An area of approximately 12,480m² is proposed to be acquired permanently for the construction of the Project and associated earthworks extending from the existing footpath at Station Road to the edge of the proposed earthworks. Footpath 200 passes through the site and is used for recreational purposes by local residents including from East Tilbury.

- 13.6.59 An area of 12,777m² of replacement land would be provided, connecting the two severed parts of the existing common. The characteristic of the setting would be improved, with the replacement land set within the new Tilbury Fields landscape east of the North Portal. Requirements set out in the oLEMP seek to '*replace the Tilbury Green Common land and reconnect the two parts of the existing common land. With the use of a footpath which allows the public to enjoy the same rights and an improved characteristic of the setting, with woodland planting and WCH route being of a higher standard than the existing footpath*'. The replacement land would form part of a wider WCH network proposed by the Project, improving connectivity for walkers, cyclists and horse riders between settlements, sites of interest (Tilbury Fort and Coalhouse Fort) and the new Tilbury Fields. Works affecting the existing common land would last for approximately five years, with replacement land not available for public use for up to a further year.

- 13.6.60 The replacement land would be no less advantageous than the existing land, and the DCO includes a provision ensuring that the same rights, trusts and incidents that apply to the existing site will apply to the replacement land.

- 13.6.61 Tilbury Green has been attributed a low sensitivity by virtue of the frequency and level of use by members of the community. The magnitude of impact as a result of construction activities and disruption is considered to be moderate adverse, resulting in a **slight adverse** significance of effect.

Ron Evans Memorial Field

- 13.6.62 The Ron Evans Memorial Field is an area of designated public open space located immediately to the south-west of the A13/A1089 junction. The area of open space is currently well used by members of the local community for informal recreational purposes such as walking and off-road cycling. There are a number of formal and informal footpaths passing through it, including Footpath 97 running in a north-east direction from Long Lane. Permanent acquisition of land to the north-east of the site would be required for the construction of the new road, associated earthworks and landscaping.

- 13.6.63 The Project proposes replacement land directly to the west and to the south of the existing Ron Evans Memorial Field (shown on Figure 2.4: Environmental Masterplan (Application Document 6.2)). The replacement land is approximately 92,124m² compared to the 82,668m² that is proposed to be acquired or be subject to rights. The replacement land is split into two different areas that, combined, are greater in size than the land required permanently for the new road. The northern parcel of replacement land would be adjacent to the A13, with the southern parcel located further away from the A13 junction. The replacement land would be as attractive, or more attractive than the existing Ron Evans Memorial Field due to it being laid out as a high quality open mosaic habitat (whereas the existing area of open space is in a relatively poor state) and of better quality and nature overall (as it provides a setting that is more attractively landscaped than the current setting and is nearer to the surrounding settlements).
- 13.6.64 The replacement land is proposed to be designated as open space. Compared to the current site, the land would have improved characteristics and could be used in the same way as the existing field. The replacement land and the retained existing area of open space would also be adjacent to an area of proposed environmental compensation (totalling circa 47,000m²) which would also be accessible to the public once completed. This would help increase the quality and quantity of public recreation sites within Thurrock. The replacement land would be no less advantageous to the public. Informal paths would connect the replacement and retained land with an adjacent area of proposed environmental mitigation to the north of Long Lane to function as one coherent space. The site would be accessed by existing routes from Long Lane and Fairfield Way. There may be a potential additional entrance from Stifford Clays Road. Access will be further developed in consultation with stakeholders as set out in the Design Principles (Application Document 7.5).
- 13.6.65 The Ron Evans Memorial Field is of high sensitivity as an area of public open space used by nearby communities. The magnitude of impact is considered to be minor adverse, resulting in a **slight adverse** significance of effect.
- Orsett Fen*
- 13.6.66 The Project would pass directly through Orsett Fen, an area of common land. Impacts therefore relate to the permanent acquisition of land, for which replacement land would be provided, which would be no less advantageous than the existing land. Acquisition of part of the Orsett Fen common is required for the proposed construction of the new road, associated earthworks and provision of environmental mitigation. The area lost would be around 56% of the total extent of the existing common. The replacement common land comprises approximately 619,670m² compared to the approximately 534,600m² that is proposed to be acquired or be subject to permanent rights.
- 13.6.67 The replacement land would be split into two areas to the north and south of the existing Orsett Fen. The replacement land could be used for agricultural purposes (as is the case for the existing site) and is no less advantageous for the public. The area of common land which would be acquired for environmental mitigation, currently in agricultural use, would also be accessible to the public post construction. This would link to existing public rights of way along the Mardyke and to proposed WCH routes to Green Lane to the south.

Further details are provided in Appendix 2 of the outline Landscape and Ecology Management Plan (oLEMP) (Application Document 6.7). Therefore, public accessibility to the Orsett Fen and Mardyke valley would improve as a result of the Project. Article 40 of the draft Development Consent Order confirms that the replacement land would be as useful or more useful than the existing Orsett Fen to be permanently acquired as it can be used for the same purpose as it would legally be designated with the same rights, trusts and incidents.

13.6.68 Orsett Fen is currently in agricultural use and not used by members of the community and has therefore been attributed a negligible level of sensitivity. Impacts on the site would be negligible, resulting in a **neutral** significance of effect.

13.6.69 Table 13.58 provides a summary of the effects on community land to the north of the River Thames.

Table 13.58 Effects on community land – north of River Thames

Receptor	Nature of impact	Sensitivity	Magnitude of impact	Significance of effect
Tilbury Fort	Temporary impacts relating to amenity for users	Very high	Minor adverse	Moderate adverse
Coalhouse Fort	Temporary impacts relating to access and amenity for users	Very high	Minor adverse	Moderate adverse
West Tilbury Marshes	The Project may have to acquire permanent rights in connection with a power supply for the North Portal, although there would not be an effect on any activity above ground. The site is currently not publicly accessible.	Negligible	Negligible	Neutral
Walton Common	Temporary possession of land and permanent acquisition of rights for the installation of multi-utilities for the permanent power supply to the northern portal building and a temporary power cable to power the TBM Substation is needed by the Project. The proposed works would be underground in this location. Once the works are completed, the land would be reinstated to the existing land use. Construction of the Thurrock Flexible Generation Plant, which was granted development consent in February 2022, would result in the loss of approximately 10.1ha of the common. A	Low	Negligible	Neutral

Receptor	Nature of impact	Sensitivity	Magnitude of impact	Significance of effect
	successful application to de-register the area of Walton Common affected by the TFGP DCO was made in 2022, resulting in the release of 10.1ha of Walton Common and the provision of an area of replacement common land to the north of the railway line in exchange. The proposed exchange land is not affected by the Project.			
Anchor Fields Park	No direct impact likely during construction.	High	No change	Slight adverse
Tilbury Green	Permanent acquisition of land for the construction of carriageway. Replacement land provided, with new footpath and landscaping, connecting the two parts of the common. Disruption would last for a period of approximately six years.	Low	Moderate	Slight adverse
Condovers Scout Activity Centre	Temporary disruption associated with utilities diversions and permanent rights over land. Works would be of short duration and not impact operation of the facility.	Medium	Negligible	Slight adverse
TFL Field Target Club	Temporary possession of part of the site required to access existing overhead powerlines for inspection, restringing and earthing. There may be some restrictions on the use of the site during construction. Anticipated that current weekend shoots would not be impacted by the Project.	High	Minor	Slight adverse
ETL Gun Club	Temporary possession of part of the site required to access existing overhead powerlines for inspection, restringing and earthing. There may be some restrictions on the use of the site during construction. Anticipated that current weekend shoots would not be impacted by the Project.	High	Minor	Slight adverse
Gobions Park	No direct impact likely during construction.	High	No change	Neutral

Receptor	Nature of impact	Sensitivity	Magnitude of impact	Significance of effect
Linford Recreation Ground	No direct impact likely during construction.	High	No change	Neutral
Arthur Barnes Court Recreational Ground	No direct impact likely during construction.	High	No change	Neutral
Orsett Golf Club	South-western corner of site impacted by works to Brentwood Road (land permanently acquired for highways works to construct Brentwood Road Bridge), the diversion of a high-pressure gas pipeline and environmental mitigation. There would be a temporary impact on the championship tee at the 9 th hole during works to divert the gas pipeline; the tee may need to be relocated during the works but this would not impact overall use of the course.	Low	Moderate adverse	Slight adverse
Thurrock Rugby Football Club	Potential impacts from runoff impacting on playing field drainage. Temporary construction impacts related to restringing of existing overhead electricity cables would cause minimal disruption to club.	Medium	Minor adverse	Slight adverse
Ron Evans Memorial Field	Permanent acquisition of land with replacement land of greater area and improved characteristics provided. Temporary use of land for construction, access and utilities diversions.	High	Minor adverse	Slight adverse
Mardyke Valley Golf Club	No direct impact likely during construction.	Low	Negligible	Neutral
Linford Allotments	Temporary construction impacts related to utilities diversions which may include temporary restrictions in use, although access would be maintained at all times.	Medium	Minor adverse	Slight adverse
Rectory Road Allotments	No direct impact likely during construction.	High	Negligible	Slight adverse
King George's Field	Temporary possession of land at the eastern corner of the Field as	High	Negligible	Slight adverse

Receptor	Nature of impact	Sensitivity	Magnitude of impact	Significance of effect
	part of the utilities working area for the proposed underground utilities work along the adjacent A1013. Following the works, the land would revert to its former state as open space.			
Orsett Cricket Club	No direct impact likely during construction.	Medium	Negligible	Slight adverse
Orsett Bowling Club	No direct impact likely during construction.	Medium	Negligible	Slight adverse
Grangewaters Outdoor Education Centre	An area of the existing car park to be used for temporary construction compound and facilities. Land would be returned to the education centre for reinstatement of use as a car park once construction is completed. Access to and operation of the education centre would be maintained at all times during the works.	High	Minor adverse	Slight adverse
Orsett Fen	Permanent acquisition of land for construction of Project. Replacement common land would be provided which would be no less advantageous than the existing land. The Project has environmental mitigation which proposes to re-wet the Orsett Fen (i.e. the existing land designated as common land) back to its original state. The mitigation land would be designated with rights to allow public access.	Negligible	Negligible	Neutral
South Ockendon Recreation Ground	No direct impact likely during construction.	High	Negligible	Slight adverse
Top Meadow Golf Club	Temporary construction impacts related to restringing of existing overhead electricity cables. Proposed works would be for a short period to adjust the tension of existing overhead powerlines. Minimal disruption to golf club; access and use of the golf club would be maintained at all times.	Low	Minor adverse	Slight adverse

Receptor	Nature of impact	Sensitivity	Magnitude of impact	Significance of effect
	Potential impacts on amenity for users.			
Thames Chase Community Forest	Permanent acquisition of land for construction of the Project. Replacement land would be provided. Disruption to internal footpath network and links to the wider PRow network. Temporary construction impacts related to utilities diversions.	Very high	Negligible	Slight adverse
Cranham Golf Course	Nearby enabling works would take approximately two years. Construction activities would not impact on the ability to play golf. Potential impacts on amenity for users.	Low	Negligible	Slight adverse
Folkes Lane Woodland	Temporary possession of land together with a permanent easement as part of enabling works for the widening of the M25 carriageway and provision of WCH bridge over M25.	Very high	Negligible	Slight adverse

Community assets

- 13.6.70 No community assets (e.g. village halls, healthcare facilities, education facilities, religious facilities) would be subject to permanent acquisition of land or temporary possession as a result of the construction of the Project. Likely effects are instead related to changes in accessibility (journey time) as a result of construction activities involving temporary road closures.
- 13.6.71 Access to community facilities and assets would be maintained during the construction phase, with mitigation measures relating to construction traffic management and community engagement as set out in the oTMPfC (Application Document 7.14) and CoCP (Application Document 6.3, Appendix 2.2) respectively.
- 13.6.72 Upminster Cemetery and South Essex Crematorium serve a wide catchment area. Road closures and diversions (notably the temporary closure of Ockendon Road) would result in increased journey times and changes to accessibility. Diversion routes associated with the Ockendon Road closure may result in journey time increases of around ten minutes. The oTMPfC (Application Document 7.14) highlights cemeteries and crematoria specifically as stakeholders who may have particular requirements and outlines how these would be addressed in the TMP as a minimum, including:
- a. For access and egress to be maintained throughout the construction period with the exception of night-time and weekend closures when required for specific planned works
 - b. Advance warning and particular sensitivity around significant events particularly at evenings and weekends.

- 13.6.73 Representatives of facilities such as the Upminster Cemetery and South Essex Crematorium who may be particularly concerned about the potential impacts associated with the temporary closure of Ockendon Road would be invited to attend meetings of the relevant Traffic Management Forum (as described in the oTMPfC (Application Document 7.14). The sensitivity of the cemetery and crematorium as a community asset is considered to be very high, given that level of use is likely to be daily. Mitigation measures have been proposed in the oTMPfC (Application Document 7.14). Engagement is ongoing with the London Borough of Havering regarding potential impacts on the facilities. Impacts are temporary in nature, albeit likely to be medium-term (between six months and two years in duration). As such, impacts have been assessed as minor adverse, resulting in a **moderate adverse** effect, which is **significant**.
- 13.6.74 The Sugarloaf Riding School for the Disabled is located south of Stifford Clays Road in Orsett. Although the site itself would not be impacted by construction activities, works to Stifford Clays Road may impact the entrance to the riding school for a short period of time (less than one month), although access would be maintained at all times. Due to the specialist nature of activities offered at the centre, the riding school is described as being of very high sensitivity. The magnitude of impact is assessed as minor adverse, in that there would be a discernible change in attributes including access to the school, although this would not compromise the overall viability of the school as a community facility. Ongoing engagement with the owners of the riding school, together with traffic management measures proposed in the oTMPfC (Application Document 7.14) would ensure that impacts on usage were reduced. Impacts on the Sugarloaf Riding School are assessed as **slight adverse** and **not significant**.
- 13.6.75 Other community assets for which particular impacts have been identified by virtue of their proximity to the Order Limits or to specific construction activities include the following:
- a. Whitecroft Care Home – part of the title of the care home is located within the Order Limits; the care home building itself is within 300m of the Stanford Road compound. The care home building would not be affected by the permanent or temporary use of land for construction of the Project, although a small area of land owned by the care home would be required permanently for the works to connect the existing driveway to the realigned Stanford Road. The Stanford Road compound would support construction works affecting slip roads between the A13 and A1013. Most of the compound would be used for storage, equipment and stockpiling, in addition to providing space for car parking, offices, welfare facilities and workshops. Access to the care home would be maintained at all times during the construction phase. Mitigation measures identified in relation to construction traffic management and community engagement are set out in the CoCP (Application Document 6.3, Appendix 2.2). The Whitecroft Care Home is identified as being of high sensitivity. Impacts on the care home are assessed as minor adverse due to a discernible change in access during the construction period, resulting in a **slight adverse** level of effect which is not significant.

- b. Treetops and Beacon Hill Post-16 schools are both education establishments located next to the A1089 and A1013 at Grays, Thurrock and are within approximately 10m of the Order Limits for the Project. The schools are both establishments for children with Special Educational Needs and Disabilities (SEND) and intake includes children and young people with a variety of sensory and other issues. Engagement with the schools has highlighted they have potential concerns over air quality, noise and access during construction (impacts and mitigation relating to air quality and noise are described further in Chapter 5: Air Quality and Chapter 12: Noise and Vibration). During construction, multiple night and possibly weekend closures of the A1089 would be required for specific construction activities in this location. A section of the A1013 would be affected by traffic management measures including lane closures and traffic lights to enable utility works and other construction activities as part of the Project. Works in this location are scheduled to take approximately eight months to complete. Further information is provided in the oTMPfC (Application Document 7.14). The schools are assessed as being of very high sensitivity due to the specialist services they provide. The magnitude of impact on these schools during construction is considered to be minor adverse and relate primarily to minor and temporary (albeit long-term) changes to accessibility, resulting in a **moderate adverse** impact which is **significant**.
- c. Grangewater Outdoor Education Centre – a small area within the existing carpark for the centre would be required to connect a temporary water supply for a construction compound. This would be for a short period of time (between two to four weeks) and would be managed through the CoCP (Application Document 6.3, Appendix 2.2). The centre has been assessed as being of medium sensitivity. The magnitude of impact is considered to be minor adverse, due to its temporary (and short-term) nature, resulting in a **slight adverse** impact which is not significant.
- d. Wild Thyme Outdoors – run as a private recreational facility focusing on provision of foraging and outdoor lifestyle education services primarily for children with special educational and behavioural needs. Wild Thyme operates at The Wilderness, which is a private woodland, on an informal word of mouth arrangement with the landowner. Permanent acquisition of land is required at the southern part of the site for construction of the Project and is likely to lead to extinguishment of the current use of The Wilderness by Wild Thyme Outdoors. Wild Thyme Outdoors is not affiliated to or registered with any regulatory body in relation to the provision of their services. Engagement with Wild Thyme Outdoors suggests that usage of the site has averaged around 30 children / young people per week, with numbers higher during school holiday periods. The facility is not offering services during 2022 due to damage arising from Storm Eunice at the end of 2021. Ongoing engagement with Wild Thyme Outdoors has focused on

opportunities for off-site service provision, for example on compensation land. Wild Thyme Outdoors is considered to be of high sensitivity due to the frequency of use (prior to 2022) and the users of the service (primarily children with special needs). The magnitude of impact is considered to be major adverse, given the loss of a significant part of The Wilderness private woodland, such that the quality / integrity of the site as a location for providing outdoor educational services would be compromised. The significance of effect is identified as **large adverse** which is **significant**. Active engagement with Wild Thyme Outdoors is continuing to identify compensation land / alternative mitigation.

- 13.6.76 Community assets identified in Table 13.16 are of very high or high sensitivity as a result of their frequency of use by the community; the magnitude of impact is considered to be negligible as a result of the introduction of minor severance or the minor impacts on amenity due to changes in the local noise or traffic environment. Any severance or amenity effects on community assets are therefore assessed as **slight adverse** and **not significant**. Severance is assessed in more detail as part of the human health assessment contained later in this chapter and within the HEqIA (Application Document 7.10).

Construction workforce impacts – accommodation and the housing market

- 13.6.77 An assessment has been made in relation to impacts of the construction workforce on accommodation and the housing market and associated community facilities (notably healthcare). As noted in Section 15.3, impacts have been considered in relation to accommodation as a 'community asset', given the role of the private rented sector in particular in being used by Local Authorities to discharge statutory housing need and homelessness services.
- 13.6.78 The assessment has been undertaken at a Project-wide level, taking into account variations to the south and north of the River Thames (as it is assumed that workers would not commute across the river to work at Construction Compounds, and each area is distinct in terms of its Local Authorities responsible for housing, and defined as separate strategic housing market areas; and 'peak' effects in each of the north and south areas are predicted to occur at different times/phases within the Construction Period) and draws on information provided in the Workers Accommodation Report (Application Document 7.18).
- 13.6.79 The predicted construction workforce for the Project would peak at 4,514 people, although it is noted that the peak number of workers may take place at different times in the respective areas to the north and south of the River Thames. Assessing the potential impacts of the construction workforce on local housing markets has taken into account existing socio-economic characteristics of the local areas to the north and south of the River Thames, existing levels of accommodation in the private rented and visitor accommodation sectors, pressures on local accommodation associated with future planned residential and commercial developments, pre-existing pressures on the lower-end of affordability in the private rented sector currently used by Local Authorities to support people in receipt of housing benefit or homeless/at risk of homelessness, and assumptions around employment dynamics (for example

the proportions of workers who would be locally employed), contract tenures, types of accommodation likely to be sought, method of travel to construction compounds, and spatial distribution of the workforce.

- 13.6.80 Worker accommodation demand for the Project as a whole is summarised in Table 13.59. The proportion of the workforce anticipated to be drawn from the existing labour market (i.e. not moving to temporary accommodation in the area) has been assumed to be 35%, although evidence from other major construction schemes shows that much higher local employment rates can be achieved even in much smaller labour markets, and that this is likely therefore to be a conservative figure.
- 13.6.81 This assessment is based on the assumptions that accommodation would be provided onsite within construction compounds for the specialists that would work on the tunnel (to the north of the River Thames only). In addition, accommodation would be provided at this location for the small number of workers who would work in hyperbaric conditions during the tunnelling works. These personnel would stay under pressurised conditions for a period of time on site in a specialised facility.

Table 13.59 Likely demand for worker accommodation

Worker category	Percentage of total workforce	Total number (at Project construction peak)
Home-based	35%	1,580
Onsite (including hyperbaric)	10.7%	480
Remainder requiring accommodation (assuming peak construction workforce of 4,514)		2,454

- 13.6.82 The exact locations where workers may choose to live would depend on a number of factors including skill level, duration of work/contracts, price and abundance of accommodation, access to main homes, travel choices and accessibility to construction compounds, and Access to community and commercial facilities.
- 13.6.83 The Workers Accommodation Report (Application Document 7.18) draws on research for the labour market as a whole, and specific surveys for the construction industry in London, the East and the South-East, suggesting that construction workers are used to travelling further to work than average, up to 90 minutes from home. Those choosing to temporarily stay in accommodation in the local area to work on the Project during their on-shift period are assumed to be willing to travel up to 60 minutes from their temporary accommodation to their construction compounds.
- 13.6.84 Catchment areas for construction workers travelling by car from the northern and southern tunnel entrance construction compounds are shown in Plate 13.8 and Plate 13.9 respectively. The plates show the 30, 60 and 90 minute catchment areas. The commuting catchment area has been created assuming private car use during the AM peak, but it has also considered locations where public transport could be an option. Generally, while it is possible to cross between the north and south within 60 minutes, there are significant barriers to north–south movements including resilience of the Dartford Crossing, for example, as well as additional costs. Therefore, accommodation has been looked at distinctly between those working in the north and south and then also living on their respective side of the River Thames.

Plate 13.8 Workforce commuting catchment areas from the northern tunnel entrance compound

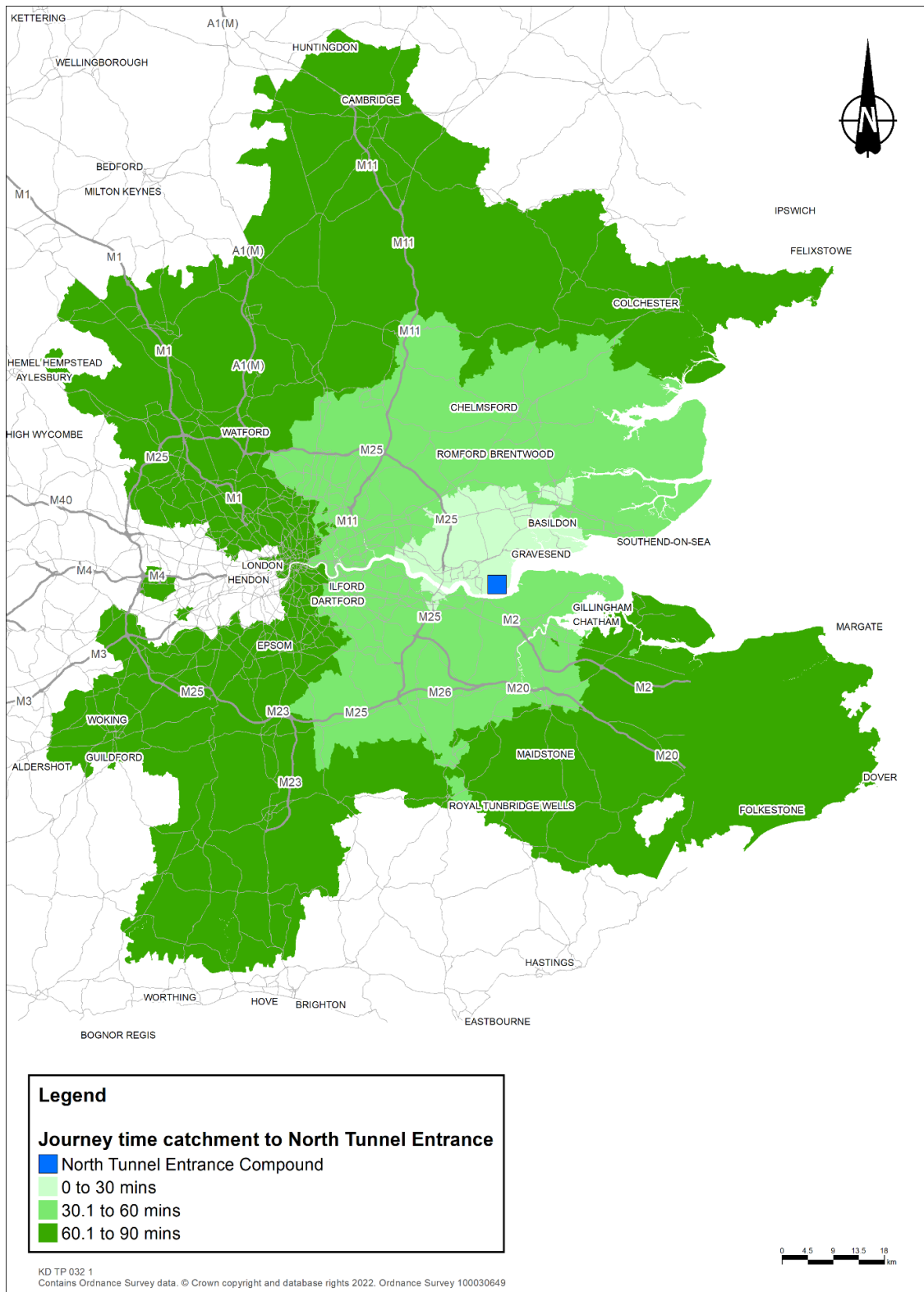
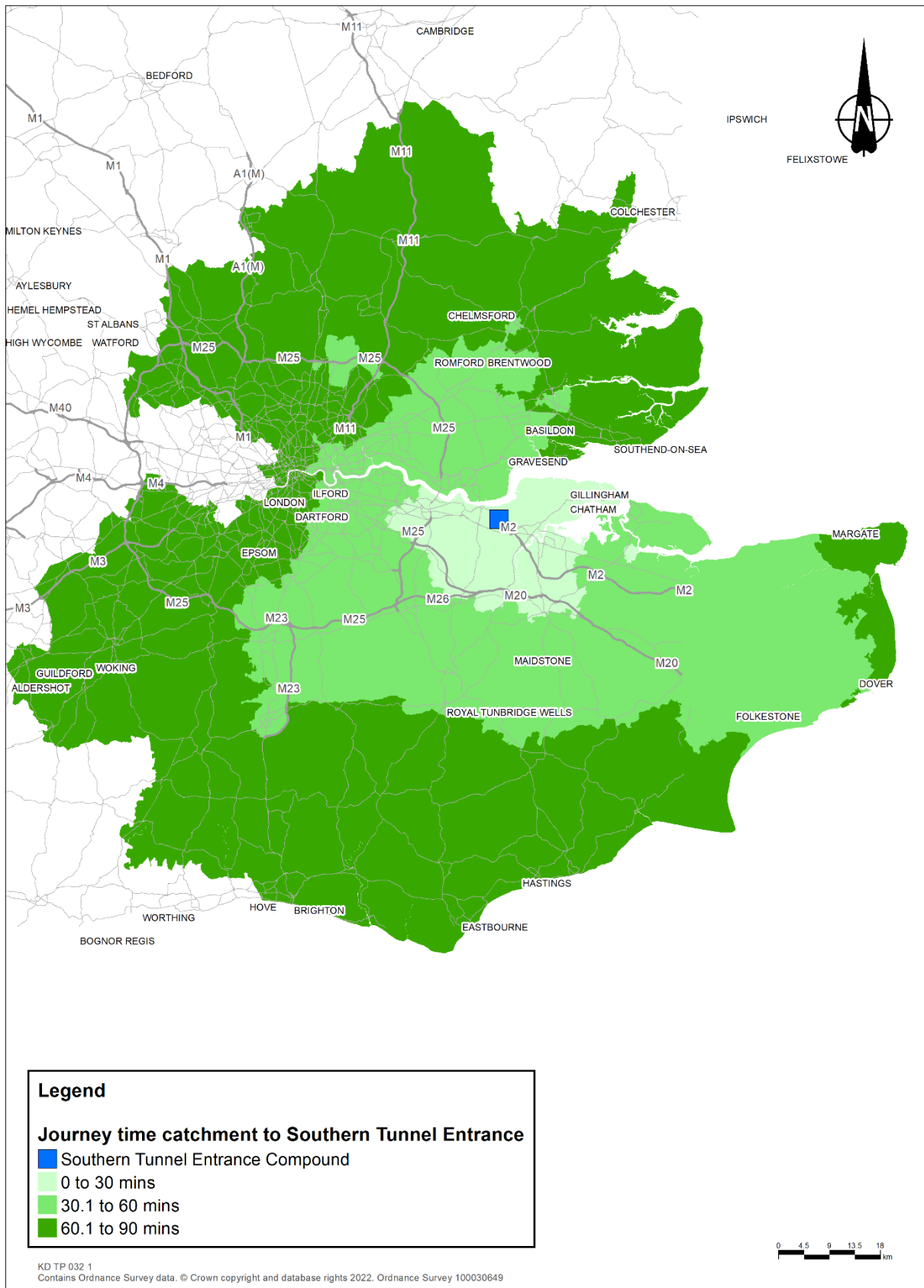


Plate 13.9 Workforce commuting catchment areas from the southern tunnel entrance compound



- 13.6.85 The greatest level of pressure in terms of workforce accommodation is on the private rented sector, where there may be competition between workers and local households for more affordable rented accommodation. Analysis of bedspace availability within the private rented to the north and south of the River Thames has shown that workers would utilise 0.65% of the overall supply of bedspaces to the north of the River Thames and 0.44% of the overall supply to the south of the River Thames (based on 2011 Census data).
- 13.6.86 A further potential source of accommodation for the construction workforce is visitor accommodation. This has also been assessed within the 60 minute catchment area where there are 53,794 bed spaces to the south of the River Thames and 31,643 bed spaces to the north of the Thames. Average occupancy levels in 2019 were around 79% for the north of the River Thames and 80% to the south of the River Thames. A conservative assumption has been made that 50% of the accommodation will be affordable and within a reasonable commute by car or public transport (less than or equal to 60 minutes by car or public transport). This brings the available number of bed spaces for visitor accommodation to approximately 8,702 in total, of which 5,379 are to the south of the River Thames and 3,323 are to the north.
- 13.6.87 In considering the operation of the housing market overall as a community asset, it has been accorded a very high level of sensitivity in that it is used by the majority of the community (more than 50%), that there are limited alternative facilities available at a local level, and that the private rented sector in particular is used as a resource for Local Authorities to discharge some of their statutory housing and homelessness prevention functions. The assessment of construction workforce demand for accommodation, based on a number of conservative assumptions detailed in the Workers Accommodation Report (Application Document 7.18), suggests there overall, there is capacity to meet the needs of the Project without significantly affecting the ability of the housing market to operate, at a strategic level. A sensitivity analysis and assessment of the Project in the context of other major developments in the pipeline has been applied. Taking the findings of this further analysis into account has led to the conclusion that the level of demand would represent a small proportion of supply and would remain well within the level of frictional vacancy available in the housing market at a Local Authority scale.
- 13.6.88 Stakeholders have raised concerns in relation to the impacts of the construction workforce on a constrained housing market. The Project recognises that there would be the potential for local concentrations in areas closest to the northern and southern tunnel entrance compounds and that despite there being a sizeable amount of accommodation available, there may be risks that this could cause issues in the more affordable element of the private rented sector which is most sensitive to competition.
- 13.6.89 Given concerns raised by local authorities about localised effects on some parts of the accommodation market, the Applicant is nonetheless proposing the following pro-active measures to monitor and manage the uptake of accommodation. These are secured via the Framework Construction Travel Plan (FCTP, Application Document 7.13):
- a. Accommodation Helpdesk – this would be operated by the Applicant and would be a tool to assist workers with finding suitable and available

accommodation near the Project. The helpdesk would support prospective providers of accommodation in understanding the Project and its workforce and managing tenancies safely and legally. Workers would not be mandated to use accommodation registered on the Accommodation Helpdesk. The Helpdesk would also oversee collation of monthly data from the Contractors and produce accommodation monitoring reports which would in turn inform where workers could be directed/recommended via the helpdesk.

- b. Accommodation database – the Contractors would be required to create and maintain a live database that monitors the accommodation being used by the workforce in terms of the type of accommodation (onsite project accommodation, private rented, spare rooms/latent, owner-occupied or tourist/visitor) and the location of this accommodation (via a postcode). The Contractors would mandate that its workforce, and those of its suppliers, regularly update their information related to the database for every worker. This database would be reported on a monthly basis to members of the Workforce Accommodation Working Group (WAWG).
- c. WAWG – this would include representatives from the Applicant, its Contractors, and local authorities. The WAWG would receive monthly workforce accommodation monitoring reports from the helpdesk, and regular updates and information from the Project including ‘look-ahead’ for potential workforce implications over a 12-month period led by the Applicant and Contractors. The findings of the workforce accommodation monitoring report would be considered alongside other information, such as other monitoring secured by the Project (e.g., via the Framework Construction Travel Plan (Application Document 7.13) and SEE Strategy (appended to Section 106 Agreements – Heads of Term (Application Document 7.3)) and information provided by local authorities on market conditions and other developments in the local area.

13.6.90 Contractors would also be required to propose further reasonably practicable measures which encourage a higher proportion of locally employed workers (thereby reducing demand for accommodation) and incentivise workers to live in areas which have higher capacity. Measures would be presented to the WAWG, and the Applicant would have due regard to comments raised at that group on the measures to be undertaken.

13.6.91 The early creation of an effective Accommodation Helpdesk would not only identify and direct workers to appropriate accommodation but would be a key mechanism, together with the accommodation monitoring reports, to monitor impacts on the local accommodation market.

13.6.92 The Helpdesk would also signpost potential landlords and businesses to assist and encourage bringing forward of latent beds to the market.

- 13.6.93 The Applicant would continue to monitor the combined impacts of accommodation and work with local authorities to assess impacts on local accommodation through the WAWG
- 13.6.94 Taking these factors and the measures highlighted above into account, the magnitude of impact is described as negligible overall. The significance of effect is therefore considered to be **slight adverse** and therefore **not significant**.

Construction workforce impacts – healthcare facilities

- 13.6.95 Section 4 of this Chapter (Baseline) identified a lack of capacity for primary healthcare services in the areas to the north and south of the River Thames, based on average list sizes per GP and feedback from health stakeholders via CIPHAG. Although there are plans for some new provision within the study areas to the north and south of the River Thames (for example the Tilbury Integrated Medical Centre is planned to be operational from 2024), this is to resolve existing capacity and resourcing issues rather than to meet additional healthcare needs from new populations such as migrant construction workers. Areas through which the Project route passes include populations which have poor health outcomes and high levels of health need.
- 13.6.96 It is assumed that 35% of the Project construction workforce would be existing residents in the local area and would therefore be already registered with existing GP practices. However, when the construction workforce is at its peak (2027), this would still leave nearly 3,000 construction workers additional to the area who would require access to primary and acute healthcare services. Taking this into account, the Project has secured a commitment in the REAC (Application Document 6.3, ES Appendix 2.2) whereby the Contractor will provide an appropriate range of medical and occupational healthcare services to meet the physical and mental health needs of the construction workforce. At this stage, it is noted that the range of services will be agreed with National Highways, following engagement with Integrated Care Partnerships.
- 13.6.97 The sensitivity of healthcare resources is considered to be very high, given that it is used by the majority of the community on a regular basis. With mitigation in place, it is considered that the magnitude of impact on primary healthcare services as a result of the presence of the construction workforce would be negligible and the effect would therefore be **slight adverse** and **not significant**.

Development land and businesses

- 13.6.98 The following section considers the impacts of the Project on development land and businesses. Likely effects relate to permanent land acquisition and temporary possession of land and to changes in levels of access or severance as a result of construction activities.

South of the River Thames

Development land

- 13.6.99 No development land has been identified within the Order Limits. Development land identified within the wider area, of relevance due to strategic employment-generating potential, includes Thames Gateway, Gravesend Opportunity Areas, Ebbsfleet Garden City proposals, the London Resort and plans for the

expansion of the Bluewater Shopping Centre. These sites are attributed a very high sensitivity due to their employment-generating potential. No direct impacts have been identified on these areas of development land as a result of construction activities associated with the Project, resulting in a **neutral** effect, which is **not significant**.

- 13.6.100 Indirect impacts relate to changes in accessibility and/or severance as a result of construction activities. For the purposes of modelling impacts the construction schedule from early 2025 to late 2030 has been divided into 11 phases. The Transport Assessment (Application Document 7.9) identifies impacts on journey times, with journey time changes noted where delays caused by construction activities are forecast to be more than one minute or over 5% of the journey time. Sections of the Affected Road Network (ARN) falling into this category to the south of the River Thames comprise the A2 junction 2 (with the M25) to M2 junction 1; delays on the A2 are forecast to commence in phase 2 of construction and last until the end of phase 4. Road closures to the south of the River Thames during construction include Brewers Road, which would be closed for a period of approximately 18 months to facilitate demolition of the existing bridge and construction of a replacement structure. The oTMPfC (Application Document 7.14) has been produced which sets the principles to be applied during the construction of the Project. Indirect impacts on development land as a result of changes in journey time are assessed as **minor adverse** and **not significant**.

Businesses

- 13.6.101 The following businesses to the south of the River Thames would be subject to property demolition to enable construction activities associated with the Project, namely:
- a. Depot located off Henhurst Road
 - b. Cobham Service Station (A2 westbound, ESSO)
 - c. Hartshill Nursery and Baylis Landscapes, Thong Lane
- 13.6.102 Each of the above has been attributed a medium sensitivity, by virtue of the area covered by each employment site (less than 1ha) in line with DMRB LA 112. Loss of these businesses would likely result in a cumulative loss of up to 30 jobs. Business owners and tenants would be able to claim compensation when their land or property is being compulsorily purchased, including for example the market value of the land, disturbance compensation and injurious affection compensation (where the construction or use of the Project has reduced the value of the remaining land). Each of the businesses would be lost to demolition, thereby resulting in a major magnitude of impact. This results in a **moderate adverse** significance of effect for each business, which is **significant**.
- 13.6.103 It is acknowledged that the ESSO Cobham Service Station is well used and that there are no plans for a direct replacement of this type of facility as part of the Project. In the south east, the Applicant is taking active steps to improve provision of roadside facilities, including making progress to explore the possibility of a new lorry park at Chigwell, and encouraging further service provision as a key element of the forthcoming Route Strategies in the region.

- 13.6.104 The impacts of the Project during construction on the SVGC have been described in relation to the loss of a private outdoor sporting facility earlier in this chapter.
- 13.6.105 Businesses otherwise affected during construction (for example subject to temporary possession of land or directly impacted by construction activities) are as follows:
- a. The Inn on the Lake is located immediately to the north of the A2. The site covers an area of between 1ha and 5ha and is therefore deemed to be of high sensitivity. Temporary possession of land and the permanent acquisition of rights would be required for environmental mitigation and proposed utility diversions. It is anticipated that a proportion of the car park would be used for a period of 18 months. The hotel, which has 76 bedrooms, is also used as a venue for weddings and other activities (a significant proportion of income to the business is from events). Access to the property would be maintained from the north via Thong Lane during construction; access would remain possible via Brewers Road except for when Brewers Road bridge is being replaced. The scale of construction activities taking place in and around the hotel are such that the business may not be operable for several years; engagement with the business is ongoing. The magnitude of impact is considered to be moderate adverse, as a result of effects which would compromise the viability of the property, resulting in a **moderate adverse** effect, which is **significant**.
 - b. Harlex Haulage Services Ltd is located on Park Pale (accessed from Brewers Road). The haulage company would be impacted by the planned closure of Brewers Road during the construction of the new Brewers Road green bridge; this is anticipated to be for a duration of 18 months. Alternative access arrangements would be via The Ridgeway, the A226 and the A289, resulting in a diversion of approximately 5km. The business would also be impacted by traffic management measures along Park Pale during the installation of a gas pipeline. The site covers an area of approximately 1ha and is therefore attributed a high sensitivity. The magnitude of impact is considered to be minor adverse due to the introduction of temporary severance, resulting in a **slight adverse** effect, which is **not significant**.
 - c. The Nook Pet Hotel, located on Brewers Road, would be impacted as a result of utilities works around the property in addition to changes in access associated with the closure of the Brewers Road bridge (estimated to be in the region of 18 months), although access to the property would be maintained at all times. The site is less than 1ha in size and is therefore accorded a medium sensitivity. The magnitude of impact is considered to be minor adverse as a result of changes in operating conditions for the business, resulting in a **slight adverse** effect, which is **not significant**.

North of the River Thames

Development land

- 13.6.106 Construction activities which may impact the site of the proposed Brentwood Enterprise Park relate to the connection of the Project with the M25 and A127. The Transport Assessment (Application Document 7.9) does not identify significant impacts on the A127 during construction. The Brentwood Enterprise Park site is part of Brentwood Borough Council's emerging Local Plan (Brentwood Borough Council, 2019) and has been attributed a very high sensitivity by virtue of its size (more than 5ha). Engagement with the promoters of the Brentwood Enterprise Park is ongoing regarding several matters, (these have included a gas pipeline diversion which has subsequently been de-scoped) and site access arrangements, to mitigate the impact of the Project. As a result of collaboration with the promoters of Brentwood Enterprise Park, the Order Limits have been revised to allow for potential future collaboration regarding the design of the access from the B186. The Applicant is progressing legal agreements with the promoters of Brentwood Enterprise Park to manage potential construction interfaces between the Project and the proposed Brentwood Enterprise Park should they both be under construction at the same time; further information is provided in Application Document 7.17 (Interrelationships with other Nationally Significant Projects and Major Development Schemes). As such, the magnitude of impact is considered to be minor, resulting in a **moderate adverse** effect, which is considered **significant**.
- 13.6.107 The Tilbury2 order limits overlap with the Project Order Limits along the infrastructure corridor to the south of the Tilbury Loop railway line. This land is required by Tilbury2 for the construction of storage areas, highways and associated works and a rail line. The land would also be required by the Project for the installation or diversion of underground utilities within a multi-utility corridor. Temporary possession of land is required from within the Order Limits for the Tilbury2 DCO project to facilitate access for the North Portal construction area (temporary possession of land equates to approximately 27ha). Tilbury2 is of very high sensitivity due to its size; the magnitude of impact is considered to be negligible as a result of the proportion of land impacted and the likely timing of construction activities such that the development of the Tilbury2 project would not be affected. This results in a **slight adverse** effect, which is **not significant**. Further information about the interrelationship between Tilbury2 and the Project is provided in Application Document 7.17 (Interrelationships with other Nationally Significant Projects and Major Development Schemes).
- 13.6.108 The Port of Tilbury (PoT) Freeport Tax Site boundary (part of the Thames Freeport designation) overlaps with the Project Order Limits at Tilbury Fields immediately east of the consented Tilbury2. Tilbury Fields was proposed as a new park of approximately 45 hectares on the northern banks of the River Thames; however the proposed site includes riverside land earmarked for port facilities as part of the Port of Tilbury Freeport Tax Site development, essential to the Port's development ambitions. Given the critical importance of the land to Thames Freeport, and in the interest of supporting sustainable local development and regional economic growth in the region, the Applicant, in consultation with the DfT and the Department for Levelling Up, Housing and Communities (DLUHC), has revised its proposals for Tilbury Fields to avoid any fundamental conflict with Thames Freeport.

- 13.6.109 Proposals for the revision to Tilbury Fields relocate a substantial amount of the planned open space and ecological mitigation to the land east of the Project, substantially reducing the overlap in the proposed area of permanent land acquisition. There remains a small overlap of the area identified for permanent land acquisition and the PoT Freeport Tax Site boundary, comprising a corner of the planned port development areas located to the west of the Lower Thames Crossing tunnel. This land, which would be required to manage the change in levels between the port facilities and the landscaping associated with the Project is a matter of discussion with Port of Tilbury London Limited (PoTLL) and it is anticipated that an agreement will be reached between the two parties. Thames Freeport is of very high sensitivity due to its size; the magnitude of impact is considered to be minor as a result of the proportion of land impacted and the likelihood for the Project not to adversely affect the progression of proposals for the Freeport. This results in a **moderate adverse** effect, which is **significant**.
- 13.6.110 Other areas of development land identified in the study area comprise land south of Bucklands Camp, Ockendon Solar Farm, and the Orsett Quarry ecological park proposals. The sensitivity of each of these sites is considered to be medium due to the fact that limited alternative facilities are available in the local area and the proposals do not have an employment or residential aspect to them. The magnitude of impact is considered to be negligible in that there may be some minor detrimental alteration to existing characters or features, resulting in a **neutral** significance of effect, which is **not significant**.
- 13.6.111 Development land identified within the wider area, of relevance due to strategic employment-generating potential, includes the Purfleet on Thames regeneration project, Lakeside Shopping Centre expansion plans and the Thames Enterprise Park proposals. These sites are attributed a very high sensitivity due to their employment-generating potential. No impacts have been identified on these areas of development land as a result of construction activities associated with the Project resulting in a **neutral** effect, which is **not significant**.

Businesses

- 13.6.112 The Cranham solar farm would be subject to demolition. The site would also be impacted by utility diversions and forms part of environmental mitigation proposals. The site has been attributed a high sensitivity, by virtue of it covering an area of between 1ha and 5ha. Due to the nature of the business, loss of employment associated with demolition of the solar farm would be low. Loss of the Cranham solar farm is assessed as having an impact of major adverse magnitude, resulting in a **large adverse** effect, which is **significant**.
- 13.6.113 Recycled in Orsett has been attributed a high sensitivity in accordance with DMRB LA 112 (Highways England, 2020b), by virtue of the area covered by the site. The permanent acquisition of 2,300m² of land would be required to enable highways works at this location; the area of permanent land required forms a very small proportion of the overall site area. A second area of impact relates to the temporary possession of land and the permanent acquisition of rights for utilities totalling circa 3,300m². The magnitude of impact is considered to be negligible, resulting in a **slight adverse** effect, which is **not significant**.

- 13.6.114 Orsett Showground would be subject to permanent acquisition of land to enable highway construction, together with the acquisition of permanent rights in association with the diversion of a high-pressure gas pipeline. Approximately 1.3ha of land would be compulsorily acquired for the highway. In addition, a corridor for permanent rights would be acquired within a 1ha area of land for the operation and maintenance of the diverted gas pipeline. The purpose of the permanent acquisition of land at this location is to enable highways works where the Project would merge with the A13 slip road onto the Orsett Cock junction, the existing A13 link road alignment plus associated earthworks, and the realignment of Rectory Road together with associated earthworks.
- 13.6.115 These works are programmed to take up to two years and over this period would have an operational impact on the showground in terms of the useable area and potential impacts on access and amenity of users. There would also be temporary possession of land to enable construction of a gas pipeline diversion, together with the acquisition of permanent rights for this area. Land required for temporary utility works would be returned to its existing condition upon the completion of the works. Orsett Showground is identified as a receptor of very high sensitivity due to it covering an area greater than five hectares in size (the total size of the site is approximately 15ha). The magnitude of impact is considered to be minor adverse, resulting in a **moderate adverse** effect, which is **significant**.
- 13.6.116 Businesses subject to changes as a result of construction activities are summarised below:
- a. Readmans Industrial Estate, East Tilbury, is located outside of the Order Limits and would not be directly impacted by the Project in terms of permanent land acquisition or temporary possession of land. However, there may be an indirect effect associated with traffic management measures required along Station Road, which forms the main access. Traffic management measures are described in more detail in the oTMPfC (Application Document 7.14) and are likely to remain in place for up to one year. The Industrial Estate covers an area of approximately 4ha in size and is therefore attributed a high sensitivity. The magnitude of impact associated with construction activities is considered to be minor adverse, resulting in a **slight adverse** effect, which is **not significant**.
 - b. The Manor Farm Shop is located on Ockendon Road. During construction, access to the shop would be impacted as a result of planned closures to Ockendon Road. Diversion routes may include Dennis Road and Dennises Lane or St Mary's Lane (depending on direction of travel). Manor Farm Shop is attributed a medium sensitivity (as a site of <1ha in size). The magnitude of impact is considered to be moderate due to the vulnerability of smaller businesses to changes in customer access. This would result in a **moderate adverse** effect, which is **significant**.

- c. The Manor Farm fishing lake, which is located within the Order Limits as part of environmental mitigation measures, would not be impacted during construction works in terms of its use for recreational fishing purposes. The lake, which is a privately run recreational facility, is attributed a low sensitivity and the magnitude of impact is considered to be negligible, resulting in a **negligible effect** which is **not significant**.
- d. Two further private fishing lakes, Hobb's Hole and Moat Lake, are located just outside of the Order Limits. Both lakes are in very close proximity to construction activities which may result in changes to characteristics of these features. The land surrounding Hobb's Hole Fishing Lake is designated as replacement land for impacts on Thames Chase Forest Centre and as such access arrangements to the lake would need to be changed; similarly, the pedestrian route used to access Moat Lake is proposed to be improved as part of the Project. Construction of the Project would not affect the operation of either fishing lake. Both fishing lakes are attributed a low sensitivity and the magnitude of impact is considered to be negligible, resulting in a **negligible effect** which is **not significant**.
- e. Tarmac Topblock is located to the north of Linford, off Buckingham Hill Road. The main site is used for the manufacture and storage of building products (notably aircrete blocks). A registered landfill (Linford Quarry) is located to the west of the site and is used for the disposal of rejected or broken aircrete blocks manufactured at the Tarmac factory. At the time of writing, approximately 40 hectares of the site are undergoing restoration works which were originally due to be completed in 2013 but which have since been extended to March 2025. While no impacts are predicted on the operation of the main site as a result of works to the overhead power lines, the landfill site would be subject to temporary possession in order to allow construction of an embankment at this location, impacting upon Tarmac's usage of the landfill during this time. The site is attributed a high sensitivity. The magnitude of impact is described as minor adverse, due to the introduction of a change in operating conditions, resulting in a **slight adverse effect**, which is **not significant**.
- f. Latchford Farm Aquatics is located on St Mary's Lane, Upminster. There would be temporary impacts during construction. Measures would be put in place so that access would be maintained at all times. The site is attributed a medium sensitivity. The magnitude of impact is considered to be minor adverse, resulting in a **slight adverse effect**, which is **not significant**.
- g. KLT Utilities Ltd – Station Road Yard is located on Station Road, East Tilbury. There would be temporary impacts during construction due to the installation of overhead powerlines. The site is attributed a medium sensitivity. The magnitude of impacts is considered to be minor adverse, resulting in a **slight adverse effect**, which is **not significant**.

- h. The Foxhound Riding School is a private business providing equestrian facilities and a tack shop, located in the vicinity of Baker Street. Although the Riding School is not within the Order Limits and not directly affected by the proposals for the project, the business has concerns about the impact of noise on their day to day operations such that there may be a discernible change in usage as a result of safety concerns from users (arising from the impacts of construction noise on the horses themselves). The site is attributed a high sensitivity. The business is attributed a high level of sensitivity on the basis of area covered. Engagement is ongoing with the riding school to fully understand the nature of their concerns. Given the current location of the Riding School in terms of proximity to the A13, it is not considered that construction of the Project would have a materially worse effect. As such, the magnitude of impact is considered to be minor, resulting in a **slight adverse** effect which is considered to be **not significant**.

Agricultural land holdings

- 13.6.117 During construction, a total of 1804.65ha of land within agricultural landholdings would be affected. The impacts on each affected landholding are assessed in the following sections.

South of the River Thames

- 13.6.118 A total of 27 landholdings in agricultural use would be affected south of the River Thames, as shown on Figure 13.5 (Application Document 6.2).
- 13.6.119 Land would be required temporarily during the construction phase or permanently. The temporary and permanent land requirement would occur simultaneously at the start of the construction phase, resulting in a combined impact on each holding. As works are completed during the construction phase, land required temporarily (for example construction compounds) would be returned to agricultural use to reduce the impact on individual holdings.
- 13.6.120 The impacts on each landholding during construction are summarised in Table 13.60. This shows the maximum area of each holding required during construction. The percentage figure stated is based on the known extent of the landholding in relation to how it overlaps or intersects with the order limits; as such it presents a worst-case scenario where there are additional land areas under the same ownership. Severance impacts are based on the extent to which land remains accessible with the implementation of the measures outlined previously – it is assumed that, as existing highways connections would be maintained and accommodation works would seek to maintain access as far as practicable, severance would not be a significant impact. Should it become apparent during ongoing landowner engagement that severance is an issue, this would be dealt with through negotiation and agreement with the landowner.

Table 13.60 Summary of effects on landholdings – south of the River Thames

Holding ID (see figure 13.5)	Area of holding required	Percentage of holding required during construction	Sensitivity to change	Magnitude of impact	Classification of effect during construction
CON13011956	0.970	28.4	High	Moderate	Large
GRP341	80.865	21.9	Low	Moderate	Slight
GRP149	9.135	100.0	Low	Major	Moderate
GRP332	52.119	85.9	Low	Major	Moderate
CON20062081	6.219	100.0	High	Major	Very large
GRP007	19.931	44.1	Low	Moderate	Slight
GRP119	77.033	90.6	Medium	Major	Large
GRP077	51.157	52.4	Low	Major	Moderate
CON13016957	1.834	100.0	High	Major	Very large
GRP306	3.495	100.0	High	Major	Very large
GRP053	10.428	56.4	High	Major	Very large
GRP043	50.181	91.6	Low	Major	Moderate
GRP009	9.616	17.0	High	Minor	Moderate
GRP052	48.212	78.9	Medium	Major	Large
GRP010	0.705	11.1	Low	Minor	Slight
GRP330	7.830	4.9	High	Negligible	Slight
GRP151	0.362	0.7	High	Negligible	Slight
GRP056	7.830	30.7	High	Moderate	Large
CON10035438	0.155	16.6	High	Minor	Moderate
GRP058	0.808	4.2	High	Negligible	Slight
GRP112	5.989	4.1	High	Negligible	Slight
GRP016	0.174	34.7	High	Moderate	Large
GRP002	52.115	61.4	Low	Major	Moderate
GRP124	3.259	100.0	High	Major	Very large
GRP304	3.266	100.0	Low	Major	Moderate
GRP184	7.620	100.0	Low	Major	Moderate
GRP047	9.791	84.6	High	Major	Very large

13.6.121 Approximately 185.1ha of land associated with agricultural landholdings required for construction would be returned to agricultural use by the end of the construction phase. The effect on each landholding at the end of the construction phase as a result of land being reinstated is summarised in Table 13.61 (there would be no change to the severance impacts).

Table 13.61 Summary of effects on landholdings once land required temporarily has been returned – south of the River Thames

Holding ID	Area of holding required permanently	Percentage of holding required permanently	Sensitivity to change	Magnitude of impact	Classification of effect once land required temporarily has been returned
CON13011956	0.108	3.2	High	Negligible	Slight
GRP341	80.544	21.8	Low	Moderate	Slight
GRP149	6.363	69.7	Low	Major	Moderate
GRP332	39.453	65.0	Low	Major	Moderate
CON20062081	6.219	100.0	High	Major	Very large
GRP007	19.917	44.0	Low	Moderate	Slight
GRP119	69.288	81.5	Medium	Major	Large
GRP077	7.684	7.9	Low	Minor	Slight
CON13016957	1.834	100.0	High	Major	Very large
GRP306	3.495	100.0	High	Major	Very large
GRP053	4.920	26.6	High	Moderate	Large
GRP043	22.146	40.4	Low	Moderate	Slight
GRP009	0.000	0.0	High	No change	Neutral
GRP052	12.083	19.8	Medium	Minor	Slight
GRP010	0.000	0.0	Low	No change	Neutral
GRP330	0.000	0.0	High	No change	Neutral
GRP151	0.113	0.2	High	Negligible	Slight
GRP056	0.000	0.0	High	No change	Neutral
CON10035438	0.000	0.0	High	No change	Neutral
GRP058	0.308	1.6	High	Negligible	Slight
GRP112	0.000	0.0	High	No change	Neutral
GRP016	0.000	0.0	High	No change	Neutral
GRP002	39.449	46.5	Low	Moderate	Slight
GRP124	2.826	86.7	High	Major	Very large
GRP304	2.378	72.8	Low	Major	Moderate
GRP184	7.620	100.0	Low	Major	Moderate
GRP047	9.239	79.8	High	Major	Very large

13.6.122 During the construction phase, 27 landholdings would be temporarily affected, of which 20 would experience **moderate to very large adverse** effects, which would be considered **significant**. Overall, following the reinstatement of land required temporarily by the end of the construction phase, 20 landholdings in

agricultural use would be permanently affected, of which 11 would experience **moderate to very large adverse** effects, which would be considered **significant**.

- 13.6.123 However, compensation would be payable in accordance with the Statutory Compensation Code. Consultation with landowners, occupiers and agents would continue as the Project develops to manage and reduce impacts on property owners as far as reasonably possible.

North of the River Thames

- 13.6.124 A total of 36 identifiable landholdings in agricultural use would be affected north of the River Thames, as shown on Figure 13.5 (Application Document 6.2).
- 13.6.125 Land may be required temporarily during the construction phase or permanently. The temporary and permanent land requirement would occur simultaneously at the start of the construction phase, resulting in a combined impact on each holding. As works are completed during the construction phase, land not required permanently would be returned to agricultural use to reduce the impact on individual holdings.
- 13.6.126 The effects on each holding during construction are summarised in Table 13.62. This shows the maximum area of each holding required during construction. The percentage figure stated is based on the known extent of the landholding in relation to how it overlaps or intersects with the order limits; as such it presents a worst-case scenario where there are additional land areas under the same ownership. The effects of severance are based on the extent to which land remains accessible with the implementation of the measures outlined previously – it is assumed that, as existing highways connections would be maintained (with the exception of Hornsby Lane) and accommodation works would seek to maintain access as far as practicable, severance would not be a significant impact. Should it become apparent during ongoing landowner engagement that severance is an issue, this will be dealt with through the proposed landowner compensation negotiations.

Table 13.62 Summary of effects on landholdings – north of the River Thames

Holding ID (see figure 13.5)	Area of holding required	Percentage of holding required during construction	Sensitivity to change	Magnitude of impact	Classification of effect during construction
CON10058775	0.353	15.5	High	Minor	Moderate
GRP036	2.662	46.5	High	Moderate	Large
GRP152	8.159	100.0	High	Major	Very large
GRP023	117.868	35.4	Low	Moderate	Slight
GRP054	3.596	18.7	High	Minor	Moderate
GRP331	1.633	12.8	High	Minor	Moderate
GRP109	1.111	100.0	Low	Major	Moderate
GRP335	3.044	2.4	Low	Negligible	Slight

Holding ID (see figure 13.5)	Area of holding required	Percentage of holding required during construction	Sensitivity to change	Magnitude of impact	Classification of effect during construction
GRP035	8.049	69.9	Low	Major	Moderate
CON10039643 CON10039678	0.029	0.3	Low	Negligible	Slight
GRP040	1.158	7.0	Low	Minor	Slight
GRP329	5.564	76.9	High	Major	Very large
ORG20001466	2.631	33.5	High	Moderate	Large
GRP001	643.437	34.9	Low	Moderate	Slight
GRP133	38.566	94.0	Low	Major	Moderate
GRP042	88.765	76.2	Low	Major	Moderate
GRP045	18.148	86.6	Low	Major	Moderate
GRP106	2.143	3.9	Low	Negligible	Slight
GRP322	0.149	100.0	High	Major	Very large
CON10057184	0.268	8.3	High	Minor	Moderate
GRP027	5.530	6.2	Low	Minor	Slight
GRP087	12.036	49.3	Low	Moderate	Slight
CON10056526 CON10056530	0.652	33.1	High	Moderate	Large
CON10030124	0.265	13.3	High	Minor	Moderate
GRP022	32.561	19.2	Low	Minor	Slight
GRP019	12.169	9.8	Low	Minor	Slight
GRP006	0.949	33.1	High	Moderate	Large
GRP317	6.883	13.5	Low	Minor	Slight
GRP114	98.782	96.6	Low	Major	Moderate
ORG10000019	2.632	67.9	High	Major	Very large
GRP024	30.559	27.1	Low	Moderate	Slight
GRP041	70.596	31.0	Low	Moderate	Slight
ORG20001529	0.030	2.6	Low	Negligible	Slight
ORG20001561 ORG20001562 ORG20001563	1.012	2.7	Low	Negligible	Slight
GRP272	8.197	96.3	Low	Major	Moderate
GRP142	53.369	56.1	Low	Major	Moderate

13.6.127 Approximately 542.15 ha of land associated with agricultural landholdings required for construction would be returned to agricultural use by the end of the construction phase. The effect on each landholding at the end of the construction phase (i.e. once land required temporarily has been reinstated) is summarised in Table 13.63 (there would be no change to the severance impacts).

Table 13.63 Summary of effects on landholdings once land required temporarily has been returned – north of the River Thames

Holding ID	Area of holding required permanently	Percentage of holding required permanently	Sensitivity to change	Magnitude of impact	Classification of effect once land required temporarily has been returned
CON10058775	0.0000012	0.00005	High	Negligible	Slight
GRP036	0.119	2.1	High	Negligible	Slight
GRP152	5.469	67.0	High	Major	Very large
GRP023	70.384	21.1	Low	Moderate	Slight
GRP054	2.143	11.2	High	Minor	Moderate
GRP331	0.000	0.0	High	No change	Neutral
GRP109	1.111	100.0	Low	Major	Moderate
GRP335	0.002	0.0	Low	Negligible	Slight
GRP035	0.491	4.3	Low	Negligible	Slight
CON10039643 CON10039678	0.000	0.0	Low	No change	Neutral
GRP040	0.000	0.0	Low	No change	Neutral
GRP329	5.564	76.9	High	Major	Very large
ORG20001466	0.000	0.0	High	No change	Neutral
GRP001	309.239	16.8	Low	Minor	Slight
GRP133	10.882	26.5	Low	Moderate	Slight
GRP042	63.446	54.4	Low	Major	Moderate
GRP045	18.148	86.6	Low	Major	Moderate
GRP106	2.143	3.9	Low	Negligible	Slight
GRP322	0.070	46.9	High	Moderate	Large
CON10057184	0.268	8.3	High	Minor	Moderate
GRP027	0.000	0.0	Low	No change	Neutral
GRP087	10.164	41.6	Low	Moderate	Slight
CON10056526 CON10056530	0.000	0.0	High	No change	Neutral
CON10030124	0.198	9.9	High	Minor	Moderate

Holding ID	Area of holding required permanently	Percentage of holding required permanently	Sensitivity to change	Magnitude of impact	Classification of effect once land required temporarily has been returned
GRP022	15.548	9.2	Low	Minor	Slight
GRP019	12.169	9.8	Low	Minor	Slight
GRP006	0.801	27.9	High	Moderate	Large
GRP317	0.000	0.0	Low	No change	Neutral
GRP114	98.782	96.6	Low	Major	Moderate
ORG10000019	2.513	64.8	High	Major	Very large
GRP024	26.445	23.5	Low	Moderate	Slight
GRP041	31.789	14.0	Low	Minor	Slight
ORG20001529	0.030	2.6	Low	Negligible	Slight
ORG20001561 ORG20001562 ORG20001563	0.000	0.0	Low	No change	Neutral
GRP272	1.174	13.8	Low	Minor	Slight
GRP142	52.313	55.0	Low	Major	Moderate

13.6.128 During the construction phase, 36 landholdings would be temporarily affected, of which 21 would experience **moderate to very large adverse** effects, which would be considered **significant**. Overall, following the reinstatement of land required temporarily by the end of the construction phase, 28 landholdings in agricultural use would be permanently affected, of which 13 would experience **moderate to very large adverse** effects, which would be considered **significant**.

13.6.129 However, compensation would be payable in accordance with the Compensation Code. Consultation with landowners, occupiers and agents would continue as the Project develops, to manage and reduce impacts on property owners as far as reasonably possible.

Walkers, cyclists and horse riders (WCH)

13.6.130 The following sections consider the impacts of the Project on WCH. Likely effects during construction include severance of routes with associated changes in journey length and changes in the amenity value of individual routes. WCH routes considered include both PRow and minor roads crossing the Project route.

13.6.131 Sensitivity of individual routes has been identified using the criteria set out in Table 13.3 and have been informed by user counts and condition surveys.

South of the River Thames

- 13.6.132 PRow to the south of the River Thames which would be temporarily or permanently affected by the Project during the construction phase are listed in Table 13.64. An assessment of the effects on minor roads severed or otherwise affected by the Project are shown in Table 13.65. The tables provide details around the estimated duration of effects together with likely changes in journey length for users.
- 13.6.133 PRow may be affected by changes in amenity as a result of construction activities. Detail relating to effects on PRow users is set out in Chapter 7: Landscape and Visual and Chapter 12: Noise and Vibration, and has been incorporated into the human health assessment and the HEqIA (Application Document 7.10).

Table 13.64 PRow temporarily or permanently affected by the Project – south of the River Thames

Receptor	Nature of effect	Change in journey length	Sensitivity of route	Magnitude of impact	Significance of effect
NS169	The eastern section of the existing route would be affected by the main construction works and would be permanently closed until the diversion is opened to the north and across the Thong Lane green bridge. To maintain connectivity between Shorne Wood Country Park and residential areas to the west during the construction phase, the Project would create new routes and open these to the public within a month of closing the existing route. For safety reasons the intermittent closures/interference of the route would be necessary to facilitate key works such as overhead line diversions.	<50m	Medium	Negligible	Neutral
NS167	Impacts during the construction phase would result from required utility diversion works, which may affect the route for a period of up to 48 months. To maintain connectivity between Shorne Wood Country Park and residential areas to the west during the construction phase, the Project would aim to install new routes and open these to the public within a month of closing the existing route. A temporary designated walkway would be provided adjacent to the existing Thong Lane to connect the new routes prior to installation of the new Thong Lane Green bridge. For safety reasons the intermittent closures/interference of the route would be necessary to facilitate key works such as overhead line diversions. Although the length of route has increased by more than 500m and this would therefore constitute a major adverse magnitude of effect in line with DMRB LA 112, the nature of the route is recreational and as such the greater distance may not be perceived as an adverse effect by users (indeed, it may have a health benefit in terms of encouraging levels of physical activity).	>500m	Medium	Major	Moderate

Receptor	Nature of effect	Change in journey length	Sensitivity of route	Magnitude of impact	Significance of effect
NS174	<p>This footpath is to be impacted by construction activities between the A2 and Thong Lane green bridge and would be temporarily closed for a duration of 48 months. A new bridleway is proposed to be created following the eastern edge of Riverview Park, before connecting into a network of proposed routes at Thong Lane. This is to be constructed early in the construction programme.</p> <p>The new footpath would form part of a wider network of routes to allow for continued connectivity to Shorne Wood Country Park to the east. The Project would aim to install new routes and open these to the public within a month of closing the existing route.</p> <p>Although the length of route has increased by more than 500m and this would therefore constitute a major adverse magnitude of effect in line with DMRB LA 112, the nature of the route is recreational and as such the greater distance may not be perceived as an adverse effect by users (indeed, it may have a health benefit in terms of encouraging levels of physical activity).</p>	>500m	Medium	Major	Moderate
NCR177	<p>NCR 177 between Gravesend East junction and the Park Pale bridge over the A2 would initially be affected by utility works. The route would also be permanently closed to accommodate the new LTC/A2 junction. Upgrades to existing footpaths and tracks would be undertaken prior to the closure of the existing NCR177 alignment to ensure that a suitable alternative route is available; once works are complete an alternative roadside route would be available as a permanent diversion.</p> <p>Following engagement with Forestry England, the Order Limits was amended to allow the temporary diversion of NCR 177 and to keep cyclists separate to the horse riding trail to the north within Jeskyns Community Wood. The Order Limits were amended to keep the temporary diversion following an existing trail (the Darnley Trail) within Ashenbank Wood in response to feedback from the Woodland Trust.</p>	<p>Temporary: 250-500m</p> <p>Permanent: 100m</p>	Very high	<p>Temporary and permanent: Negligible</p>	<p>Temporary and permanent: Slight adverse</p>

Receptor	Nature of effect	Change in journey length	Sensitivity of route	Magnitude of impact	Significance of effect
	<p>The route from Gravesend East junction to B262 Hall Road would also be affected by utilities works to divert overhead lines. The proposed temporary diversion route as detailed above would also be impacted by these works. Options to reduce the impacts to this route including the introduction of measures such as protection scaffolds over the existing route or additional temporary local diversions.</p> <p>Although both the temporary and permanent diversions to NCR 177 involve increased travel distances, these are not considered to be significant in terms of affecting their level of use by cyclists in terms of the overall distances typically travelled by cyclists using the route; both the temporary and permanent diversion routes allow for improved user experience.</p>				
NU48	The route would be affected by utility works where the route crosses the Order Limits to the north of the A2, requiring temporary closure. The existing footpath would be temporarily diverted around the working area to maintain access.	<50m	Medium	Negligible	Neutral
NS161	A temporary diversion around the proposed utilities working area would be in place for the duration of works here, which is anticipated to last for approximately six months.	<50m	Medium	Negligible	Neutral
NG/2	The route may be affected by the utility works proposed for providing power to the Milton Compound and would require a temporary closure of <1 month. No diversion is proposed for this period of time.	None	Medium	No change	Neutral
NS164	The route would be affected by utility diversion works requiring temporary closure for four months for gas pipeline diversion works and for two periods of two months for overhead line diversion works. In addition, a section of the existing route that coincides with the southern tunnel entrance compound would need to be closed for the duration of the construction phase. No diversion is proposed for the route during the construction phase.	>500m	Medium	Major	Moderate adverse

Receptor	Nature of effect	Change in journey length	Sensitivity of route	Magnitude of impact	Significance of effect
	Footpath NS164 is primarily a recreational route, although usage levels identified from surveys are low. Alternative recreation routes to the east and south of Shorne would be available for use.				
NS165	<p>The route would be affected by utility diversion works requiring temporary closure for four months for gas pipeline diversion works and two periods of two months for overhead line diversion works. In addition, a section of the existing route that coincides with the southern tunnel entrance compound would need to be closed for the duration of the LTC construction period. No diversion is proposed for the route for the construction phase.</p> <p>Footpath NS165 is primarily a recreational route, although usage levels identified from surveys are low. Alternative recreation routes to the east and south of Shorne would be available for use.</p>	>500m	Medium	Major	Moderate adverse
NG17/1	<p>A section of the existing route would need to be closed permanently to accommodate the A2 eastbound to A122 northbound slip road. The remaining route would be temporarily closed and the western end upgraded to bridleway.</p> <p>To maintain connectivity between Shorne Wood Country Park and residential areas to the west during LTC construction phase, the Project would aim to install new routes and ensure that these are open to the public within a month of closing the existing route. A temporary designated walkway would be provided adjacent to the existing Thong Lane to connect new routes, prior to installation of the Thong Lane Green Bridge over the Project.</p> <p>For safety reasons the intermittent closures/interference of the route would be necessary to facilitate key works such as overhead line diversions.</p> <p>Although the length of route has increased by more than 500m and this would therefore constitute a major adverse magnitude of effect in line with DMRB LA 112, the nature of the route is recreational and as such</p>	>500m	Medium	Major	Moderate

Receptor	Nature of effect	Change in journey length	Sensitivity of route	Magnitude of impact	Significance of effect
	the greater distance may not be perceived as an adverse effect by users (indeed, it may have a health benefit in terms of encouraging levels of physical activity).				
Footpaths NG7 and NG8	<p>These footpaths would need to be closed to facilitate construction of the South Portal and Gravesend link. Routes would be permanently diverted around the South Portal via new routes. However, these new routes would not be available until towards the end of the construction phase (circa 66 months).</p> <p>However as stated in respect of other routes in this area, although the length of the routes has increased by more than 500m, the nature of routes in this area is recreational and as such the greater distance may not be perceived as an adverse effect by users (indeed, it may have a health benefit in terms of encouraging levels of physical activity).</p>	>500m	Medium	Major	Moderate adverse
Footpath NS367/1	This route would be permanently closed to accommodate new link roads required to form the A122/A2/M2 junction. No permanent diversion is proposed; alternative routes with improved user experience are proposed in the wider area as part of the Project.	>500m	Low	Major	Slight adverse
KT/NS/195 KT/NS/311	These routes are not affected by works associated with the construction of the Project, but are to be upgraded to enable the diversion route for NCR 177. Currently the routes allow motorised vehicles, but this use would be suspended while the temporary route is in place. This would require a short term closure of less than one month in duration.	No change	Medium	No change	Neutral

Table 13.65 Minor roads affected by the Project – south of the River Thames

Receptor	Nature of effect	Change in journey length	Sensitivity of route	Magnitude of impact	Significance of effect
Thong Lane	Thong Lane would be affected by various construction activities, including the diversion of utility services, the construction of the Thong Lane green bridges and construction of the local link road between the Henhurst Road roundabout and the Thong Lane/Brewers Road roundabout. The new bridge structure over the Project would be built in stages to maintain access and therefore minimise disruption to users of this route. However, short-term closures would be necessary to divert traffic onto the temporary alignment.	No change	Very high	Negligible	Slight adverse
Brewers Road	The route would require temporary closure due to various construction works including demolition of the existing bridge, construction of the replacement structure and construction of local link road between Henhurst Road roundabout and the Thong Lane/Brewers Road roundabout. This would last for approximately 18 months to facilitate demolition of existing bridge and construction of replacement structure.	>500m	Very high	Major adverse	Very large adverse
A226 Gravesend Road	The route would require temporary closure due to various construction activities including the creation of a temporary haul route to provide access to the South Portal. This would take the form of a dedicated temporary access road from the A226 to the South Portal construction site.	No change	Very high	No change	Neutral

North of the River Thames

- 13.6.134 PRow to the north of the River Thames which would be temporarily severed or otherwise affected by the Project are listed in Table 13.66, with permanent effects described in Table 13.68. Where impacts are to be within the construction phase as well as the operational phase, these are recorded in both Table 13.69 and Table 13.70 for completeness. An assessment of the effects on minor roads severed or otherwise affected by the Project is shown in Table 13.67. The tables show the estimated periods of time that use of the route would be affected and changes in journey length for users. A number of roads may be temporarily closed for short durations, typically overnight or at weekends; these include Station Road, Heath Road, St Mary's Road and Love Lane.
- 13.6.135 PRow may be affected by changes in amenity as a result of construction activities. Detail relating to effects on PRow users is set out in Chapter 7: Landscape and Visual and Chapter 12: Noise and Vibration, and has been incorporated into the human health assessment and HEqIA (Application Document 7.10).

Table 13.66 PRoW temporarily or permanently affected by the Project – north of the River Thames

Receptor	Nature of effect	Change in journey length	Sensitivity of route	Magnitude of impact	Significance of effect
BR183	<p>The bridleway crosses the main works construction site and would be closed for a period of nine months. Temporary closure of the route is also likely for a period of three years for the section between the M25 and A127. Following construction the route would be diverted and upgraded.</p> <p>A short section of this route that falls within the Order Limits would be closed for five years. To mitigate the impacts of this closure the Project would aim to make an alternative route providing WCH access over the A127 and M25 available for use within a year of closing the existing route. The proposed new route would utilise the proposed new equestrian standard footbridge over the A127 and the existing Folkes Lane bridge.</p> <p>The diversion would allow for continued connectivity between Cranham and villages to the north-east.</p> <p>BR183 is used as a connecting footpath and bridleway between the outskirts of Cranham and Great Warley. The proposed alternative route connecting these locations is shorter by a distance of circa 2km than the existing route.</p>	Journey length reduced by approximately 2km	Medium	Moderate beneficial	Large beneficial
Thames Chase culvert	<p>The unofficial route through the culvert connecting the parcels of the Thames Chase Community Forest on either side of the M25 would be closed. Due to the high number of users of this route, a diversion is proposed passing along the BR289 on the western side of the M25, before following St Marys Lane and linking the two sections of Thames Chase Community Forest.</p> <p>Although the proposed diversion would be a greater distance from the car park at Thames Chase Forest Centre</p>	250-500m	Medium	Moderate beneficial	Moderate beneficial

Receptor	Nature of effect	Change in journey length	Sensitivity of route	Magnitude of impact	Significance of effect
	on the western side of the M25 to the Thames Chase Forest parcels on the eastern side of the motorway, the new route would provide improved user experience. As a recreational route, the increased distance is not considered to be a significant adverse effect.				
FP251	<p>During the construction period, this footpath is to be temporarily closed. The route would be realigned and made available after completion of the utilities diversion works (representing a closure of approximately 12 months).</p> <p>The footpath is formed of several sections. The diversion proposed only applies to the section running parallel to the east of the M25. This route does not currently appear to be well used, perhaps due to historic severance from the construction of the M25.</p>	<50m	Low	Negligible	Neutral
FP136	The route coincides with the Project alignment. The section of the route that falls within the Order Limits would be closed for a period of approximately 30 months to facilitate the diversion of utilities in the area and construction of the new FP136 footbridge to carry the route over the Project. The route would then be diverted and upgraded, and reopened once the FP136 footbridge is operational. The east-west section of FP136 would be surfaced and redesignated as bridleway, connecting to BR219.	250-500m	Medium	Moderate adverse	Moderate adverse
BR219	Two temporary closures, or alternative management, for periods of two months would be required to facilitate utilities diversion works. A further temporary closure of the section that falls within the Order Limits would be required for construction of the Project route for a period of 36 months.	>500m	Medium	Major adverse	Moderate adverse

Receptor	Nature of effect	Change in journey length	Sensitivity of route	Magnitude of impact	Significance of effect
	Following construction, the route would be upgraded, resurfaced and slightly realigned south of Mardyke prior to reopening. A new bridleway would connect to BR 219 and Green Lane.				
BR161	A section of Green Lane extending between Stifford Clays Road and the proposed new Green Lane bridge would be used as a construction access route. During this period, Bridleway 161 would be closed to WCH for safety reasons. A temporary diversion route is to be provided on the eastern side of the same field. Closure would be required for a period of 60 months. The Project includes for improvement to the route where it links to a new overbridge. A new section of bridleway is proposed linking BR219 and Green Lane to the north. To the south, a new pedestrian and cycle route will link Green Lane to Stifford Clays Road. This would allow for additional connectivity to the west.	<50m	Medium	Negligible	Neutral
BR206 / BR223	Utilities diversion works would initially require temporary closure of the route. The bridleway would be subsequently affected by main works to construct the link roads that form the LTC/A13 Junction and would be closed until a diversion via new routes N.038 and N.078 is opened towards the end of the Project construction phase. During the period of the closure an alternative route would be available via FP96, FP93, FP82, School Lane and Rectory Road. The temporary diversion would not be suitable for all users as the temporary diversion would not be designated as a bridleway.	<50m	Medium	Minor adverse	Slight adverse
FP79	The footpath would be severed by the construction of the Project. Closure would be required to facilitate utilities diversion works and construction of the Project mainline. During the period of closure, a temporary diversion route	>500m	Medium	Moderate adverse	Moderate adverse

Receptor	Nature of effect	Change in journey length	Sensitivity of route	Magnitude of impact	Significance of effect
	<p>would be made available via FP95, a new temporary footpath adjacent to Brentwood Road and the existing farm track opposite High House Lane.</p> <p>This route is primarily used for recreational purposes and as such, the longer length is not considered to constitute an adverse effect.</p>				
BR58 / FP61	<p>Utility over-head works and road construction works would require temporary closure of these routes for approximately two years. Once the Muckingford Road bridge over the Project is completed a temporary diversion would be created. The temporary diversion route would be in place until the construction works are complete or until it is safe to reopen the route via the proposed new alignment. The temporary diversion would run from the northern side of the railway line at Coal Road Path, and follow a north-easterly direction to Muckingford Road.</p> <p>These routes are primarily used for recreational purposes and as such, the longer length is not considered to constitute an adverse effect.</p>	>500m	Medium	Moderate beneficial	Moderate beneficial
FP200	<p>The northern end of the route would require temporary closure (60 months) due to utilities protection works and a section of the route would also be permanently closed to facilitate construction of a new viaduct to take the Project route over the Tilbury Loop railway line.</p> <p>New proposed routes and surface improvements as part of the Project would be made available prior to closure of the existing FP200 route to provide a suitable alternative during the construction period. The central and eastern section of the route would be realigned, resurfaced and redesignated as bridleway between Station Road and Coal House Fort.</p>	250-500m	Medium	Moderate beneficial	Moderate beneficial

Receptor	Nature of effect	Change in journey length	Sensitivity of route	Magnitude of impact	Significance of effect
FP104	The southern end of the existing route would be impacted by utilities diversion works. The section of this route that falls within the Order Limits would be closed during this period. The route would then be reopened on the existing alignment or via a minor diversion to avoid construction works associated with the /A13/A1089/A122 junction. The route would be affected for a period of approximately eight months.	50-250m	Medium	Minor	Slight adverse
FP107	Utilities diversion works would require the temporary stop up of FP107. Mitigation measures would be sought to maintain the footpath during construction with localised diversions.	50-250m	Medium	Minor	Slight adverse
FP105	The northern end of the existing route would be impacted by utilities diversion works and subsequent works to construct the link roads that form the /A13/A1089/A122 junction. The section of FP105 that falls within the Order Limits (approx. 60m) would be closed during the Project construction phase for a period of approximately 60 months.	50-250m	Medium	Minor	Slight adverse
FP30	Utility over-head works and road construction works would require temporary closure of the route for approximately two years. Once the new Muckingford Road bridge is completed a temporary diversion would be created with surface improvements. The temporary diversion route would be in place until construction works are complete or until it is safe to reopen the route via the proposed new alignment. The temporary diversion will run from the northern side of the railway line at Coal Road Path, following a north-easterly direction to Muckingford Road. The diversion	>500m	Medium	Major adverse	Moderate adverse

Receptor	Nature of effect	Change in journey length	Sensitivity of route	Magnitude of impact	Significance of effect
	route would be approximately 2km in length, connecting up with FP66 at the western end (Muckingford Road) and Bridleway 58 at the southern end. These routes are primarily used for recreational purposes and as such, the longer length is not considered to constitute an adverse effect.				
FP146	This route would be subject to a temporary closure for a period of less than one month to allow for a section of the Two Forts Way to be upgraded for use by pedestrians and cyclists.	No change	Medium	No change	Neutral
FP176	The footpath would be affected by gas pipeline diversion works and other construction activities. A temporary closure is likely to be required for three years. The diversion would increase the journey length of users by greater than 500m. This route is primarily used for recreational purposes and as such, the longer length would not necessarily constitute an adverse effect.	>500m	Medium	Major	Moderate adverse
FP177	A short section of route that falls within the Order Limits would be closed for a period of around five years during the construction phase.	<50m	Medium	Negligible	Neutral
FP179	The footpath would be affected by gas pipeline diversion works and would be closed for a period of up to nine months. The diversion would increase the journey length for users by more than 500m. There is a short section of route that falls within the Order Limits that would be closed for five years due to construction activities.	>500m	Medium	Major	Large adverse
FP180	This footpath would be affected temporarily as a result of gas pipeline diversion works (access may continue during this process). Following initial works, the main construction	>500m	Medium	Major	Large adverse

Receptor	Nature of effect	Change in journey length	Sensitivity of route	Magnitude of impact	Significance of effect
	works for the Project would restrict access, resulting in a temporary, albeit long-term, closure likely for three years. There is a short section of route that falls within Order Limits to be closed for five years due to construction activities. No diversions are proposed as part of the Project. Alternative routes are available within the wider area for recreational purposes.				
FP231	During the construction period, this footpath would be temporarily closed. The route would be realigned via a new route and would be made available after completion of the utilities diversion works (approximately 12 month closure).	>500m	Medium	Major	Moderate adverse
FP96	Utilities diversion for high pressure gas pipeline diversion works would require the temporary stop up of this route for up to eight months. It is the aspiration to allow for localised diversion dependent on construction methods selected.	50-250m	Medium	Minor	Slight adverse
FP78	Utilities diversion works would require the intermittent temporary closures (for less than one month) of the route for a period of approximately nine months. A further short-term closure of the route would be required towards the end of the construction programme to permanently realign the route, to better connect to the bridge proposed over the Project alignment. High House Lane is to be realigned and re-designated as bridleway. No diversions are proposed during this period as alternative routes are available within the wider area for recreational purposes.	No change	Medium	No change	Neutral
FP207	This footpath would be affected by utilities diversions for enabling works. A temporary closure would initially be required for a period of eight months.	<50m	Medium	Negligible	Neutral

Table 13.67 Minor roads affected by the Project – north of the River Thames

Receptor	Nature of effect	Change in journey length	Sensitivity of route	Magnitude of impact	Significance of effect
B188 Baker Street	The section of Baker Street that extends south of the A13 would be closed to the public and used for construction vehicle access only. A diversion route for vehicles to the north of Baker Street would be created. The duration of the impact would likely be 60 months.	>500m increase	Very high	Major adverse	Very large adverse
Hornsby Lane	Hornsby Lane would be permanently closed to vehicular traffic and WCH use. A diversion route would be available via the Heath Road footpath, and east along Stanford Road shared surface.	No change	Low	Negligible	Slight adverse
Fort Road	Fort Road would be used as an access road to provide access to construction compounds. There is a potential impact on the quality of route for WCH due to increased traffic flows.	No change	High	Minor adverse	Slight adverse
Muckingford Road	Construction of the Muckingford Road green bridge and realignment works including construction of new shared surface would be carried out offline. However, a temporary closure of the route would be required to tie the new alignment into the existing.	No change	High	Negligible	Slight adverse
Brentwood Road	Brentwood Road would remain open throughout construction as existing road temporarily diverted next to existing route to facilitate construction of new bridge structure and associated embankments. Duration of impact likely to be less than one month.	No change	High	Negligible	Slight adverse
Rectory Road	Construction activities relate to a new bridge to carry Rectory Road over the Project, together with improvement works to the existing Rectory Road. Rectory Road would be closed for approximately seven months until the new bridge structure is open.	>500m increase	High	Major	Large adverse

Receptor	Nature of effect	Change in journey length	Sensitivity of route	Magnitude of impact	Significance of effect
A1013 Stanford Road	The A1013 would remain open throughout as a new bridge is built offline, which would carry the realigned A1013 over the existing and improved A1089, the new link road between the northbound carriageway of the A1089 and the northbound carriageway of the Project. The duration of the impact would likely be less than one month.	No change	Very high	Negligible	Slight adverse
Stifford Clays Road	Construction of two new bridges over the Project and realignment of Stifford Clays Road including provision of new off-road cycle track would require temporary closure of the route.	No change	High	Negligible	Slight adverse
Ockendon Road	The Project northbound carriageway passes under Ockendon Road, with a new road bridge constructed for Ockendon Road itself. Due to space constraints, the new bridge structure would need to be built online, so the existing road would need to be closed to allow for construction of the new bridge and diversion of the associated utilities. In addition, the Project southbound carriageway would pass under Ockendon Road; this would be facilitated by underpinning the existing bridge structure that passes over the M25 and thereby preventing the need for replacement. Temporary road closures would be necessary; diversion routes would use Dennis Lane or St Mary's Lane to cross the M25. The duration of the impact would likely be 19 months.	>500m	High	Major adverse	Large adverse
B186 North Road	The new North Road green bridge would be constructed offline to minimise disruption. However, diversion of utilities assets and works to tie the new bridge into the existing road would require temporary closures. The new bridge would include a WCH route alongside the road. The duration of impact would likely be less than one month.	No change	High	Negligible	Slight adverse

Receptor	Nature of effect	Change in journey length	Sensitivity of route	Magnitude of impact	Significance of effect
Hoford Road	The route would be temporarily closed during realignment work and the construction of a new bridge to carry Hoford Road over the Project road. The duration of impact would likely be 12 months.	No change	Low	Negligible	Slight adverse
High House Lane	High House Lane would be permanently closed where it crosses the Project route. The existing junction from Brentwood Road would still serve Brook Farm. The section south of the Project route would be diverted to the west along the alignment of FP78 to join Brentwood Road. FP78 would be upgraded and designated as bridleway.	50m	Low	Minor	Slight adverse
Low Street Lane	The northern end of Low Street Lane at its junction with Muckingford Road would be stopped up permanently. The road is already closed to public vehicular traffic and is only used for WCH and private farm access.	>500m	Low	Major adverse	Slight adverse
Gammonfields Way	A new Gammonfields Way would be constructed as part of the A1013 works. The new alignment would be used for construction access and would also serve the relocated traveller's site.	>50m	Low	Minor	Neutral
Long Lane	Long Lane links north Thurrock to the A1013 running partly parallel along the edge of the A1089 via the Gammonfields Way travellers' site. Long Lane would be shortened to tie into the diverted Gammonfields Way.	>50m	Low	Minor	Neutral
St Mary's Lane	The majority of construction works would be able to take place without closing St Marys Lane. In order to facilitate construction vehicle movements, the pavement may be narrowed or closed, however WCH access would remain open in some form.	No change	Very high	No change	Neutral
Clay Tye Road	Clay Tye Road would be affected by works to divert utility assets affected by the Project currently located adjacent to	No change	High	No change	Neutral

Receptor	Nature of effect	Change in journey length	Sensitivity of route	Magnitude of impact	Significance of effect
	and within the carriageway. There would be reduced highway capacity in sections due to traffic management measures. The works are scheduled to be undertaken in years one and two of the construction programme and would take approximately nine months to complete.				

Use of the River

- 13.6.136 The baseline data used in this topic assessment include information relating to existing vessel movements on the River Thames. Section 4 of this Chapter described the use of the River Thames by passenger, service and recreational vessels.
- 13.6.137 Based on the predicted vessel movements associated with the construction of the Project, as outlined in Chapter 4, a qualitative assessment of the use of the river by the Project has been carried out. The conclusion of this assessment was that there would be no significant effects because the use of established facilities would not give rise to the use of any vessels or any additional vessel movements that would not otherwise be likely to occur in the absence of the Project.

Human health

- 13.6.138 This section provides a summary of potential impacts on human health as a result of the construction of the Project. Further detail to inform the assessment of each area of potential impact, including a review of associated evidence, findings from baseline information, detail relating to linkages with local health and wellbeing strategies, and key issues arising from consultation and engagement in relation to each of the topic areas is provided within the HEqIA (Application Document 7.10). Table 13.68 summarises potential effects by health determinant, including health outcomes for specific communities/populations.

Table 13.68 Human health assessment – construction

Health determinant	Likely changes to health determinants	Health outcome
<p>Accessibility Topic includes:</p> <ul style="list-style-type: none"> • access to community, recreational, education and healthcare facilities • access to employment • spatial characteristics of the transport network including the road network and public transport routes 	<p>Access to jobs, services and community infrastructure may be impacted as a result of increased journey times during construction. However, this would be managed through measures set out in a Traffic Management Plan (TMP) and appropriate communication with local residents and affected communities.</p> <p>Negative effects may be experienced by more vulnerable populations who are more dependent on public transport use and therefore may have less choice around mode of transport and route. Increased journey times for buses using the local road network may have an impact in relation to accessing services and employment for these groups, although it is noted that these impacts would be temporary in nature (although long-term, i.e. longer than two years). The majority of increases in journey time would be below six minutes in duration, although there are a handful of routes that may experience delays of just over six minutes during various time periods and construction phases (further information relating to bus travel times can be found in the Transport Assessment (Application Document 7.9)).</p> <p>Delays in undertaking local journeys may be experienced by residents directly affected by temporary and permanent road closures; these may particularly relate to residents and users of facilities in Orsett and Baker Street. Although users of Baker Street/Heath Road may experience increases in journey time across a number of the construction phases, these are typically of around one minute in duration (with the exception of Phase 4 where journey time may increase by 3.5 minutes).</p> <p>The link between being able to access jobs, services and social opportunities and people’s health and wellbeing is well documented, with the evidence base described in more detail in the HEqIA (Application Document 7.10).</p> <p>The number of people potentially impacted by changes in accessibility during the construction period is likely to be high, relating to communities along the route and within a wider geographical area.</p> <p>Local health, wellbeing and equalities strategies and priorities reviewed in Appendix A of the HEqIA (Application Document 7.10) reference the importance</p>	<ul style="list-style-type: none"> • The health outcome for the general population within the wider study area in relation to changes in accessibility is considered to be neutral and therefore not significant in terms of overall population health.

Health determinant	Likely changes to health determinants	Health outcome
	<p>of reducing health inequalities and promoting opportunity, both of which areas can be influenced by changes in accessibility and how it may affect populations disparately.</p> <p>The main construction works are anticipated to last approximately six years, but the phasing of construction activities may reduce the length of time that particular areas are impacted for. Impacts on accessibility are likely to be long-term for communities along the length of the route – even where they may be affected by a single construction phase, this may last for up to two years.</p> <p>A range of traffic management measures have been identified which are secured in the oTMPfC (Application Document 7.14) and which would be taken forward into the TMP. Communication with local communities around changes in traffic management at local area level would taken place through the Community Liaison Groups and Traffic Management Forums set out in the CoCP (Application Document 6.3, ES Appendix 2.2) and oTMPfC respectively.</p>	
<p>Traffic-related severance Topic includes:</p> <ul style="list-style-type: none"> • severance/ separation of communities from community, recreational, education and healthcare facilities by virtue of increases in traffic flows 	<p>Measures have been proposed in the oTMPfC (Application Document 7.14) to reduce construction vehicle movements. HGVs would be restricted along a number of local roads in response to stakeholder requests. Potential severance impacts have been identified at a number of locations during the construction period as a result of increases in traffic flows. The characteristics of these routes in terms of adjacent land uses and populations has been assessed. Locations include:</p> <ul style="list-style-type: none"> • Chalk Road, Gravesham • Lower Higham Road, Gravesham • Gravesend Road (A226) • Thong Lane (A226 to Vigilant Way) • St Chad’s Road, Tilbury • Linford Road, Chadwell St Mary • Old Road East, Gravesend <p>Severance impacts during construction would be temporary in nature, although at a number of locations identified the temporary effect would last for several years; the phasing of construction activities may reduce the length of time that particular</p>	<ul style="list-style-type: none"> • The health outcome for the general population in relation to changes in severance during construction is considered to be neutral. • The health outcome for sensitive populations (for example older people, people in low-income households and children) in relation to changes in severance during construction is considered to be negative but not significant.

Health determinant	Likely changes to health determinants	Health outcome
	<p>areas are impacted for (for example severance effects along Chalk Road are predicted to last for Phase 2 of the construction works, which is six months in duration), however the duration of effect for all locations has been assessed as medium to long-term.</p> <p>Evidence set out in the HEqIA (Application Document 7.10) has shown that the potential ‘barrier effect’ associated with road traffic can be linked to people’s health and wellbeing, with the potential to affect quality of life and discourage trip-making, which can impact on mental wellbeing particularly for older populations who may have less choice around mode of transport and route. A number of the wards identified as potentially experiencing a severance effect contain higher proportions of more sensitive groups, for example older people, people in low income households and children.</p> <p>A number of the road links identified where a potential severance may occur are in wards where there is a higher than average proportion of older people; a more localised analysis of demographic data reveals that this is the case only at Thong Lane. Other locations, including Chalk Road, Lower Higham Road, Gravesend Road and St Chad’s Road, all show higher proportions of children at a local level.</p> <p>The number of people potentially impacted by changes in traffic-related severance is likely to be low, and restricted to communities in proximity to the particular locations identified.</p> <p>Local health, wellbeing and equalities strategies and priorities reviewed in Appendix A of the HEqIA (Application Document 7.10) reference the importance of reducing health inequalities and the importance of promoting mental health and wellbeing.</p>	
<p>Access to green space and outdoor recreation Topic includes:</p> <ul style="list-style-type: none"> loss or reduced access to areas of green space and outdoor recreation facilities 	<p>Generally, access would be maintained to areas of public open space and outdoor recreation assets during the construction period. There are limited instances where this may not be the case – for example with the loss of Southern Valley Golf Course.</p> <p>There is strong evidence (described in the HEqIA (Application Document 7.10)) setting out the links between access to green space and the benefits of outdoor recreation with people’s health and wellbeing, particularly in relation to the health benefits of an active lifestyle, or accessing nature on people’s mental health and</p>	<p>Health outcomes associated with changes to green space and outdoor recreation are considered to relate primarily to mental health and wellbeing. Sensitive populations include users of existing areas of green space and outdoor recreation assets, children</p>

Health determinant	Likely changes to health determinants	Health outcome
<ul style="list-style-type: none"> landscape amenity 	<p>wellbeing. Physical activity is considered separately as part of the Active Travel topic.</p> <p>Local health, wellbeing and equalities strategies and priorities reviewed in Appendix A of the HEqIA (Application Document 7.10) reference the importance of physical activity amongst local residents as a way of improving health outcomes. The availability of green space and outdoor recreation opportunities provides local residents with the opportunity for incorporating physical activity into their daily lives.</p> <p>The duration of potential impact varies according to location along the Project route, from short-term impacts associated with footpath upgrades through to medium- and long-term impacts associated with more significant construction activities.</p> <p>The number of people that would be impacted by changes to areas of green space and outdoor recreation facilities is likely to be high along the Project route; communities along the route corridor have areas of local green space which they may visit. However, alternatives are considered to be available within reasonable travel distances of populations along the Project route. The main construction works are planned to last up to six years; during this time it is anticipated that people would adapt their behaviour according to the location and extent of construction activities.</p> <p>Impacts associated with visual intrusion are likely to be confined to locations in the vicinity of construction activities and there are alternative routes and locations available should people wish to avoid these.</p> <p>People in low-income households who may not have access to private vehicles may experience an adverse impact in terms of access to green space and outdoor recreation, due to fewer alternatives being available to them within a reasonable journey time. To the south of the River Thames, this may relate to some groups on the eastern fringe of Gravesend, who may currently access fields next to Claylane Wood, or the wider countryside via footpaths through the former SVGC site. To the north of the River Thames, this may relate to some groups near Thames Chase (southern outskirts of Cranham) or users of the Ron Evans Memorial Field.</p>	<p>and young people, people in low-income households, people without access to private transport, people with mental health condition, pedestrians and cyclists and older people.</p> <p>The assessment of impacts on population health is considered to be negative, although it would not be significant in terms of overall population health.</p>

Health determinant	Likely changes to health determinants	Health outcome
	<p>Accessibility standards for different types of open space are set by individual local authorities and include both walk and drive-time standards. For Havering and Gravesham, the accessibility standard for natural and semi-natural open space is a ten minute walk time, with the Thurrock equivalent being 15 minutes. Gravesham also include a five minute walk time category for amenity green space. Within these parameters, it is considered that, although there may be fewer alternatives, there remains an adequate range of options.</p> <p>For the area in the vicinity of the M2/A2/A122 Lower Thames Crossing Junction, where construction activities would necessitate the permanent closure and diversion of a number of WCH routes, the oTMPfC (Application Document 7.14) secures the provision and maintenance of a suitable alternative route connecting Riverview Park and Gravesend with Shorne Woods Country Park within one month of closing the existing route except where short term closures are required for safety reasons. This would benefit residents in communities on the eastern fringe of Gravesend, notably Chalk, Westcourt, Riverview Park and Singlewell.</p> <p>Where there are effects on well used areas of green space (such as Thames Chase Community Forest), the Applicant would work closely with operators to ensure that sites could remain open and that disruption for users would be reduced.</p> <p>The Applicant has been working with local authorities to identify replacement land, or land which could mitigate the impacts identified for areas of temporary possession and permanent acquisition of land affecting public open space.</p>	
<p>Active travel Topic includes changes to public rights of way and wider footpath network, impacts on levels of physical activity</p>	<p>A number of PRoWs would be impacted during construction, both in terms of their route and the amenity of users. The number of routes either closed for a significant period of time, or permanently, and for which no diversion has been proposed, is small. Where possible, diversion routes have been identified; in many instances these routes are proposed to be constructed or available for users either prior to the closure of the original route or within a short period of time. It is noted that there are instances where this period of time may be over two years, however, alternative routes are available for the local community to use.</p>	<p>For residents within wards potentially affected by changes to the PRoW network and sensitive populations including people in low-income households, children and young people, women, those without access to private transport and pedestrians / cyclists, the health outcome as a result of changes in active travel during</p>

Health determinant	Likely changes to health determinants	Health outcome
	<p>A range of measures are in place to ensure that active travel routes for children are not adversely impacted by the Project and to enable communication and engagement with individual schools.</p> <p>PRoW and footpath user surveys undertaken in 2019 showed that the majority of affected routes have relatively low levels of usage. The number of people who would be impacted by changes to the active travel environment is therefore likely to be low. For routes that see a high level of use currently – for example the NCR 177 cycle route – mitigation measures have been secured by Design Principle (Application Document 7.5) which ensure the creation of appropriate diversions prior to closure. For example, a replacement route for NCR 177 would be created south of HS1 that is suitable for road bikes.</p> <p>There is strong evidence setting out the links between active travel and health and wellbeing, particularly in relation to the health benefits of an active lifestyle (including on people’s mental health and wellbeing).</p> <p>The duration of potential impact varies according to location along the Project route, from short-term weekend closures of an individual route through to long-term closures.</p> <p>Local health, wellbeing and equalities strategies reviewed in Appendix A of the HEqIA (Application Document 7.10) reference the importance of promoting walking and cycling amongst local residents for a variety of purposes, whether this is for commuting, school or leisure purposes.</p>	<p>construction of the Project is assessed as neutral.</p>
Affordability	No health impacts relating to affordability have been identified during the construction phase.	N/A
<p>Road safety</p> <p>Topic includes assessment of impacts of driver stress associated with delay</p>	<p>A variety of measures are proposed to manage the impacts of construction traffic on the road network and thereby reduce adverse impacts for key receptors (such as schools and care homes) as well as for local residents (for example arising from driver stress or frustration). These measures are secured in the FCTP (Application Document 7.13), oTMPfC (Application Document 7.14) and oMHP (Application Document 6.3 Appendix 2.2).</p> <p>The two Traffic Management Forums, covering roads in Kent and roads north of the Thames, would consist of the main works Contractors, utility companies, local authorities, local highway authorities, public transport operators, emergency</p>	<p>The health outcome for affected communities and sensitive populations (these include children and young people, older people and people in low-income households) as a result of changes in road safety during construction of the Project is assessed as neutral.</p>

Health determinant	Likely changes to health determinants	Health outcome
	<p>services, National Highways maintenance providers and any other affected stakeholders depending on the planned construction phases (as set out in the oTMPfC (Application Document 7.14)). The TMFs would review the performance of implemented traffic management with a focus on areas including direct impacts to the travelling public (including WCH) and impacts on local businesses and communities. Local community leaders of Community Liaison Groups would be invited to the Traffic Management Forum. These measures would help to manage driver stress arising from frustration and uncertainty during the construction phase.</p> <p>There is strong evidence setting out the links between road safety and people’s health and wellbeing.</p> <p>The number of people that may potentially be affected is high, due to the number of travel routes across the study area. The duration of potential impact is likely to be medium to long-term depending on location (given the different timescales associated with construction phasing ranging from several months to a couple of years per phase).</p> <p>Local health, wellbeing and equalities strategies reviewed in Appendix A of the HEqIA (Application Document 7.10) reference the importance of external environmental factors and the influence these can have on people’s health and wellbeing.</p>	<p>The health outcome for users of the local and strategic road network as a result of driver stress is assessed as negative (but not significant).</p>
Air quality	<p>A range of mitigation measures described in the REAC, which forms part of the CoCP (Application Document 6.3, ES Appendix 2.2) ensure the effective management of construction dust, and appropriately manage emissions from construction plant and construction traffic. ES Chapter 5: Air Quality (Application Document 6.1) has assessed impacts arising from constructive activities and concluded that, with mitigation as described, there would be no significant effects on air quality. As a result there would be no discernible health impacts for communities living in proximity to construction activities more generally, or those groups of particularly high sensitivity to change which have been identified.</p> <p>It is noted that potential health impacts associated with dust emissions and changes in air quality as a result of construction traffic and activities remains a concern of local communities and other stakeholders (for example schools located</p>	<p>Affected communities and populations are likely to include those communities living in proximity to construction compounds, construction routes and sites of construction activity in addition to sensitive populations such as children, older people, people with pre-existing respiratory health conditions such as asthma, people in low-income households and people living in areas which exhibit poor health indicators.</p>

Health determinant	Likely changes to health determinants	Health outcome
	<p>in close proximity to construction activities), as evidenced through consultation responses made during the various Project consultations and as part of wider engagement. The proposals for ongoing community engagement during construction works via the establishment of CLGs provides a mechanism by which specific concerns can continue to be raised and addressed.</p> <p>The HEqIA (Application Document 7.10) sets out strong evidence describing the links between changes in air quality and health outcomes.</p> <p>The number of people that would be impacted by changes in air quality during construction is low as a result of the mitigation measures identified.</p> <p>The duration of potential impact would be medium-term (six months to two years in duration), taking into account individual construction phases.</p> <p>Local health and wellbeing strategies reviewed in Appendix A of the HEqIA (Application Document 7.10) reference the importance of the wider environment on both mental and physical health and wellbeing, with improvements in air quality identified specifically as a priority area in a number of strategies.</p> <p>No physical health impacts have been identified as a result of changes in air quality during construction; it is acknowledged that dust emissions in particular continue to be a cause for concern for people and this is addressed further as part of the assessment of impacts on mental health and wellbeing.</p>	<p>With appropriate mitigation as described, the health outcome for affected communities / sensitive populations as a result of changes in air quality during construction is assessed as neutral.</p>
Noise and vibration	<p>ES Chapter 12: Noise and Vibration (Application Document 6.1) has assessed the effects of construction traffic and construction activities on noise levels. Temporary moderate or major adverse changes in construction road traffic noise levels have been identified at a number of noise sensitive receptors to the north and south of the River Thames. A range of mitigation measures have been set out in the CoCP (Application Document 6.3, ES Appendix 2.2) to ensure the effective management of site-based construction noise and to appropriately manage construction traffic.</p> <p>Concerns highlighted during Statutory Consultation, Supplementary Consultation, Design Refinement Consultation, Community Impacts Consultation and Local Refinement Consultation have included anxiety around noise impacts from construction activities. This is considered in the later section relating to potential mental health and wellbeing impacts.</p>	<ul style="list-style-type: none"> The health outcome for affected communities and sensitive populations (including older people, children, people with pre-existing health conditions/ disabilities and shift workers) as a result of changes in noise levels during construction is assessed as negative and significant.

Health determinant	Likely changes to health determinants	Health outcome
	<p>Adverse effects may be experienced by sensitive populations including older people, children, people with pre-existing health conditions/disabilities and shift workers. Many people within these groups are likely to be within their homes for longer periods of time and therefore exposed to construction noise for more of the time. People may experience noise effects differentially within a population and even relatively small changes in noise levels can have a disproportionate effect on people’s wellbeing / quality of life.</p> <p>The HEqIA (Application Document 7.10) describes strong evidence setting out the links between changes in noise levels and health outcomes.</p> <p>The number of people that would be impacted by changes in noise levels during construction is likely to be low as a result of the mitigation measures identified.</p> <p>The duration of potential impact would be medium-term (six months to two years in duration), taking into account individual construction phases.</p> <p>Local health and wellbeing strategies reviewed in Appendix A of the HEqIA (Application Document 7.10) reference the importance of the wider environment on both mental and physical health and wellbeing.</p> <p>Potential health outcomes associated with changes in noise levels are likely to relate to anxiety / stress as a result of changes in the local environment, in addition to sleep disturbance for residents located in close proximity to particular activities.</p>	
Work and training	<p>The Project would provide a significant number of new employment opportunities over the course of the construction period, both in terms of direct and indirect employment. The number of job losses as a result of permanent land acquisition for the Project (businesses lost to property demolition) is low in the context of the local labour market.</p> <p>The HEqIA (Application Document 7.10) describes strong evidence setting out the links between employment and training and both physical and mental wellbeing.</p> <p>The number of people that would experience beneficial changes as a result of the creation of new employment and training opportunities is high – supporting more than 22,000 jobs in the areas to the south and north of the River Thames, with 45% of employees to be from within 20 miles of the Project route, including within the host local authorities of Gravesham, Medway, Dartford, Thurrock, Havering</p>	<ul style="list-style-type: none"> • The health outcome for affected communities / populations during construction is considered to be positive and significant.

Health determinant	Likely changes to health determinants	Health outcome
	<p>and Brentwood. The catchment area of 20 miles from the Project route includes some of the most deprived communities, including for example Westcourt and Riverside wards to the south of the River Thames.</p> <p>The duration of impact would be long-term (i.e. more than two years in duration). Creating a skills legacy is one of the ambitions for the Project as set out in the Skills, Education and Employment Strategy (this document is secured via S106 agreement (Application Document 7.3)).</p> <p>Local health and wellbeing strategies reference the importance of work and training as one of the wider social determinants of health. The proposals are in line with the UK Government's Levelling Up plans to unlock economic growth through job creation, new work for businesses and higher skilled workers. This aligns with tackling health inequality which is a priority for local authorities.</p> <p>The SEE Strategy contains a range of targets for employment and training. It includes the implementation of inclusive and accessible recruitment processes designed to attract, recruit, and retain people from a range of backgrounds; irrespective of gender, race, disability, sexual orientation, religion or belief, age, transgender status, pregnancy and maternity, marriage or civil partnership, or socioeconomic status (this list is not exhaustive). Priority groups identified through engagement with stakeholders include care leavers, NEETs, ex-military, people who are homeless / at risk of homelessness, ex-offenders, adult learners and women returners (again, this list is not exhaustive).</p> <p>Project Contractors would be partnered with a cluster of local schools with which they will be required to prioritise their engagement. These clusters will be made up of education providers most impacted by the project and with those from areas of socio-economic disadvantage.</p>	
<p>Housing and community services</p> <p>Topic includes impacts associated with loss of private property and associated change in</p>	<p>Property Loss and Sense of Community</p> <p>Impacts associated with property loss and the need for relocation as a result of the Project causes disturbance to people's lives, which can in turn create stress and anxiety. The sensitivity of a population depends on factors including age (with older people often being more worried and finding it difficult to adapt) as well as younger groups (for example families with school age children may face</p>	<ul style="list-style-type: none"> Health impacts associated with loss of private property and associated change in sense of community are likely to be primarily associated with mental wellbeing. The health outcome for affected

Health determinant	Likely changes to health determinants	Health outcome
<p>sense of community; impacts on gypsy and traveller communities; and impacts associated with the construction workforce on accommodation and healthcare facilities</p>	<p>challenges if there is a need to move schools or if there is an increase in journey times).</p> <p>The HEqIA (Application Document 7.10) describes strong evidence around the importance of housing as a determinant of health, although the links between community cohesion and health are less well documented.</p> <p>Local health and wellbeing strategies reviewed in Appendix A of the HEqIA (Application Document 7.10) reference the importance of the wider environment on both mental and physical health and wellbeing.</p> <p>Communities affected by loss of a cluster of due to permanent land acquisition (notably Baker Street and North Ockendon), which are more rural in nature, may find relocation more difficult due to well established community networks and lack of choice regarding alternatives premises. Effects are likely to be compounded by issues of uncertainty regarding likelihood and timescale.</p> <p>Residents are able to claim various types of financial compensation if they are directly affected by property loss or blight.</p> <p>The number of people that would experience change directly as a result of loss of private property is low, however the number of people who may experience an indirect change in the sense of community as a result of that property loss would be higher.</p> <p>The duration of impact would be permanent (loss of private property) and medium-term (six months to two years in duration) for changes in sense of community.</p> <p>Impacts on Traveller Communities</p> <p>The site of the existing Gammonfields Way travellers’ site located to the west of Baker Street would be acquired permanently for the Project road alignment. A replacement site would be constructed by the Applicant on adjacent land to the west of the existing site as part of the DCO. The traveller community here may be more vulnerable to adverse health effects as a result of perceived lack of control or choice over relocation. Close consultation has taken place with the community and via Thurrock Council dedicated officers. Relocation is to an adjacent site, with a similar quality and quantity of provision. The new site would be constructed prior to the existing site being closed.</p>	<p>communities / populations during construction is considered to be negative but not significant.</p> <ul style="list-style-type: none"> Health impacts relating to traveller communities are likely to be primarily associated with mental wellbeing; the health outcome for is considered to be neutral. The health outcome for affected communities / populations as a result of construction workforce impacts on accommodation during construction is considered to be neutral. The health outcome for affected communities / populations as a result of impacts of the construction workforce on healthcare facilities during construction is considered to be neutral.

Health determinant	Likely changes to health determinants	Health outcome
	<p>Extensive engagement has taken place to date to ensure members of the traveller community have been involved in the decision-making process and this will continue as designs are progressed and to reduce disruption to the community. Design Principle S11.12 (Application Document 7.5) requires the Contractor to consult with Thurrock Council and the Gammonfield Way travellers' community throughout the design development and construction of the site.</p> <p>The duration of impact would be medium-term (i.e. between six months and two years in duration).</p> <p>Other traveller communities impacted during construction include privately owned sites at Railway Sidings (Thurrock), Linford (Thurrock) and Gravesend Road sites (Gravesham). The nature of the impacts at these locations has been described earlier in this chapter and primarily relates to utility works (Railway Sidings), the acquisition of rights for overhead line diversions (Linford) and impacts associated with residential amenity due to the proximity of construction activity (two sites accessed from Gravesend Road).</p> <p>Impacts of the construction workforce on accommodation</p> <p>The impacts of the construction workforce on accommodation have been assessed elsewhere in this Chapter. However, related health impacts are likely to be associated with mental wellbeing and concerns that people are unable to access appropriate housing within their local area, or that increased demand creates affordability issues through rental increases. People in low-income households are particularly vulnerable to changes in affordability and are more likely to have poorer quality of health. There is potential for adverse impacts in terms of widening health inequalities as a result of workforce impacts on accommodation. Appropriate good practice measures have been identified by the Applicant to co-ordinate and monitor worker accommodation use (secured by the FCTP (Application Document 7.13) and implement reasonably practicable measures which encourage local workforce participation and incentivise workers to areas which have higher capacity if needed.</p> <p>Impacts of construction workforce on healthcare services and facilities</p> <p>The HEqIA (Application Document 7.10) describes strong evidence around access to community services and facilities (such as healthcare services) as a determinant of health. The number of people potentially impacted is high and</p>	

Health determinant	Likely changes to health determinants	Health outcome
	<p>geographically diverse (construction workers may reside in areas within a 60 minute drive from the main construction compounds).</p> <p>The duration of impact would be long-term (i.e. more than two years in duration) due to the length of the construction programme.</p> <p>Health impacts may relate to worsening health conditions as a result of residents being unable to access healthcare services in a timely way. Older people and people with pre-existing conditions may be particularly vulnerable. The Project incorporates a commitment for onsite medical and occupational healthcare services to be provided for members of the construction workforce (secured in the REAC (PH002) (Application Document 6.3, Appendix 2.2). The nature of services provided would be informed by engagement with Integrated Care Partnerships.</p>	
Mental health and wellbeing	<p>The potential impacts of the Project during construction in relation to mental health and wellbeing have been assessed for each of the protective factors as set out in the National Mental Health Development Unit (2011) toolkit (the full assessment is set out in the HEqIA (Application Document 7.10)). This has identified potential issues in addition to the various mitigation measures and other interventions that the Project would put in place to reduce impacts on communities and people’s lives. The assessment has identified that there are likely to be both positive and negative impacts relating to mental health and wellbeing in particular:</p> <p>Positive effects may result from the construction phase including job creation, the introduction of skills and training programmes and a comprehensive education programme. These activities may particularly benefit some of the most sensitive populations (for example people in low-income households and the long-term unemployed) and thereby help to reduce inequalities.</p> <p>Negative effects may be experienced particularly in relation to people’s sense of control and resilience. While effects would be experienced differentially across communities, due to a range of individual factors, the baseline data suggests that less-resilient groups are present in higher proportions within certain wards along the Project route. Negative effects are likely to be compounded by issues of uncertainty regarding likelihood and timescale. Measures designed to reduce</p>	<p>Sensitive populations relate to communities located in close proximity to construction routes and activities as well as populations within and outside of these communities with a high sensitivity to mental health and wellbeing impacts. Health outcomes for these groups are described as both positive and negative. Both positive and negative health outcomes are likely to be significant.</p>

Health determinant	Likely changes to health determinants	Health outcome
	<p>negative effects include the comprehensive community liaison arrangements set out in the CoCP (Application Document 6.3, ES Appendix 2.2).</p> <p>The number of people potentially exposed to both positive and negative effects is likely to be high and geographically diverse.</p> <p>The HEqIA (Application Document 7.10) sets out strong evidence setting out the links between wider environmental factors and mental health and wellbeing.</p> <p>Local health and wellbeing strategies reviewed in Appendix A of the HEqIA (Application Document 7.10) reference the importance of the wider environment on both mental and physical health and wellbeing.</p> <p>The duration of impact is considered to relate to the entire construction period and is therefore described as long-term (more than two years duration). Individuals may not, however, experience negative effects throughout this duration – for example anxieties around uncertainty may diminish once construction is underway or when local activities are complete.</p>	
<p>Pollution and flood-risk</p>	<p>Local residents and land users near significant earthwork movements</p> <p>ES Chapter 10: Geology and Soils (Application Document 6.1) identifies a negligible magnitude of impact in relation to pollution arising from potentially contaminated fugitive dust, resulting in a slight adverse significance of effect for residents in close proximity and a negligible significance of effect for users of public open space.</p> <p>The number of people potentially exposed to such pollution would be very low and would depend on factors including weather conditions. A range of mitigation measures and good practice construction methods have been identified.</p> <p>There is strong evidence setting out the links between contamination, pollution and flood-risk and human health.</p> <p>The duration of impact would depend on the nature of the construction activity and would likely be short to medium-term at different locations depending on the activity being undertaken.</p> <p>Local health and wellbeing strategies reference the importance of the wider environment on both mental and physical health and wellbeing.</p>	<p>For local residents and land users near significant earthwork movements, the health outcome is considered to be neutral.</p>

Health determinant	Likely changes to health determinants	Health outcome
Light pollution	<p>ES Chapter 7: Landscape and Visual (Application Document 6.1) predicts limited perceived changes in the night-time environment across all LLCAs with the exception of one LLCA within Thurrock (the Mardyke area) as a result of the introduction of new light sources associated with construction activities. The magnitude of change is therefore considered to be low (Thurrock Reclaimed Fen (sub area Mardyke) LLCA or negligible (all other LLVAs).</p> <p>The number of people that would experience changes in light pollution as a result of construction of the Project is considered to be low – limited to populations living in close proximity to construction compounds and ULHs or in rural areas within close proximity of the Project route.</p> <p>The duration of impact would be long-term (i.e. more than two years in duration).</p> <p>Local health and wellbeing strategies reference the importance of the wider environment on both mental and physical health and wellbeing.</p> <p>A range of good practice mitigation measures have been identified to prevent or minimise light disturbance to residents.</p>	<p>The health outcome for both general and sensitive populations / communities as a result of changes in light pollution during construction is considered to be neutral.</p>
<p>Climate change</p> <p>Topic includes health impacts relating to Greenhouse Gas Emissions (GHGs) as well as the vulnerability of the Project to climate change</p>	<p>Local health and wellbeing strategies reference the importance of the wider environment and resilience to climate change on both mental and physical health and wellbeing; more deprived communities in particular are highlighted as being more vulnerable to climate change, resulting in health inequalities.</p> <p>GHG Emissions</p> <p>ES Chapter 15: Climate (Application Document 6.1) states the ambition for the Project to achieve carbon neutral construction, with a variety of mechanisms and management arrangements set out in the Carbon and Energy Management Plan (Application Document 7.19). GHG emissions from the Project do not have a material impact on the ability of the Government to meet carbon reduction targets and the Project is compatible with (or goes beyond) the budgeted, science based 1.5°C trajectory of the Paris Agreement (in terms of rate of emissions reduction).</p> <p>There is strong evidence setting out the links between climate change and both physical and mental wellbeing.</p> <p>Duration of potential impacts associated with climate change are considered to be long-term. The number of people potentially affected is high.</p>	<p>The health outcome for both general and sensitive populations / communities as a result of climate change impacts arising from GHG emissions is considered to be neutral.</p> <p>The health outcome for both general and sensitive populations / communities as a result of the vulnerability of the Project to climate change during construction is considered to be neutral.</p>

Health determinant	Likely changes to health determinants	Health outcome
	<p><i>Vulnerability of the Project to climate change</i></p> <p>ES Chapter 15: Climate (Application Document 6.1) describes potential impacts on the construction workforce as a result of more extreme weather events (for example increases in temperature and increases in rainfall).</p> <p>The number of people likely to experience impacts as a result of the vulnerability of the Project to climate change during construction is considered to be low, limited to members of the construction workforce.</p> <p>The duration of impact would be long-term (i.e. more than two years in duration).</p> <p>The Project has a target of achieving at least 45% of employees to be from within 20 miles of the Project route; the SEE Strategy for the Project (secured by Section 106 Agreement (Application Document 7.3)) also states that people from a variety of low socio-economic groups are priority groups for employment. These measures are designed to help tackle inequality.</p>	
<p>Electric and Magnetic Fields (EMFs)</p>	<p>No health impact has been identified in relation to EMFs as a result of the Project during the construction phase. Further detail relating to EMFs can be found in Appendix D of the HEqIA (Application Document 7.10).</p>	<p>The health outcome is recorded as neutral.</p>

Operational phase

Private property and housing

- 13.6.139 Impacts on private property and housing during operation would arise from the permanent acquisition of land required for the Project. These have been reported as part of the construction phase and the findings are not repeated in this section. Assessments of impacts relating to residential amenity are summarised as part of the human health assessment in Table 13.73 and described more fully in individual topic chapters (Chapter 5: Air Quality, Chapter 7: Landscape and Visual and Chapter 12: Noise and Vibration) in addition to the HEqIA (Application Document 7.10).

Community land and assets

- 13.6.140 Effects on community land and assets during operation would include the permanent acquisition of land and changes to usage or access characteristics. Impacts arising from permanent land acquisition have been reported as part of the construction phase and the findings are not repeated in this section. Changes relating to amenity characteristics (for example landscape character or noise) are reported in Chapter 7: Landscape and Visual and Chapter 12: Noise and Vibration.

South of the River Thames

Community land

- 13.6.141 Permanent changes to usage or access characteristics of community land to the south of the River Thames during the operational phase of the Project are detailed in this section.
- 13.6.142 With the exception of SVGC, no loss or detrimental alteration to characteristics, features or elements of individual areas of community land have been identified, such that the overall viability of the facility would be compromised or directly affected.
- 13.6.143 SVGC would be permanently acquired for the Project and during operation, the site would be replaced with a country park (known as Chalk Park). The provision of a new recreational landscape here, which would both provide open space of over 35ha and create a desirable separation between the South Portal and the edge of Gravesend, is secured by Design Principle S3.04 (Application Document 7.5). Via the Thong Lane green bridge over the Project, and new footpaths within Chalk Park itself, the area would be connected with footpaths into Shorne Woods Country Park and the wider AONB. Chalk Park would have open views to the AONB and the River Thames, with woodland planting to ensure that it complies with landscape and design principles for the Project (set out in the Project Design Report (Application Document 7.4) and Figure 2.4: Environmental Masterplan (Application Document 6.2)).
- 13.6.144 Environmental enhancement opportunities arising during operation have been identified in relation to the provision of a new car park area to the west of Thong Lane to provide recreational access to the PRoW network and open spaces within the wider area (Design Principle S2.11). Facilities at the car park area include provision for buildings including a kiosk, toilets, changing and storage facility, and together with an area for cycle hire and cycle wash facility. The car

park area would also include provision for horsebox parking with suitable surfaced parking for 10-12 horseboxes, located away from the main car park circulation. The car park and associated facilities would provide an additional means of accessing Shorne Woods Country Park particularly for residents from the eastern outskirts of Gravesend, reducing journey times to the current access point from Brewers Road.

13.6.145 The sensitivity of receptors has been determined using criteria set out in Table 13.3. Table 13.69 summarises the significance of effect for all community land receptors to the south of the River Thames.

Table 13.69 Effects on community land – south of River Thames

Receptor	Nature of impact	Sensitivity	Magnitude of impact	Significance of effect
Shorne Woods Country Park	Replacement land is immediately adjacent to the east of Shorne Woods Country Park and would be landscaped to match the existing site and use, allowing for the spaces to interlink together and function as one. The new area of woodland to the east would link Shorne Woods with Great Crabbles Wood, thus creating new recreational areas. The new car park and associated facilities provides additional means of access to the Country Park. A further area of ancient woodland compensation would be provided on land north of Brummelhill Wood and Randall Wood (to the north of Shorne Woods Country Park).	Very high	Minor beneficial	Large beneficial
Jeskyns Community Woodland	It is proposed to upgrade an existing footpath, which would connect into a wider WCH network. A short section of permissive bridleway would be created near to the car park. The land would be returned to its existing use as part of Jeskyns Community Woodland.	Very high	Minor beneficial	Moderate beneficial
Michael Gardens Play Area	Permanent works to upgrade the footpath suitable for pedestrian and cyclist use through the site would offer improved access to the wider WCH network. The path would be returned to the existing use.	Very high	Minor beneficial	Moderate beneficial
Gravesend Golf Centre (private)	An alternative site would be provided to the south-east of Cascades Leisure Centre, currently part of the SVGC site, enabling the	High	No change	Neutral

Receptor	Nature of impact	Sensitivity	Magnitude of impact	Significance of effect
recreational facility)	business to continue. The site would have public access to Chalk Park and from Thong Lane, with a proposed mixed-species hedgerow forming the site boundary. The alternative site would be greater in area and would be developed to be equal or better in terms of quality and accessibility to the community.			
Cyclopark	No operational impacts identified.	High	No change	Neutral
Claylane Wood	Replacement land is proposed directly to the north of the existing Claylane Wood. The replacement land would be accessible directly from Claylane Wood via existing Bridleway NS174. It would be accessible from Gravesend via new footpaths and bridleways proposed by the Project, connecting into a network of WCH routes around the southern portal and new open space at Chalk Park.	Low	Moderate beneficial	Slight beneficial
Cobham Hall Park and Garden	There would be no permanent effect on the operation of the site. The upgraded footpath NS179 would remain in place permanently and would be open to walkers, cyclists and horse-riders.	Low	Negligible	Neutral
Rochester & Cobham Park Golf Club	No operational impacts would occur.	Low	No change	Neutral

Community assets

13.6.146 Impacts on the SVGC have already been described as part of the construction assessment. No community assets are predicted to be adversely affected in the operational phase, as a result of severance or loss or detrimental alteration of particular characteristics, features or elements. Individual community assets have been accorded sensitivity values ranging between negligible and very high. The magnitude of impact across all community assets has been assessed as negligible, resulting in a **neutral** significance of effect which is **not significant**.

North of the River Thames

Community land

- 13.6.147 Permanent changes to usage or access characteristics of community land to the north of the River Thames as a result of the operational phase of the Project are detailed in this section.
- 13.6.148 No loss or detrimental alteration to characteristics, features or elements of individual areas of community land have been identified, such that the overall viability of the facility would be compromised or directly affected. Similarly, no permanent severance effects would be created in relation to areas of community land.
- 13.6.149 Design Principle S9.02 describes the creation of a new public park, known as Tilbury Fields, at Goshems Farm. The park would be over 35 hectares in size, be designed with elevated areas to create vistas (above the surrounding landfill) across the Thames Estuary and guide views to features such as Tilbury Fort, Cliffe Fort and Coalhouse Fort that reflect the military history of the Thames. The new park would be publicly accessible, via the Two Forts Way in the south and from FP200 in the north. It would incorporate accessible permissive routes through the landforms and allow users to reach the elevated areas.
- 13.6.150 Environmental enhancement opportunities have been identified in relation to the provision and improvements of new routes for WCH, designed to improve access to the existing network and to increase access for users (including those with limited mobility). These are listed in Section 5 of this chapter and secured by Design Principles (Application Document 7.5).
- 13.6.151 The sensitivity of receptors has been determined using criteria set out in Table 13.3. Table 13.70 summarises the significance of effect for all community land receptors to the north of the River Thames.

Table 13.70 Effects on community land – north of River Thames

Receptor	Nature of impact	Sensitivity	Magnitude of impact	Significance of effect
Folkes Lane Woodland	Replacement land has been secured as set out in Section 5 of this chapter. The land would be accessible from the existing site and from Folkes Lane and Beredens Lane via the existing footbridge over the M25 and would include new woodland planting. The replacement land would serve the multi-purpose of public open space, woodland planting and community woodland (as part of the new Hole Farm community woodland) over a greater land area.	Very high	Minor beneficial	Moderate beneficial
Thames Chase	There are two areas of replacement land: one to the north and one to the south of the existing	Very high	Minor beneficial	Moderate beneficial

Receptor	Nature of impact	Sensitivity	Magnitude of impact	Significance of effect
Community Forest	<p>Thames Chase Community Forest; both areas are on the western side of the M25. The replacement land (which is greater in size than that affected by approximately 14,000m²) would be designed to match the existing Thames Chase Community Forest's characteristics and would be developed in collaboration with stakeholders. The replacement land would be accessed through the existing site and internal footpath network of the Thames Chase Community Forest, with an additional access from the new footbridge over the M25 reconnecting Thames Chase Community Forest to the Land of the Fanns and the wider environment. The replacement land would also be located closer to existing residential areas, thereby enabling people to more easily access the site. Proposed improvements to the wider WCH network also provide access from Ockendon Road and Clay Tye Road, with further opportunities to provide access to Thames Chase Community Forest to the north of the site from St Mary's Lane.</p>			
Ron Evans Memorial Field	<p>The replacement land proposes landscape works to match the existing site and its use and allow spaces to interlink together and function as one. The replacement land would be equally as accessible as the existing site for the wider community and would be accessed through the existing site and from Long Lane and Fairfield Way. A further additional access point from Stifford Clays Road would be further developed in consultation with stakeholders. The replacement provision is of better quality due to being further from the current road infrastructure.</p>	High	Minor beneficial	Moderate beneficial
Grangewater Outdoor	<p>No direct impact likely during operation.</p>	High	No change	Neutral

Receptor	Nature of impact	Sensitivity	Magnitude of impact	Significance of effect
Education Centre				
Thurrock Rugby Football Club	No direct impact likely during operation.	Medium	No change	Neutral
Condovers Scout Activity Centre	Permanent rights for utility works.	Medium	Negligible	Slight adverse
Tilbury Green	Replacement land is proposed to the east of the existing Tilbury Green. The northern half of the replacement land would follow the diverted Footpath 200, maintaining a connection between Station Road in the north and Coalhouse Fort and beyond in the south. The replacement land would also support proposed WCH routes to the new riverfront Tilbury Fields open space from Station Road. Although the replacement land would be close to the new Project alignment, it would be screened from the new road by earthworks and planting, as part of the proposed Tilbury Fields, as set out in the Design Principles (Application Document 7.5).	Low	Negligible	Neutral
Orsett Golf Club	No direct impact likely during operation.	Low	No change	Neutral
Orsett Fen	The existing site is currently used for agricultural purposes. The replacement land would be located adjacent to upgraded/new WCH routes and the publicly accessible wet grassland habitat creation. The Project includes environmental mitigation which proposes to re-wet the Orsett Fen (i.e. part of the existing common land that is to be de-registered) in order to create a mosaic of wet grassland with a network of ditches and ponds for water voles. This mitigation land, which is currently in agricultural use, would be accessible to the public with footpaths along the Mardyke and alongside the mitigation land. Therefore, the ability for the public to access the	Negligible	Moderate beneficial	Slight beneficial

Receptor	Nature of impact	Sensitivity	Magnitude of impact	Significance of effect
	area is improved as part of the Project. Further detail is provided in Appendix 2 (Proposed S193 Public Access Land in the Orsett Fen) of the oLEMP (Application Document 6.7).			
West Tilbury Marshes	The Project may have to acquire permanent rights in connection with a power supply for the North Portal, although there would not be an effect on any activity above ground. The site is currently not publicly accessible.	Negligible	Negligible	Neutral

Community assets

- 13.6.152 No community assets would be affected adversely during the operational phase of the Project as a result of severance or the loss or detrimental alteration of particular characteristics, features or elements. Individual community assets have been accorded sensitivity values ranging between negligible and very high. The magnitude of impact across all community assets has been assessed as negligible, resulting in a **neutral** significance of effect which is **not significant**.

Development land and businesses

- 13.6.153 The following sections describe the impact of the Project on development land and businesses to the south and north of the River Thames. Likely effects relate to permanent acquisition of land and to changes in accessibility. Permanent impacts resulting from demolition and permanent land acquisition have been reported under the construction heading.

South of the River Thames

Development land

- 13.6.154 The Need for the Project (Application Document 7.1) notes that the Project would improve connectivity across the local area and wider region and could strengthen local economic performance and skills, thereby improving productivity and economic competitiveness. Improvements in transport links for residents, visitors and employees would have a moderate magnitude beneficial impact for development land identified to the south of the River Thames, which translates into a **very large beneficial** effect, which is considered **significant**.

Businesses

- 13.6.155 Impacts on businesses during operation would arise from the permanent acquisition necessary for the Project. This has been reported as part of the construction phase and the findings are not repeated in this section.
- 13.6.156 Changes relating to amenity characteristics (for example landscape character or noise) are reported in Chapter 7: Landscape and Visual and Chapter 12: Noise and Vibration.

North of the River Thames

Development land

- 13.6.157 As stated above in relation to the study area to the south of the River Thames, improvements in transport links for residents, visitors and employees would have a moderate magnitude beneficial impact for development land. The wider economic benefits associated with improved accessibility are described in detail in the Need for the Project (Application Document 7.1) and translate into a **very large beneficial** effect, which is considered **significant**.
- 13.6.158 Once operational, the Project would not have an impact on Tilbury2 (further detail is provided in the Interrelationships with other Nationally Significant Projects and Major Development Schemes document (Application Document 7.17). Tilbury2 has been described as being of very high sensitivity by virtue of its employment generating potential. The magnitude of impact is described as no change as there would be no observable impact, resulting in a **neutral** effect which is **not significant**.
- 13.6.159 Impacts on the Port of Tilbury Freeport Tax Site boundary (part of the Thames Freeport designation) reported during the construction phase would be the same during the operational phase of the Project. It is noted as part of the construction assessment that the purpose of the land required by the Project would be to manage the change in levels between the port facilities and the landscaping associated with the Project. This is a matter of discussion with the PoTLL and it is anticipated that an agreement will be reached between the two parties.

Businesses

- 13.6.160 No further impacts are anticipated during operation of the Project. Changes relating to amenity characteristics (for example landscape character or noise) are reported in Chapter 7: Landscape and Visual and Chapter 12: Noise and Vibration.

Agricultural land holdings

- 13.6.161 During operation, there would be limited potential effects on agricultural landholdings.

South and north of the River Thames

- 13.6.162 There is the potential for invasive weed species to grow within the Order Limits and spread to neighbouring agricultural land. However, these would be controlled using an appropriate management regime that would remove weed growth that might threaten adjoining land. The impact during operation is therefore assessed as being of minor magnitude which would be a **slight adverse** effect and **not significant**.
- 13.6.163 Some access to land would be required for maintenance purposes relating to utilities. Access arrangements would be agreed with each affected landowner.

Walkers, cyclists and horse riders (WCH)

- 13.6.164 Operational impacts on WCH would derive from changes in journey lengths associated with permanently severed or altered routes, changes in journey quality as a result of the creation of new or improved routes, and changes in

amenity for users as a result of noise or visual impacts associated with the Project. These areas are considered in the following sections for WCH to the south and north of the River Thames.

- 13.6.165 All severed PRoWs, bridleways and cycle routes would be re-linked across the Project unless better quality routes can be provided nearby, the route can be rationalised to better link communities with the places they want to go, or realigned routes provide better connectivity into the existing WCH network. Proposals for WCH routes are included in the Design Principles (Application Document 7.5) and were described in Section 5 of this chapter.
- 13.6.166 A range of environmental enhancement opportunities have been identified, which have been described in Section 5 of this chapter. Many of these relate to improvements to the WCH network, either the creation of new routes or improvements to existing. Part E of the Project Design Report (Application Document 7.4) and design principle PEO.06 within the Design Principles document (Application Document 7.5) describe these in more detail.

South of the River Thames

- 13.6.167 A summary of impacts relating to WCH routes during the operation phase is provided below. Routes have been adapted and realigned around the Project taking into account factors such as journey purpose, length and user experience. The majority of these routes are identified as recreational in purpose and as such, journey length is not as important for users (as opposed, for example to routes used for commuting purposes or travel to school). DMRB 112 requires an assessment of increase in journey length to inform the magnitude of change. The assessment presented here has also taken into account factors such as user experience and amenity value. Whilst a number of the routes have increased in length, this is not considered to constitute an adverse effect; indeed there may be benefits associated with increases in journey length for recreational purposes in terms of physical activity and health.
- 13.6.168 For each of the following PRoW, the sensitivity has been identified as medium and the magnitude of impact as major, given the increased lengths in route (more than 500m). For each of these ProW, this is considered to be a moderate beneficial impact for the following reasons:
- Footpath NS167 /NS169 /NS174 – the Project does not propose to re-connect these footpaths through the M2/A2/A122 junction as it is considered to worsen the experience for WCH. Instead, it is proposed to form two new links, from footpaths NG17 and NS174 in the south, through a newly landscaped setting to the west of the junction. This would enable continued connectivity to Shorne Wood Country Park to the east via the Thong Lane Green bridge over the Project.
 - Footpath NG7 – the existing alignment of NG7 would be severed by the South Portal approach cutting. The footpath would be permanently diverted around the South Portal via new routes. Within Chalk Park NG7 would merge with a new bridleway connecting Thong Lane, near Cascades Leisure Centre, to NG8. Although the route between Chalk and Shorne

which NG7 provides would be lengthened, this is considered appropriate in light of user safety and quality of user experience.

- c. Footpath NG8 – footpath NG8 would be realigned within a landscaped grassland area. The middle part would pass along the eastern edge of Chalk Park where new routes and two connections to Thong Lane are provided. The northern section of the new NG8 alignment would enable new linkages to be created, including to the A226 adjacent to the junction with Castle Lane where a signalised crossing would be provided; and to the south around the tunnel portal to bring users to the eastern side of the portal and connect with the existing alignments of NG7, NG8 and NG9. All of the realigned NG8 and the new connection to Castle Lane would be given bridleway status.
- d. NCR 177 – this is a well used commuter route. The replacement roadside route is marginally more direct than the existing route. Combined with improved user experience, this is considered to be beneficial for users.

13.6.169 Other WCH routes that would be affected to the south of the River Thames are described in Table 13.71.

Table 13.71 WCH routes permanently affected – south of the River Thames

Receptor	Nature of effect	Change in journey length	Sensitivity of route	Magnitude of impact	Significance of effect
Footpath NG9	The route would be resurfaced and redesignated as bridleway.	No change	Medium	No change	Neutral
NS/175A	The route would be resurfaced and redesignated for use by pedestrians and cyclists as part of a new route.	No change	Medium	No change	Neutral
KT/NS/195 KT/NS/311 KT/NS/177	Routes form part of the upgrade for diversion of NCR 177 and would be resurfaced, subject to agreements with Forestry England.	No change	Medium	No change	Neutral

13.6.170 All minor roads crossed by the Project would be reconnected and would not be subject to any changes in journey length.

13.6.171 The Project design includes the creation of green bridges at Thong Lane and Brewers Road. The purpose of the green bridges is to maintain and enhance connectivity for WCH, to create habitat corridors and to allow for a better and more pleasant environment for those using, crossing and living in the immediate vicinity of the Project.

North of the River Thames

- 13.6.172 A summary of impacts relating to WCH routes during the operation phase is provided here. As identified for the area to the south of the River Thames, a number of routes have been adapted and realigned around the Project to take into account factors such as journey purpose, length and user experience and whilst there may be an increase in journey length, this is not necessarily considered to constitute an adverse effect. Potential benefits associated with increases in journey length for recreational purposes include in terms of physical activity and health.
- 13.6.173 For each of the following PRoW, the sensitivity has been identified as medium and the magnitude of impact as major, given the increased lengths in route (in some instances more than 500m). For each of these PRoW, this is considered to be a **moderate beneficial** and therefore **significant** impact for the following reasons:
- a. Footpath 252 – the footpath connects Dennis Road to the site of North Ockendon Hall. The route currently includes an at-grade crossing of the Upminster to Grays branch railway line. During the operational phase, the footpath would be permanently diverted. An upgraded route would be via a new equestrian standard bridge over the railway line and Project alignment. Both of these bridges allow full WCH crossing of these two pieces of infrastructure and increase safety by removing the level crossing. The new route would be designated as a bridleway and forms part of a new network of routes designed as part of the project, including direction connections with FP151 and FP254, and indirectly with FP135 to the east off North Road. A proposed shared use pedestrian, cycle and horse riding track will be provided along Dennis Road connecting to FP151.
 - b. Footpath 230 – section of route extending between Ockendon Road and Thames Chase Community Forest to be permanently realigned to accommodate the LTC route. Route to be replaced by a diverted and upgraded route via a new equestrian standard footbridge over the M25. The new footpath route would be designated as a permissive bridleway and will form part of a new route for previous users of the Thames Chase culvert (an undesignated recreational route passing under the M25). An existing cycle track to the south of FP 230 would be converted to bridleway (becoming part of FP230).
 - c. BR58 – also known as Coal Road and forming part of a proposed north-west to south-east WCH link between Coalhouse Fort and Muckingford Road. When combined with Muckingford Road shared track this allows access to Coalhouse Fort from Chadwell St Mary. The Project route severs the existing alignment of BR58. The northern section of the bridleway would be diverted in an east-west orientation to pass beneath Tilbury Viaduct to then connect in the west with Low Street Lane. Low Street Lane is closed to motor vehicles and would provide a connection from BR58 to FP67 and BR63.

- d. FP61 – again, the existing alignment would be severed by the Project route. As a result, FP61 would be diverted to the south to connect to BR58 which passes beneath Tilbury Viaduct and from which High House Lane can be accessed. This represents an increase in route length of just under 1km, however users wishing to get to Hoford Road or High House Lane would also have the option of using the Muckingford Road shared route rather than taking a longer diversion.
- e. FP200 – with the introduction of north-south routes through Tilbury Fields and Two Forts Way this route would form part of a triangular recreational route but would also form part of a link to Muckingford Road. The southern part of FP200 would be surfaced and re-designated as bridleway. These improvements would follow the trodden alignment as this follows the desire line. The northern section of the footpath connects Station Road to Princess Margaret Road close to Coalhouse Fort. The length of FP200 impacted would be realigned further east and would represent a shorter journey length.
- f. FP136 – part of the existing footpath FP136 directly west of the Mardyke would be resurfaced and redesignated as bridleway. The existing footbridge over the Mardyke would be replaced with a bridge suitable for all three user types (WCH). The upgrade of FP136 would link the Mardyke for all WCH users to a new connection between footpaths FP136 and FP135 allowing onward connection to North Road.
- g. FP78 – the footpath currently connects High House Lane to Brentwood Road and when combined with FP95 and FP79 forms a pedestrian link between Muckingford Road and Rectory Road. A diversion of High House Lane has been designed to bring it along the existing alignment of FP78 and connect to Brentwood Road south of the Project alignment. There would be a Pegasus crossing over Brentwood Road to connect FP78 with FP95. Consequently, a footway alongside the realigned section of High House Lane has been provided in order to retain this connection.
- h. There would be additional beneficial effects arising from those PRow that are being redesignated as bridleways, allowing wider usage. This relates to FP78, FP95, FP79, FP135 and FP254.
- e. Other routes permanently affected during the operation phase are listed in Table 13.72.

Table 13.72 WCH routes permanently affected – north of the River Thames

Receptor	Nature of effect	Change in journey length	Sensitivity of route	Magnitude of impact	Significance of effect
Footpath 93	A permanent diversion has been proposed for the section of the route which falls within the Order Limits. As previously discussed, the additional journey length is not considered disadvantageous due to the recreational nature of this route.	>50m – 250m increase	Low	Minor	Neutral
Footpath 60	A short section of the route would be permanently stopped up due to the Muckingford Road alignment moving south. No diversion is required as FP60 would still connect to the realigned Muckingford Road and new proposed ped-cycle shared use footway.	<50m	Low	Negligible	Neutral
Footpath 97	The footpath would be permanently shortened by approximately 200m to accommodate new link roads adjacent to the A13.	>50-250m	Low	Minor	Neutral
Bridleway 161	The Project includes for improvement to the route where it links to a new overbridge. A new section of bridleway is proposed linking BR219 and Green Lane to the north. To the south, a new pedestrian and cycle route would link Green Lane to Stifford Clays Road. This would allow for additional connectivity to the west.	<50m	Medium	Negligible	Slight positive
Footpath 251	The route would be realigned along the top of the widened M25	<50m	Low	Negligible	Neutral

Receptor	Nature of effect	Change in journey length	Sensitivity of route	Magnitude of impact	Significance of effect
	cutting (allowing the construction of the new slip road).				
Footpath 151	The route would be resurfaced and redesignated as bridleway and forms part of new routes proposed under the Project.	<50m	Medium	Negligible	Neutral
FP82	Permanent diversion proposed.	>50-250m	Medium	Minor	Slight adverse
FP95	The footpath would be resurfaced and redesignated as bridleway between Brentwood Road and Footpath 79.	No change	Medium	No change	Neutral
FP135	The footpath would be redesignated as bridleway up to the farm track where it would connect to FP136.	No change	Medium	No change	Neutral
FP254	Footpath would be converted to bridleway in order to form a WCH connection between North Ockendon, Little Belhus Park and the North Road WCH track.	No change	Medium	No change	Neutral
FP207	The footpath would be permanently closed as a result of the Project.	>500m	Low	Major	Slight adverse

13.6.174 The Project design provides benefits for WCH associated with the creation of green bridges at North Road, Muckingford Road, Hoford Road and Green Lane.

13.6.175 Design Principle S9.02 describes the creation of a new country park, known as Tilbury Fields, at Goshems Farm. The park would be over 35 hectares in size, be designed with elevated areas to create vistas (above the surrounding landfill) across the Thames Estuary and guide views to features such as Tilbury Fort, Cliffe Fort and Coalhouse Fort that reflect the military history of the Thames. The new country park would be publicly accessible, via the Two Forts Way in the south and from FP200 in the north. It would incorporate accessible permissive routes through the landforms and allow users to reach the elevated areas.

- 13.6.176 Realignment of minor roads to facilitate crossing of the Project would result in some changes in journey length. For Muckingford Road, Brentwood Road, Rectory Road, Stanford Road, Stifford Clays Road and Ockendon Road, the increase in journey length of less than 50m would result in a negligible magnitude of impact and **slight adverse** effect, which is **not significant**.
- 13.6.177 Hornsby Lane (assigned a low sensitivity) would see a reduction in vehicular traffic as a result of being permanently stopped up. The diversion route for WCH would be to travel north on Heath Road along the footway, then east along Stanford Road using the shared footway / cycleway. Only a minimal change in journey length has been identified again resulting in a **slight adverse** effect which is **not significant**.

Human health

- 13.6.178 This section provides a summary of potential impacts on human health during Project operation. Further detail to inform the assessment of each area of potential impact, including a review of associated evidence, findings from baseline information, detail relating to linkages with local health and wellbeing strategies, and key issues arising from consultation and engagement in relation to each of the topic areas is provided within the HEqIA (Application Document 7.10). Table 13.73 summarises potential effects by health determinant, including health outcomes for specific communities/ populations.

Table 13.73 Human health assessment – operation

Health determinant	Likely changes to health determinants	Health outcome
<p>Accessibility Topic includes:</p> <ul style="list-style-type: none"> access to community, recreational, education and healthcare facilities access to employment spatial characteristics of the transport network including the road network and public transport routes 	<p>Analysis set out in the HEqIA (Application Document 7.10) shows improvements in accessibility to varying degrees for different types of services and facilities for wards across the study area. Improvements to accessibility would have a beneficial effect for both car and public transport users due to improvements in journey time and reliability on the road network. Traffic impact monitoring is proposed during the operational phase of the Project to identify where there may be changes in performance on the surrounding road network.</p> <p>A number of wards currently experiencing high levels of deprivation according to the Index of Multiple Deprivation and particular deprivation domains (for example income deprivation) are shown to experience improvements in accessibility (notably wards within Thurrock, Medway and Gravesham).</p> <p>Populations who are more dependent on public transport use may have less choice around mode of transport and route. The Transport Assessment (Application Document 7.9) has shown that the majority of bus routes using the local road network experience either neutral or beneficial impacts in terms of changes in journey times across the AM, inter-peak and PM peak periods. Exceptions to this include during the AM peak when four bus routes would experience an increase in journey time, each of which would be between two to three minutes in duration; during the inter-peak, only one bus route would be affected by an increase in journey time (and again this would be just over two minutes in duration); and finally, three bus routes would experience an increase in journey time during the PM peak, again of between two to three minutes duration for each.</p> <p>The link between being able to access services and social opportunities and people’s health and wellbeing is well documented. Evidence related to this is set out in the HEqIA (Application Document 7.10).</p> <p>The number of people potentially impacted by changes in accessibility is likely to be high, relating to communities across a wide geography.</p>	<ul style="list-style-type: none"> The health outcome for both the general population and sensitive populations (identified as children and young people, older people, people in low-income households and people without access to private transport as well as people with disabilities who may also be car users, those who may be experiencing rural isolation, carers and workers in key settings (such as healthcare, education, care homes)) in relation to changes in accessibility is considered to be positive and significant in terms of overall population health.

Health determinant	Likely changes to health determinants	Health outcome
	<p>Local health, wellbeing and equalities strategies and priorities (findings from which are set out in the HEqIA (Application Document 7.10)) reference the importance of reducing health inequalities and promoting opportunity, both of which areas can be influenced by changes in accessibility and how it may affect populations disparately.</p>	
<p>Traffic-related severance Topic includes:</p> <ul style="list-style-type: none"> • severance/ separation of communities from community, recreational, education and healthcare facilities 	<p>Areas of increased and decreased severance have been identified at a number of locations. Each of the links potentially affected by increased severance has been analysed to consider the likely impact on local residents in relation to the presence of amenities and facilities, with a particular focus on areas where a potential impact has been identified in relation to sensitive populations.</p> <p>Analysis has shown that, in the majority of locations where there would be increased severance as a result of changes in traffic flow, this is unlikely to have an adverse impact on health and wellbeing. This is due to factors such as the presence of existing pedestrian links and crossings, or alternatively where the existing pedestrian environment is such that severance is not likely to be an issue (for example rural roads with no pavements or nearby amenities/facilities). For several locations – notably Elaine Avenue (Strood), Brennan Drive (Tilbury) and Valley Drive (Gravesham) – it is considered that further investigation may be required into the potential for further improving pedestrian crossing provision; this has been included as part of the Section 106 Agreement Heads of Terms document (Application Document 7.3).</p> <p>The duration of effect would be permanent.</p> <p>The HEqIA (Application Document 7.10) sets out the evidence base surrounding linkages between the potential ‘barrier effect’ associated with road traffic and people’s health and wellbeing, with the potential to affect quality of life and discourage trip-making, which can impact on mental wellbeing particularly for older populations.</p> <p>The number of people potentially impacted by changes in traffic-related severance is likely to be low, and restricted to communities at particular locations identified.</p>	<p>Potentially sensitive populations to increases in traffic-related severance include children, older people, people with disabilities and/or long-term health conditions, walkers and cyclists, and people in low-income households.</p> <p>The health outcome for the general population in relation to changes in severance during operation is considered to be neutral.</p>

Health determinant	Likely changes to health determinants	Health outcome
	<p>Local health, wellbeing and equalities strategies and priorities (findings from which are set out in the HEqIA (Application Document 7.10)) reference the importance of reducing health inequalities and the importance of promoting mental health and wellbeing.</p>	
<p>Access to green space and outdoor recreation</p> <p>Topic includes:</p> <ul style="list-style-type: none"> • access to areas of green space / outdoor recreation • landscape amenity 	<p>Replacement land, or land which could mitigate the impacts identified for areas of temporary possession and permanent land acquisition affecting public open space, has been identified. Access to open space and nature has been detailed elsewhere in this ES chapter and would be improved. Examples include the greater size and improved quality of replacement land for the Ron Evans Memorial Field, the provision of a new area of publicly accessible fenland at the Mardyke, and provision of new areas of open space at Thames Chase.</p> <p>Embedded mitigation includes the creation of two publicly accessible country parks – Chalk Park to the south of the River Thames and Tilbury Fields to the north.</p> <p>The eight nitrogen deposition compensation sites identified equate to 245.7ha of a woodland-dominated mosaic of habitats including opportunities for increasing public access to the countryside.</p> <p>Accessibility to open space would be improved in wards across the study area, including wards where there are high levels of deprivation and high proportions of the population with pre-existing health conditions.</p> <p>Local health, wellbeing and equalities strategies and priorities (findings from which are set out in the HEqIA (Application Document 7.10)) reference the importance of physical activity amongst local residents as a way of improving health outcomes.</p> <p>The duration of potential impact would be permanent.</p>	<ul style="list-style-type: none"> • Health outcomes associated with changes to green space and outdoor recreation relate both to physical and mental health and wellbeing. The new green spaces would encourage more people to undertake physical activity and be connected to nature. New areas of green space are located in close proximity, and are well connected to, areas of high deprivation such as communities to the east of Gravesend and communities in the vicinity of Tilbury. Health outcomes are considered to be positive and significant in terms of overall population health.
<p>Active Travel</p>	<p>A wide range of improvements are proposed as part of the Project design, improving connectivity, filling missing links in the PRoW network and enhancing the safety of routes through the provision of shared pedestrian-cycle tracks along key routes. The proposals do not create new severance</p>	<p>Potentially affected communities and populations include residents within wards potentially affected by changes to the PRoW network, people in low-income households,</p>

Health determinant	Likely changes to health determinants	Health outcome
	<p>between communities to the west and east of the Project alignment and opportunities for walking and cycling is enhanced through the provision of green bridges and footbridges at appropriate locations.</p> <p>Historic severance created as a result of the construction of the M25 is mitigated through the creation of new pedestrian and cycle links. The network of new routes may encourage walking and cycling, including amongst communities in close proximity to these routes; this includes populations in more deprived communities such as those to the south and east of Gravesend as well as communities in parts of Thurrock. In many instances, the quality of routes is improved, making it more attractive for people to walk and cycle, with associated health benefits.</p> <p>The HEqIA (Application Document 7.10) sets out strong evidence describing the links between active travel and health and wellbeing, particularly in relation to the health benefits of an active lifestyle (including on people’s mental health and wellbeing).</p> <p>The number of people that would be impacted by changes to the active travel environment is high, in that the proposals tap into latent demand for walking and cycling routes in a number of locations.</p> <p>The duration of potential impact would be permanent.</p> <p>Local health, wellbeing and equalities strategies and priorities (findings from which are set out in the HEqIA (Application Document 7.10)) reference the importance of promoting walking and cycling amongst local residents for a variety of purposes, whether this is for commuting, school or leisure purposes.</p>	<p>children and young people, women, those without access to private transport and pedestrians / cyclists.</p> <p>The health outcome for affected communities / sensitive populations as a result of changes in active travel during Project operation is assessed as positive and significant.</p>
Affordability	<p>The road user charging strategy for the Project is aligned with that for the Dartford Crossing, including current discounts and exemptions. Residents from Thurrock and Gravesham would be eligible for a Local Resident Discount Scheme (LRDS). The benefits of the Project support the future economic development and transformation of the Lower Thames area. Promoting access to employment and wider economic benefits may help to reduce inequality.</p>	<p>The health outcome for affected communities / sensitive populations as a result of changes in affordability during operation of the Project is assessed as positive as a result of increased access to opportunity, although not significant in terms of health outcomes.</p>

Health determinant	Likely changes to health determinants	Health outcome
	<p>There is strong evidence described in the HEqIA (Application Document 7.10) setting out the links between income levels and health outcomes, particularly in relation to health inequalities.</p> <p>The number of people that would be impacted by changes to affordability is high.</p> <p>The duration of potential impact is considered to be permanent.</p> <p>Local health, wellbeing and equalities strategies and priorities (findings from which are set out in the HEqIA (Application Document 7.10)) reference the importance of addressing inequality and levelling up life chances for residents.</p> <p>Residents in low-income households are currently less likely to make cross-river trips as a result of a range of factors including the cost of travel and levels of car ownership. Although low-income residents would be able to participate in the LRDS, the poorest households would be unlikely to do so; these groups may instead benefit from the wider economic growth and associated benefits that the Project may bring to the area.</p>	
Road safety	<p>As a result of the kilometres travelled being higher in the area appraised, it is forecast that there would be a small reduction in the accident rate (accidents per vehicle kilometre travelled) over the 60-year appraisal period (from scheme opening in 2030).</p> <p>The distribution of accidents has not been considered across social population groups by residence, because users would not necessarily be from local areas and therefore the analysis would not be representative.</p> <p>The HEqIA (Application Document 7.10) sets out strong evidence describing the links between road safety and people’s health and wellbeing. As a new transport corridor, the Project is forecast to result in significant changes in traffic flows.</p> <p>The number of people that may potentially be affected is high, due to the number of routes across the study area. The duration of potential impact is permanent.</p> <p>Local health, wellbeing and equalities strategies and priorities (findings from which are set out in the HEqIA (Application Document 7.10)) reference the</p>	The health outcome for affected communities / sensitive populations as a result of changes in road safety during operation of the Project is assessed as neutral .

Health determinant	Likely changes to health determinants	Health outcome
	importance of external environmental factors and the influence these can have on people’s health and wellbeing.	
Air quality	<p>ES Chapter 5: Air Quality (Application Document 6.1) states that no significant effects have been predicted for air quality during operation of the Project.</p> <p>Across the study area for air quality, there are locations predicted to experience both improvements and deteriorations in air quality. The majority of changes in air quality are forecast to be imperceptible or small at human receptors. While there is a deterioration in air quality at receptors next to the Project route, no exceedances of the annual mean AQS objective are predicted at receptors along the route corridor, largely as a result of the distance between receptors and the Project road and the fact that background concentrations are low in this area, given the rural/suburban nature of the surrounding land use. Air quality improvements are predicted at locations near the existing Dartford Crossing.</p> <p>Concerns highlighted during Statutory Consultation, Supplementary Consultation and Design Refinement Consultation have included anxiety around air quality impacts from emissions as a result of road traffic. This is considered further in relation to potential mental health and wellbeing impacts.</p> <p>The HEqIA (Application Document 7.10) summarises strong evidence setting out the links between changes in air quality and health outcomes. Groups particularly sensitive to deteriorations or improvements in air quality and who may be more likely to experience changes to health outcomes as a result of air quality changes include children, older people and people with existing respiratory conditions. There are higher concentrations of people with existing health conditions such as respiratory disease and Chronic Obstructive Pulmonary Disease (COPD) within a number of the communities near the Project than is the case nationally.</p> <p>Local health and wellbeing strategies (findings from which are set out in the HEqIA (Application Document 7.10)) reference the importance of the wider environment on both mental and physical health and wellbeing, with</p>	The health outcome for affected communities / sensitive populations as a result of changes in air quality during construction is assessed as neutral .

Health determinant	Likely changes to health determinants	Health outcome
	<p>improvements in air quality identified specifically as a priority area in a number of strategies.</p> <p>The number of people that would be impacted by changes in air quality during operation is likely to be high across the length of the Project route.</p> <p>ES Chapter 5: Air Quality (Application Document 6.1) concludes that there is no significant effect on human health as a result of the operation of the Project.</p>	
<p>Noise and vibration</p>	<p>There are predicted to be both improvements and worsenings in noise levels during the operation of the Project. Whilst mitigation measures have been incorporated into the Project design to reduce adverse effects (including embedded measures as well as measures such as acoustic barriers and low noise surfacing), worsenings are still experienced at a number of locations. The HEqIA (Application Document 7.10) reviews a range of evidence which link changes in noise levels with health outcomes.</p> <p>The population exposed to potential changes in noise levels (both positive and negative) across the Project is high. A series of embedded and essential mitigation measures have been identified (for example the inclusion of low-noise surfacing and the locations for acoustic barriers).</p> <p>The duration of potential impact would be permanent.</p> <p>Local health and wellbeing strategies (findings from which are set out in the HEqIA (Application Document 7.10)) reference the importance of the wider environment on both mental and physical health and wellbeing.</p> <p>Potential health outcomes associated with changes in noise levels are likely to relate to anxiety / stress as a result of changes in the local environment, in addition to sleep disturbance for residents located in close proximity to particular activities.</p>	<p>Negative health outcomes associated with increases in noise levels greater than 3dB are identified in a number of wards. Whilst noise effects can be experienced differentially amongst a population, worsenings could potentially result in adverse health effects including increases in annoyance and sleep disturbance.</p> <p>Wards affected include:</p> <ul style="list-style-type: none"> • Shorne, Cobham and Luddesdown • Westcourt • Riverview • Cuxton and Halling • Snodland East • Chadwell St Mary • East Tilbury • Ockendon • Orsett <p>Positive health outcomes (associated with reductions in noise levels) are identified for the following wards:</p>

Health determinant	Likely changes to health determinants	Health outcome
		<ul style="list-style-type: none"> • Shorne, Cobham and Luddesdown • Singlewell • Westcourt • Woodlands • Painters Ash • Higham • Strood South • Chadwell St Mary • Little Thurrock Blackshots • Ockendon • Orsett • South Chafford • Stifford Clays • Aveley and Uplands • Little Thurrock Rectory • Belhus • Upminster • Cranham • Warley • Longfield New Barn and Southfleet • Brent
Work and training	The Need for the Project (Application Document 7.1) states that the Project is likely to enable wider economic impacts, such as people moving to more or less productive jobs and agglomeration based on dynamic clustering (businesses moving closer to one another) in the Lower Thames local area and wider region. Such impacts can be expected to increase productivity as	The health outcome for affected communities / populations during operation is considered to be positive and significant .

Health determinant	Likely changes to health determinants	Health outcome
	<p>businesses benefit from agglomeration through dynamic clustering, better job matching and lower costs due to the re-organisation of their business activities. The Project may also encourage the development of new homes and additional employment spaces. During operation, the Project is anticipated to add over £7 billion to the economy and create over 5,000 new jobs.</p> <p>The Project intends to create a skills legacy for the region, providing people with the tools to access higher skilled jobs, reducing the skills gap and maximising opportunities for local people to gain more meaningful employment.</p> <p>The HEqIA (Application Document 7.10) includes an evidence review which sets out strong links between employment and training and both physical and mental wellbeing.</p> <p>The number of people that would experience beneficial changes as a result of the creation of new employment and training opportunities is high. Legacy activities include the development of a significant education programme, aligned to the needs of local education providers and delivering science, technology, engineering and maths (STEM) workshops and activities in schools to educate and inspire future careers in construction, including future skills needs and carbon / sustainability education.</p> <p>The duration of impact would be long-term (i.e. more than two years in duration). Creating a skills legacy is one of the ambitions for the Project as set out in the SEE Strategy.</p> <p>Local health and wellbeing strategies (findings from which are set out in the HEqIA (Application Document 7.10)) reference the importance of work and training as one of the wider social determinants of health. The proposals are in line with the UK Government’s Levelling Up plans to unlock economic growth through job creation, new work for businesses and higher skilled workers. This aligns with tackling health inequality which is a priority for local authorities.</p> <p>The SEE Strategy, which will be secured via S106 agreement (Application Document 7.3), contains a range of targets for employment and training.</p>	

Health determinant	Likely changes to health determinants	Health outcome
	<p>Sensitive populations and communities will continue to benefit from the legacy based approach to skills and training. Engagement with local schools, including those from areas of socio-economic disadvantage, further emphasises the legacy approach.</p>	
<p>Impacts on housing and community services and facilities</p>	<p>The Project would be likely to result in improvements to accessibility which may in turn result in property market changes, particularly for those locations where accessibility improvements are greatest. There is significant planned regeneration and housing growth across local authorities in the wider region. Health effects are likely to be associated with improved security and mental wellbeing.</p> <p>Potential adverse effects may arise where people from lower-income households find themselves unable to compete in the property market and relocate further from jobs/services. There is a risk that health inequalities may widen as a result of increased affordability issues.</p> <p>The HEqIA (Application Document 7.10) describes strong evidence around the importance of housing as a determinant of health.</p> <p>The number of people potentially impacted is high and geographically diverse. The duration of impact would be long-term (i.e. more than two years in duration).</p> <p>Local health and wellbeing strategies (findings from which are set out in the HEqIA (Application Document 7.10)) reference the importance of the wider environment on both mental and physical health and wellbeing.</p>	<p>The health outcome for affected communities / populations during operation is considered to be neutral.</p>
<p>Mental health and wellbeing</p>	<p>The potential impacts of the Project during operation in relation to mental health and wellbeing have been assessed for each of the protective factors as set out in the National Mental Health Development Unit (2011) toolkit. This assessment is provided in the HEqIA (Application Document 7.10). The assessment has identified potential issues in addition to the various mitigation measures and other interventions that the Project would put in place to reduce impacts on communities and people's lives. The assessment has identified that there are likely to be both positive and negative impacts relating to mental health and wellbeing in particular:</p>	<p>Health outcomes are therefore described as both positive and negative. Both positive and negative health outcomes are likely to be significant.</p>

Health determinant	Likely changes to health determinants	Health outcome
	<p>Negative effects may continue in relation to people’s sense of control over their physical environment (although for the majority of people, these effects are likely to lessen over time as the Project becomes embedded in people’s lives and mitigation measures, for example landscaping and planting, mature). While effects would be experienced differentially across a community, due to a range of individual factors, the baseline data suggests that less-resilient groups are present in higher proportions within certain wards along the Project route. Detailed design measures would incorporate recommendations from the National Highways Suicide Prevention Toolkit; it is noted that a number of local authorities through which the Project route passes have higher than average suicide rates.</p> <p>Equally, there are potential positive effects including legacy effects associated with job creation and the introduction of skills and training programmes. These may particularly benefit some of the most sensitive populations (for example, people in low-income households and the long-term unemployed). Further benefits relate to the raft of improvements to WCH routes near the Project which would encourage physical activity and enable access to open spaces and nature, both of which are proven to have positive effects in relation to mental health and wellbeing.</p> <p>The number of people potentially exposed to both positive and negative effects is likely to be high and geographically diverse.</p> <p>The HEqIA (Application Document 7.10) notes strong evidence describing the links between wider environmental factors and mental health and wellbeing.</p> <p>Local health and wellbeing strategies (findings from which are set out in the HEqIA (Application Document 7.10)) reference the importance of the wider environment on both mental and physical health and wellbeing.</p> <p>The duration of impact is likely to be permanent, although individuals may experience a lessening of negative effects over time as the Project matures.</p>	
Pollution and flood-risk	ES Chapter 10: Geology and Soils (Application Document 6.1) identifies a negligible magnitude of impact in relation to pollution arising from exposure to contaminated soils and the migration of ground gases at landfill sites along the	Sensitive populations include road users and maintenance workers. It is unlikely that a pathway to communities / populations of high

Health determinant	Likely changes to health determinants	Health outcome
	<p>Project route and at the North Portal. ES Chapter 14: Road Drainage and the Water Environment (Application Document 6.1) does not identify any significant effects in relation to surface water and groundwater quality during the Project’s operation. The Project would contribute to reducing baseline flood risk in the Mardyke catchment through the proposed wetland restoration in Orsett Fen.</p> <p>The HEqIA (Application Document 7.10) provides strong evidence setting out the links between contamination, pollution and flood-risk and human health. The number of people potentially exposed to pollution would be very low. A range of mitigation measures have been identified setting out how accidental spillages, for example, would be dealt with.</p> <p>The duration of potential impacts would be short-term and relate to individual pollution or flooding events should they occur.</p> <p>Local health and wellbeing strategies (findings from which are set out in the HEqIA (Application Document 7.10)) reference the importance of the wider environment on both mental and physical health and wellbeing.</p>	<p>sensitivity would exist and as a result no health impacts have been identified. The health outcome is therefore considered to be neutral.</p>
<p>Light pollution</p>	<p>ES Chapter 7: Landscape and Visual (Application Document 6.1) identifies that there would be a number of locations where a perceived change in the night-time environment would occur as a result of the removal of existing roadside vegetation; the presence of vehicle lights along the Project route where not screened in cutting or by false cutting slopes; or the introduction of new lighting at certain locations (for example junctions).</p> <p>The number of people that would experience changes in light pollution as a result of the Project is considered to be low – limited to populations in rural areas within close proximity of the Project route. Outside of these areas, changes to the night-time environment would be perceived in the context of existing lighting sources.</p> <p>The duration of impact would be long-term (i.e. more than two years in duration). Where a perceived change has been identified, this effect typically reduces between opening and design years due to the establishment of mitigation planting (an exception may be elevated structures such as the Tilbury Viaduct).</p>	<p>The health outcome for both general and sensitive populations / communities as a result of changes in light pollution during operation is considered to be neutral</p>

Health determinant	Likely changes to health determinants	Health outcome
	<p>Local health and wellbeing strategies (findings from which are set out in the HEqIA (Application Document 7.10)) reference the importance of the wider environment on both mental and physical health and wellbeing.</p> <p>Embedded mitigation includes a Project-wide design principle relating to minimising lighting along the Project route. Other measures relate to the reduced height of lighting columns and the use of LED luminaires with reduced light spill.</p> <p>Health impacts are likely to be primarily associated with mental wellbeing and the perception of a potential issue rather than a significant increase in light pollution itself.</p>	
<p>Climate change Topic includes health effects arising from: GHG emissions Vulnerability of the Project to climate change</p>	<p>The health outcome from GHG emissions would be the same as for construction and is not repeated here.</p> <p>Vulnerability of the Project to climate change</p> <p>ES Chapter 15: Climate (Application Document 6.1) notes a variety of potential areas of impacts for end users of the Project as a result of changes in intensity and frequency of weather events. A range of mitigation measures have been secured and, post-mitigation, it is not considered that any of the impacts identified would be significant.</p> <p>The HEqIA (Application Document 7.10) sets out strong evidence describing the links between climate change and both physical and mental wellbeing.</p> <p>Local health and wellbeing strategies reference the importance of the wider environment and resilience to climate change on both mental and physical health and wellbeing; more deprived communities in particular are highlighted as being more vulnerable to climate change, resulting in health inequalities.</p> <p>The number of people who may potentially experience impacts as a result of the vulnerability of the Project to climate change during operation is high (end users of the Project).</p> <p>The duration of impact would be long-term (i.e. more than two years in duration).</p>	<p>GHG emissions – health outcome as for construction (neutral).</p> <p>The likelihood of events occurring has been described as low or very low and a range of appropriate mitigation has been set out. The health outcome for both general and sensitive populations / communities as a result of the vulnerability of the Project to climate change during operation is therefore considered to be neutral.</p>
<p>EMFs</p>	<p>No health impact has been identified in relation to EMFs as a result of the Project during the operation phase. Further detail relating to EMFs can be found in Appendix D of the HEqIA (Application Document 7.10).</p>	<p>The health outcome has been identified as neutral.</p>

13.7 Cumulative effects

Intra-project effects

- 13.7.1 Cumulative effects of the Project can occur as a result of interrelationships between different environmental topics, which are referred to as 'intra-project effects'. For population and human health, interrelationships are identified with air quality (Chapter 5: Air Quality), noise and vibration (Chapter 12: Noise and Vibration), landscape and visual (Chapter 7: Landscape and Visual), terrestrial biodiversity (Chapter 8: Terrestrial Biodiversity) and geology and soils (Chapter 10: Geology and Soils) and are summarised below:
- a. Air quality – the air quality assessment has been taken into account in the assessment of effects on residential amenity. Air quality effects are also a consideration within the assessment on human health undertaken within the HEqIA (Application Document 7.10) and reported in summary within this chapter.
 - b. Noise and vibration – the noise and vibration assessment has been taken into account in the assessment of effects on residential amenity. Effects arising from changes in noise levels are also a consideration within the assessment on human health undertaken within the HEqIA (Application Document 7.10) and reported in summary within this chapter.
 - c. Landscape and visual – the visual impact assessment has been taken into account in the assessment of effects on residential amenity. Landscape and visual effects are also a consideration within the assessment of effects on recreational access, connectivity and changes to landscape amenity, which forms part of the human health assessment undertaken within the HEqIA (Application Document 7.10) and reported in summary within this chapter.
 - d. Terrestrial biodiversity – potential intra-project effects relate to disturbance to species and degradation of sites and habitats from increased visitor pressure.
 - e. Geology and soils – interrelationships relate to effects associated with soil quality which have been taken into account in the assessment of effects on agricultural landholdings. A further area of overlap relates to the assessment of potential sources of pollution (land and water) and unexploded ordnance and the potential impact these may have in relation to human health.
- 13.7.2 The above interrelationships have been considered as part of the assessment reported in this chapter, and the relevant topic chapters identified above. No additional cumulative impacts are identified.

- 13.7.3 Cumulative effects on individual wards as a result of health outcomes identified are covered separately within the HEqIA (Application Document 7.10).
- 13.7.4 Effects on population and human health have been considered as part of the assessment of intra-project effects on residential receptors reported in Chapter 16: Cumulative Effects Assessment.

Inter-project effects

- 13.7.5 In addition to intra-project effects, cumulative impacts can also occur due to the Project in combination with other existing and/or approved development. These are known as ‘inter-project’ effects and are considered separately in Chapter 16: Cumulative Effects Assessment.

13.8 Monitoring

- 13.8.1 Significantly affected private assets would be entitled to financial compensation. It would not be necessary to undertake any associated monitoring.
- 13.8.2 Where there would be permanent effects on community land as a result of the permanent acquisition of land, replacement land of similar accessibility and quality would be provided. As such, it would not be necessary to undertake any monitoring.
- 13.8.3 As part of the arrangements for the accommodation helpdesk secured in the Framework Construction Travel Plan (Application Document 7.13), contractors would be required to create and maintain a live database that monitors the accommodation being used by the workforce in terms of the type of accommodation (on-site project accommodation, private rented, spare rooms/latent, owner-occupied or tourist/visitor) and the location of this accommodation (postcode). The contractors would mandate that its workforce, and those of its suppliers, regularly update their information related to the database for every worker. This database would be reported on monthly to members of the WAWG. The WAWG would receive monthly workforce accommodation monitoring reports from the helpdesk, and regular updates and information from the Project including ‘look-ahead’ for potential workforce implications over a 12-month period led by National Highways and Delivery Partners. The findings of the workforce accommodation monitoring report would be considered alongside other relevant information gathered from other sources of monitoring secured by the Project via the FCTP, and SEE Strategy (Appended to s106 Agreement, Application Document 7.3) and information provided by authorities on market conditions and other developments in the local area.
- 13.8.4 Of relevance to the human health assessment are the findings of Chapter 12: Noise and Vibration. The chapter concludes some significant effects and has informed the assessment of a negative health outcome in relation to noise. In line with DMRB LA 111 Noise and Vibration (Highways England, 2020c), a range of monitoring and evaluation measures would be implemented. This is set out in the REAC (Application Document 6.3, Appendix 2.2).

13.9 Summary

- 13.9.1 The assessment of effects on population and human health has considered the construction and operational effects on receptors and compliance with National Highways requirements. Assessments were undertaken in accordance with DMRB LA 112 (Highways England, 2020b).
- 13.9.2 The current environment has been described in relation to the local and wider economy; private property and housing; community land and assets; development land and businesses; agricultural land holdings; WCH; and human health.
- 13.9.3 Potential effects have been described in relation to each of these topic areas. A range of mitigation measures to manage potential effects have been proposed, including good practice mitigation and essential mitigation. The most significantly affected receptors would be properties at risk from demolition or acquisition as a result of the Project. Mitigation measures relate to appropriate compensation mechanisms. Community land would also be affected by virtue of temporary possession and permanent acquisition of land. However, replacement land would be provided where permanent effects have been identified.
- 13.9.4 The effects on WCH are likely to be adverse during the construction phase; during the operational phase, a range of enhancement opportunities have been identified to improve the existing PRoW network through enhanced facilities and creation of missing links, as identified in Section 13.6 of this Chapter. These are secured as commitments within the Design Principles (Application Document 7.5) and are identified in Section 5 of this chapter.
- 13.9.5 Sensitive communities and populations have been identified as part of the human health assessment. Effects on these populations are described in further detail within the HEqIA (Application Document 7.10).
- 13.9.6 summarises the likely human health outcomes identified. Table 13.76 and Table 13.77 summarise the likely human health outcomes by ward for sensitive populations. These tables take into consideration the mitigation measures set out in Section 13.5.

- 13.9.7 Table 13.74 summarises the likely significant effects in relation to the land-use and accessibility components of this chapter.
- 13.9.8 summarises the likely human health outcomes identified. Table 13.76 and Table 13.77 summarise the likely human health outcomes by ward for sensitive populations. These tables take into consideration the mitigation measures set out in Section 13.5.

Table 13.74 Land-use and accessibility sub-topics summary impact table

Impact description	Sensitivity	Impact magnitude	Effect	Significance
Construction				
South of the River Thames				
Private property and housing – four properties affected by demolition	Medium	Major adverse	Large/ moderate adverse	Significant
Private property and housing – two properties would be affected by permanent acquisition of land for the Project.	Medium	Minor	Slight adverse	Not significant
Private property and housing - one property would be affected as a result of temporary possession of land	Medium	Negligible	Neutral	Not significant
Private property and housing – effects relating to temporary changes in access to properties as a result of construction activities	Medium	Minor adverse	Slight adverse	Not significant
Private property and housing – no direct impact on travellers’ sites during construction	High	Negligible	Neutral	Not significant
Private property and housing – no change identified in relation to residential development sites within the study area.	Low	No change	Neutral	Not significant
Private property and housing – no effects identified in relation to marine and riparian assets.	High	No change	Neutral	Not significant
Community land – effects on community land range from temporary possession / permanent acquisition of land through to disruption resulting	Low to very high	No change to minor adverse	Neutral to slight adverse	No significant effects

Impact description	Sensitivity	Impact magnitude	Effect	Significance
from utilities diversions and impacts on the amenity of users				
Community land (private recreational facilities) – effects include temporary possession / permanent acquisition of land through to disruption resulting from utilities diversions and impacts on the amenity of users	Low to medium	Negligible to major adverse	Neutral to moderate adverse	Significant effects on Southern Valley Golf Course
Community assets – effects relating to changes in accessibility (journey time) or amenity as a result of construction activities	High to very high	Negligible	Slight adverse	Not significant
Community assets – impacts identified in relation to temporary possession / temporary rights	Low	No change	Neutral	Not significant
Community assets – impacts of the construction workforce on the local housing market	Very high	Negligible	Slight adverse	Not significant
Community assets – impacts of the construction workforce on healthcare facilities	Very high	Negligible	Slight adverse	Not significant
Development land – no development land has been identified within the study area. Development land identified within the wider area, of relevance due to strategic employment-generating potential, includes Thames Gateway, Gravesend Opportunity Areas, Ebbsfleet Garden City proposals, the London Resort project at Swanscombe Peninsula and plans for the expansion of the Bluewater Shopping Centre.	Very high	No change	Neutral	Not significant
Businesses – loss of businesses as a result of property demolition (Depot located off Henhurst Road, Cobham Service Station (A2 westbound,	Medium	Major adverse	Moderate adverse	Significant

Impact description	Sensitivity	Impact magnitude	Effect	Significance
ESSO) and Hartshill Nursery and Baylis Landscapes, Thong Lane)				
Businesses –impacts on businesses as a result of temporary possession of land, enabling works, utilities works and road closures.	Medium to high	Minor beneficial to moderate adverse	Slight beneficial to moderate adverse	Significant effects on The Inn on the Lake
Agricultural land holdings – 27 landholdings temporarily affected	Low to high	Negligible to major adverse	Slight to very large adverse	Significant effects in relation to 20 landholdings
Agricultural land holdings – 20 landholdings permanently affected	Low to high	Negligible to major adverse	Slight to very adverse	Significant effects in relation to 11 landholdings
Walkers, cyclists and horse riders – temporary and permanent closures of PRowS, cycle routes and bridleways as a result of construction activities, with changes in journey length identified	Low to high	No change to major adverse	Neutral to moderate adverse	Significant effects on a number of PRowS
Walkers, cyclists and horse riders – closures affecting minor roads crossed by the Project, including changes in journey length	Very high	No change to major adverse	No change to major adverse	Significant effect in relation to the temporary closure of Brewers Road during construction.
North of the River Thames				
Private property and housing – 26 properties affected by demolition	High	Major adverse	Very large / large adverse	Significant
Private property and housing – two properties would be affected by permanent acquisition of land for the Project	High	Minor	Slight adverse	Not significant
Private property and housing – relocation of the Gammonfields Way travellers' site due to permanent acquisition of land. A replacement	High	Minor	Slight adverse	Not significant

Impact description	Sensitivity	Impact magnitude	Effect	Significance
site would be constructed prior to the existing site being removed				
Private property and housing – impacts on privately owned travellers sites as a result of construction activities	High	Negligible	Slight adverse	Not significant
Private property and housing – effects relating to temporary changes in access to private properties as a result of construction activities. Access to individual properties would be maintained at all times	Very high	Negligible	Slight adverse	Not significant
Private property and housing – no change identified in relation to residential development sites within the study area.	Low	No change	Neutral	Not significant
Private property and housing – no change identified in relation to marine and riparian assets.	Very high	No change	Neutral	Not significant
Community land – effects on community land range from permanent acquisition and temporary possession of land through to disruption resulting from utilities diversions and impacts on amenity of users.	Negligible to very high	Negligible to moderate adverse	Neutral to moderate adverse	Significant adverse effects on Coalhouse Fort and Tilbury Fort
Community assets (private recreational facilities) – effects relating to permanent acquisition of land for the Project	High	Major adverse	Large adverse	Significant effects on Wild Thyme Outdoors (a private recreational facility)
Community assets – effects relating to changes in accessibility (journey time) as a result of road closures.	High to very high	Minor adverse	Moderate adverse	Significant effects relate to Upminster Cemetery and South Essex Crematorium, Treetops and Beacon Hill Post-16 Schools

Impact description	Sensitivity	Impact magnitude	Effect	Significance
Community assets – impacts of the construction workforce on the local housing market	Very high	Negligible	Slight adverse	Not significant
Community assets – impacts of the construction workforce on healthcare facilities	Very high	Negligible	Slight adverse	Not significant
Development land – potential effects on areas of development land as a result of interfaces between projects.	Very high	Minor adverse	Moderate adverse	Significant effects relating to the proposed Brentwood Enterprise Park and the Port of Tilbury Freeport Tax Site
Businesses – loss of business as a result of property demolition	High	Major	Large adverse	Significant effects relating to Cranham Solar Farm
Businesses – loss of business as a result of permanent acquisition of land	High to very high	Negligible to moderate adverse	Slight to large adverse	Significant effects relating to Orsett Showground
Businesses – impacts on businesses as a result of temporary possession of land, enabling works, utilities works and road closures	Medium to high	No change to moderate adverse	Neutral to moderate adverse	Significant effects on The Manor Farm Shop
Agricultural land holdings – 36 landholdings would be temporarily affected	Low to high	Negligible to major adverse	Slight to very large adverse	Significant effects in relation to 21 landholdings
Agricultural land holdings – 28 landholdings would be permanently affected	Low to high	Negligible to major adverse	Slight to very large adverse	Significant effects in relation to 13 landholdings
Walkers, cyclists and horse riders – severance and temporary closures of PRowS, cycle routes and bridleways as a result of construction activities, with changes in journey length identified.	Low to high	Moderate beneficial to major adverse	Moderate beneficial to Large adverse	Significant beneficial effects relating to four WCH routes. Significant adverse effects relating to eight WCH routes.
Walkers, cyclists and horse riders – closures affecting minor roads crossed by the Project, including changes in journey length.	Low to very high	No change to major adverse	Neutral to very large adverse	Significant effects in relation to access to Baker Street,

Impact description	Sensitivity	Impact magnitude	Effect	Significance
				Rectory Road and Ockendon Road.
Operation				
South of the River Thames				
Private property and housing – impacts as reported for construction in terms of permanent land acquisition	-	-	-	-
Community land – no loss or detrimental alteration to characteristics, features or elements of areas of community land have been identified, such that the overall viability would be compromised or directly affected. No permanent severance has been identified in relation to community land. Substantial amendments to access provided, including provision of new sites and replacement land.	Low to very high	No change to moderate beneficial	Neutral to large beneficial	Significant beneficial effects on existing areas of community land in relation to Shorne Woods Country Park, Jeskyns Community Woodland and the Michael Gardens Play Area. Significant beneficial effect in relation to the provision of Chalk Park.
Community assets – no community assets predicted to be affected during the operational phase as a result of severance or loss of detrimental alteration of characteristics, features or elements.	Negligible to very high	Negligible	Neutral	Not significant
Development land – the Project would bring improved connectivity across the local area and wider region thereby improving development land potential.	Very high	Moderate beneficial	Very large beneficial	Significant
Businesses – impacts reported as for construction in relation to permanent acquisition of land.	-	-	-	-

Impact description	Sensitivity	Impact magnitude	Effect	Significance
Agricultural land holdings – potential for invasive weed species to grow within the Order Limits and spread to neighbouring agricultural land.	Low	Minor adverse	Slight adverse	Not significant
Walkers, cyclists and horse riders (PRoWs) – changes in journey length and user experience for WCH routes during operational phase.	Low to high	No change to moderate beneficial	Neutral to moderate beneficial	Significant beneficial effects on six WCH routes
Walkers, cyclists and horse riders (minor roads) – all minor roads crossed by the Project would be reconnected and would not be subject to any changes in journey length	Low to very high	No change	Neutral	Not significant
North of the River Thames				
Private property and housing – impacts as reported for construction in terms of permanent land acquisition	-	-	-	-
Community land – no loss or detrimental alteration to characteristics, features or elements of areas of community land or assets have been identified, such that the overall viability of facilities would be compromised or directly affected. No permanent severance has been identified in relation to community land.	Negligible to very high	No change to moderate beneficial	Neutral to moderate beneficial	Significant beneficial effects in relation to Folkes Lane Woodland, Thames Chase Community Forest and Ron Evans Memorial Field. Significant beneficial effect in relation to the provision of Tilbury Fields.
Community assets – no community assets predicted to be affected during the operational phase as a result of severance or loss of detrimental alteration of characteristics, features or elements.	Negligible to very high	Negligible	Neutral	Not significant

Impact description	Sensitivity	Impact magnitude	Effect	Significance
Development land – the Project would bring improved connectivity across the local area and wider region, thereby improving development land potential.	Very high	Moderate beneficial	Very large	Significant
Businesses – impacts reported as for construction in relation to permanent acquisition of land.	-	-	-	-
Agricultural land holdings – potential for invasive weed species to grow within the Order Limits and spread to neighbouring agricultural land.	Low	Minor adverse	Slight adverse	Not significant
Walkers, cyclists and horse riders (PRoWs) – changes in journey length and user experience for PRoWs during operational phase.	Low to high	Moderate beneficial to major beneficial	Moderate beneficial to moderate beneficial	Significant beneficial effects on twelve WCH routes
Walkers, cyclists and horse riders (minor roads) – changes in journey length for minor roads during operational phase	Low to very high	Negligible	Slight adverse	Not significant

Table 13.75 Human health assessment summary impact table

Topic	Health outcome
Construction	
Accessibility	Neutral
Traffic-related severance	Neutral – general population Negative – children, older people, people with disabilities and/or long-term health conditions, pedestrians, parents with young children / pushchairs, people in low-income households, people without access to private transport and those experiencing rural isolation
Access to green space and outdoor recreation	Negative – general population and sensitive populations people in low-income households, children and young people, those without access to private transport and pedestrians / cyclists.
Active travel	Neutral – general population and sensitive populations including people in low-income households, children and young people, women, those without access to private transport and pedestrians / cyclists. Positive – construction workforce
Affordability	N/A
Road safety	Neutral
Air quality	Neutral
Noise and vibration	Negative and significant – General populations / sensitive communities including children and young people, older people, pregnant women/parents with newborn babies, people with pre-existing aural health conditions, people with cardiovascular conditions, people with mental health conditions, shift workers and people in low-income households
Work and training	Positive and significant
Housing and community services impacts	Impacts associated with the loss of private property and associated change in sense of community – Negative: people within impacted communities (Baker Street, North Ockendon), older people, people in low-income households Impacts on gypsy and traveller communities: neutral Impacts of construction workforce on local accommodation: neutral Impacts of construction workforce on healthcare services and facilities: neutral
Mental health and wellbeing	Both positive and negative health outcomes would be experienced by communities located in close proximity to construction routes and activities in addition to populations within and outside of these communities with a high sensitivity to mental health and wellbeing impacts Impacts experienced by the construction workforce: positive
Pollution and flood-risk	Neutral – local residents and land users near significant earthwork movements; construction workers
Light pollution	Neutral
Climate change	GHG emissions: neutral Vulnerability of the Project to climate change: neutral

EMFs	Neutral
Operation	
Accessibility	Positive (significant) – general population, sensitive communities /populations
Traffic-related severance	Neutral – general population, sensitive communities and populations
Access to green space and outdoor recreation	Positive – general population, sensitive communities and populations including: users of existing and new areas of green space and outdoor recreation assets, children and young people, people in low-income households, people without access to private transport, people with mental health conditions, pedestrians and cyclists and older people.
Active travel	Positive (significant) - people in low-income households, children and young people, women, those without access to private transport and pedestrians / cyclists
Affordability	People in low-income households: positive
Road safety	Neutral – general population, sensitive communities and populations
Air quality	Neutral – general population, sensitive communities and populations
Noise and vibration	Positive and negative – general population, sensitive communities and populations
Work and training	Positive (significant) – general population, sensitive communities and populations
Housing and community services impacts	Neutral – general population, people in low-income households
Mental health and wellbeing	Negative (significant) – general population / sensitive communities Positive (significant) – general population / sensitive communities
Pollution and flood-risk	Neutral – general population, sensitive communities and populations
Light pollution	Neutral – general population, sensitive communities and populations
Climate change	GHG emissions: neutral – general population, sensitive communities and populations Vulnerability of the Project to climate change: neutral – general population, sensitive communities and populations
EMFs	Neutral – general population, sensitive communities and populations

Table 13.76 Summary of health outcomes by ward for sensitive populations (construction)

Construction phase	Health outcome by determinant for sensitive populations (✓ = positive, X = negative, - = neutral)														
	Ward	Accessibility	Traffic-related severance	Access to green space and outdoor recreation	Active travel	Affordability	Road safety	Air quality	Noise and vibration	Work and training	Housing and community services impacts	Mental health and wellbeing	Pollution and flood-risk	Light pollution	Climate change
Gravesham															
Riverside	-	X	-	-	N/A	-	-	-	✓	-	✓/X	-	-	-	-
Riverview	-	X	X	-	N/A	-	-	-	✓	-	✓/X	-	-	-	-
Higham	-	-	X	-	N/A	-	-	-	✓	-	✓/X	-	-	-	-
Chalk	-	X	X	-	N/A	-	-	-	✓	-	✓/X	-	-	-	-
Westcourt	-	X	X	-	N/A	-	-	-	✓	-	✓/X	-	-	-	-
Shorne, Cobham and Luddesdown	-	-	-	-	N/A	-	-	X	✓	-	✓/X	-	-	-	-
Woodlands	-	-	-	-	N/A	-	-	-	✓	-	✓/X	-	-	-	-
Singlewell	-	X	X	-	N/A	-	-	-	✓	-	✓/X	-	-	-	-
Northfleet South	-	-	-	-	N/A	-	-	-	✓	-	✓/X	-	-	-	-

Construction phase	Health outcome by determinant for sensitive populations (✓ = positive, X = negative, - = neutral)															
	Ward	Accessibility	Traffic-related severance	Access to green space and outdoor recreation	Active travel	Affordability	Road safety	Air quality	Noise and vibration	Work and training	Housing and community services impacts	Mental health and wellbeing	Pollution and flood-risk	Light pollution	Climate change	EMFs
Istead Rise	-	-	-	-	N/A	-	-	-	✓	-	✓/X	-	-	-	-	
Painters Ash	-	-	X	-	N/A	-	-	-	✓	-	✓/X	-	-	-	-	
Central	-	X	-	-	N/A	-	-	-	✓	-	✓/X	-	-	-	-	
Coldharbour	-	-	-	-	N/A	-	-	-	✓	-	✓/X	-	-	-	-	
Medway																
Cuxton and Halling	-	-	-	-	N/A	-	-	X	✓	-	✓/X	-	-	-	-	
Strood South	-	-	-	-	N/A	-	-	-	✓	-	✓/X	-	-	-	-	
Strood North	-	-	-	-	N/A	-	-	-	✓	-	✓/X	-	-	-	-	
Strood Rural	-	-	-	-	N/A	-	-	-	✓	-	✓/X	-	-	-	-	
Tonbridge and Malling																
Snodland East	-	-	-	-	N/A	-	-	-	✓	-	✓/X	-	-	-	-	

Construction phase	Health outcome by determinant for sensitive populations (✓ = positive, X = negative, - = neutral)														
	Accessibility	Traffic-related severance	Access to green space and outdoor recreation	Active travel	Affordability	Road safety	Air quality	Noise and vibration	Work and training	Housing and community services impacts	Mental health and wellbeing	Pollution and flood-risk	Light pollution	Climate change	EMFs
Dartford															
Newtown	-	-	-	-	N/A	-	-	-	✓	-	✓/X	-	-	-	-
Stone Castle	-	-	-	-	N/A	-	-	-	✓	-	✓/X	-	-	-	-
Stone House	-	-	-	-	N/A	-	-	-	✓	-	✓/X	-	-	-	-
Bridge	-	-	-	-	N/A	-	-	-	✓	-	✓/X	-	-	-	-
Temple Hill	-	-	-	-	N/A	-	-	-	✓	-	✓/X	-	-	-	-
Longfield, New Barn and Southfleet	-	-	-	-	N/A	-	-	-	✓	-	✓/X	-	-	-	-
Thurrock															
Ockendon	-	-	X	-	N/A	-	-	X	✓	X	✓/X	-	-	-	-
Belhus	-	-	-	-	N/A	-	-	-	✓	-	✓/X	-	-	-	-

Construction phase	Health outcome by determinant for sensitive populations (✓ = positive, X = negative, - = neutral)														
	Ward	Accessibility	Traffic-related severance	Access to green space and outdoor recreation	Active travel	Affordability	Road safety	Air quality	Noise and vibration	Work and training	Housing and community services impacts	Mental health and wellbeing	Pollution and flood-risk	Light pollution	Climate change
Orsett	-	-	-	-	N/A	-	-	X	✓	X	✓/X	-	-	-	-
Stifford Clays	-	-	X	-	N/A	-	-	X	✓	-	✓/X	-	-	-	-
Little Thurrock Rectory	-	-	-	-	N/A	-	-	-	✓	-	✓/X	-	-	-	-
Little Thurrock Blackshots	-	-	X	-	N/A	-	-	-	✓	-	✓/X	-	-	-	-
Chadwell St Mary	-	X	X	-	N/A	-	-	-	✓	-	✓/X	-	-	-	-
Tilbury St Chads	-	X	X	-	N/A	-	-	-	✓	-	✓/X	-	-	-	-
Tilbury Riverside and Thurrock Park	-	-	-	-	N/A	-	-	X	✓	-	✓/X	-	-	-	-
East Tilbury	-	-	X	-	N/A	-	-	X	✓	-	✓/X	-	-	-	-
Aveley and Uplands	-	-	-	-	N/A	-	-	-	✓	-	✓/X	-	-	-	-

Construction phase	Health outcome by determinant for sensitive populations (✓ = positive, X = negative, - = neutral)															
	Ward	Accessibility	Traffic-related severance	Access to green space and outdoor recreation	Active travel	Affordability	Road safety	Air quality	Noise and vibration	Work and training	Housing and community services impacts	Mental health and wellbeing	Pollution and flood-risk	Light pollution	Climate change	EMFs
West Thurrock and South Stifford	-	-	-	-	N/A	-	-	-	✓	-	✓/X	-	-	-	-	
Chafford and North Stifford	-	-	-	-	N/A	-	-	X	✓	-	✓/X	-	-	-	-	
Stanford-le-Hope West	-	-	-	-	N/A	-	-	-	✓	-	✓/X	-	-	-	-	
Stanford East and Corringham Town	-	-	-	-	N/A	-	-	-	✓	-	✓/X	-	-	-	-	
The Homesteads	-	-	-	-	N/A	-	-	-	✓	-	✓/X	-	-	-	-	
Corringham and Fobbing	-	-	-	-	N/A	-	-	-	✓	-	✓/X	-	-	-	-	
Havering																
Upminster	-	-	X	-	N/A	-	-	X	✓	-	✓/X	-	-	-	-	
Cranham	-	-	X	-	N/A	-	-	-	✓	-	✓/X	-	-	-	-	
Harold Wood	-	-	-	-		-	-	-	✓	-	✓/X	-	-	-	-	

Construction phase	Health outcome by determinant for sensitive populations (✓ = positive, X = negative, - = neutral)														
	Accessibility	Traffic-related severance	Access to green space and outdoor recreation	Active travel	Affordability	Road safety	Air quality	Noise and vibration	Work and training	Housing and community services impacts	Mental health and wellbeing	Pollution and flood-risk	Light pollution	Climate change	EMFs
Ward															
Rainham and Wenningham	-	-	-	-	N/A	-	-	-	✓	-	✓/X	-	-	-	-
Gooshays	-	-	-	-	N/A	-	-	-	✓	-	✓/X	-	-	-	-
Brentwood															
Warley	-	-	-	-	N/A	-	-	-	✓	-	✓/X	-	-	-	-
South Weald	-	-	-	-	N/A	-	-	-	✓	-	✓/X	-	-	-	-
Herongate, Ingrave and West Horndon	-	-	-	-	N/A	-	-	-	✓	-	✓/X	-	-	-	-

Table 13.77 Summary of health outcomes by ward for sensitive populations (operation)

Operation phase	Health outcome by determinant for sensitive populations (✓ = positive, X = negative, - = neutral)															
	Ward	Accessibility	Traffic-related severance	Access to green space and outdoor recreation	Active travel	Affordability	Road safety	Air quality	Noise and vibration	Work and training	Housing and community services impacts	Mental health and wellbeing	Pollution and flood-risk	Light pollution	Climate change	EMFs
Gravesham																
Riverside	✓	-	✓	-	✓	-	-	-	✓	-	✓/X	-	-	-	-	-
Riverview	✓	-	✓	✓	✓	-	-	X	✓	-	✓/X	-	-	-	-	-
Higham	✓	-	✓	✓	✓	-	-	✓	✓	-	✓/X	-	-	-	-	-
Chalk	✓	-	✓	✓	✓	-	-	-	✓	-	✓/X	-	-	-	-	-
Westcourt	✓	-	✓	✓	✓	-	-	✓/X	✓	-	✓/X	-	-	-	-	-
Shorne, Cobham and Luddesdown	✓	-	✓	✓	✓	-	-	✓/X	✓	-	✓/X	-	-	-	-	-
Woodlands	✓	-	✓	✓	✓	-	-	✓	✓	-	✓/X	-	-	-	-	-
Singlewell	✓	-	✓	✓	✓	-	-	✓	✓	-	✓/X	-	-	-	-	-
Northfleet South	✓	-	✓	-	✓	-	-	-	✓	-	✓/X	-	-	-	-	-

Operation phase	Health outcome by determinant for sensitive populations (✓ = positive, X = negative, - = neutral)														
	Accessibility	Traffic-related severance	Access to green space and outdoor recreation	Active travel	Affordability	Road safety	Air quality	Noise and vibration	Work and training	Housing and community services impacts	Mental health and wellbeing	Pollution and flood-risk	Light pollution	Climate change	EMFs
Ward															
Istead Rise	✓	-	✓	✓	✓	-	-	-	✓	-	✓/X	-	-	-	-
Painters Ash	✓	-	✓	✓	✓	-	-	✓	✓	-	✓/X	-	-	-	-
Central	✓	-	✓	-	✓	-	-	-	✓	-	✓/X	-	-	-	-
Coldharbour	✓	-	✓	-	✓	-	-	-	✓	-	✓/X	-	-	-	-
Medway															
Cuxton and Halling	✓	-	✓	-	-	-	-	X	✓	-	✓/X	-	-	-	-
Strood South	✓	-	✓	-	-	-	-	-	✓	-	✓/X	-	-	-	-
Strood North	✓	-	✓	-	-	-	-	-	✓	-	✓/X	-	-	-	-
Strood Rural	✓	-	✓	-	-	-	-	-	✓	-	✓/X	-	-	-	-
Tonbridge and Malling															
Snodland East	✓	-	✓	✓	-	-	-	X	✓	-	✓/X	-	-	-	-

Operation phase	Health outcome by determinant for sensitive populations (✓ = positive, X = negative, - = neutral)														
	Accessibility	Traffic-related severance	Access to green space and outdoor recreation	Active travel	Affordability	Road safety	Air quality	Noise and vibration	Work and training	Housing and community services impacts	Mental health and wellbeing	Pollution and flood-risk	Light pollution	Climate change	EMFs
Dartford															
Newtown	✓	-	✓	-	✓	-	-	-	✓	-	✓/X	-	-	-	-
Stone Castle	✓	-	✓	-	✓	-	-	-	✓	-	✓/X	-	-	-	-
Stone House	✓	-	✓	-	✓	-	-	-	✓	-	✓/X	-	-	-	-
Bridge	✓	-	✓	-	✓	-	-	-	✓	-	✓/X	-	-	-	-
Temple Hill	✓	-	✓	-	✓	-	-	-	✓	-	✓/X	-	-	-	-
Longfield, New Barn and Southfleet	✓	-	✓	-	✓	-	-	✓	✓	-	✓/X	-	-	-	-
Thurrock															
Ockendon	-	-	X	-	N/A	-	-	X	✓	X	✓/X	-	-	-	-
Belhus	-	-	-	-	N/A	-	-	-	✓	-	✓/X	-	-	-	-

Operation phase	Health outcome by determinant for sensitive populations (✓ = positive, X = negative, - = neutral)														
	Ward	Accessibility	Traffic-related severance	Access to green space and outdoor recreation	Active travel	Affordability	Road safety	Air quality	Noise and vibration	Work and training	Housing and community services impacts	Mental health and wellbeing	Pollution and flood-risk	Light pollution	Climate change
Orsett	-	-	-	-	N/A	-	-	X	✓	X	✓/X	-	-	-	-
Stifford Clays	-	-	X	-	N/A	-	-	X	✓	-	✓/X	-	-	-	-
Little Thurrock Rectory	-	-	-	-	N/A	-	-	-	✓	-	✓/X	-	-	-	-
Little Thurrock Blackshots	-	-	X	-	N/A	-	-	-	✓	-	✓/X	-	-	-	-
Chadwell St Mary	-	X	X	-	N/A	-	-	-	✓	-	✓/X	-	-	-	-
Tilbury St Chads	-	X	X	-	N/A	-	-	-	✓	-	✓/X	-	-	-	-
Tilbury Riverside and Thurrock Park	-	-	-	-	N/A	-	-	X	✓	-	✓/X	-	-	-	-
East Tilbury	-	-	X	-	N/A	-	-	X	✓	-	✓/X	-	-	-	-
Aveley and Uplands	-	-	-	-	N/A	-	-	-	✓	-	✓/X	-	-	-	-

Operation phase	Health outcome by determinant for sensitive populations (✓ = positive, X = negative, - = neutral)															
	Ward	Accessibility	Traffic-related severance	Access to green space and outdoor recreation	Active travel	Affordability	Road safety	Air quality	Noise and vibration	Work and training	Housing and community services impacts	Mental health and wellbeing	Pollution and flood-risk	Light pollution	Climate change	EMFs
West Thurrock and South Stifford	-	-	-	-	N/A	-	-	-	✓	-	✓/X	-	-	-	-	
Chafford and North Stifford	-	-	-	-	N/A	-	-	X	✓	-	✓/X	-	-	-	-	
Stanford-le-Hope West	-	-	-	-	N/A	-	-	-	✓	-	✓/X	-	-	-	-	
Stanford East and Corringham Town	-	-	-	-	N/A	-	-	-	✓	-	✓/X	-	-	-	-	
The Homesteads	-	-	-	-	N/A	-	-	-	✓	-	✓/X	-	-	-	-	
Corringham and Fobbing	-	-	-	-	N/A	-	-	-	✓	-	✓/X	-	-	-	-	
 Havering																
Upminster	-	-	X	-	N/A	-	-	X	✓	-	✓/X	-	-	-	-	
Cranham	-	-	X	-	N/A	-	-	-	✓	-	✓/X	-	-	-	-	
Harold Wood	-	-	-	-	N/A	-	-	-	✓	-	✓/X	-	-	-	-	

Operation phase	Health outcome by determinant for sensitive populations (✓ = positive, X = negative, - = neutral)														
	Accessibility	Traffic-related severance	Access to green space and outdoor recreation	Active travel	Affordability	Road safety	Air quality	Noise and vibration	Work and training	Housing and community services impacts	Mental health and wellbeing	Pollution and flood-risk	Light pollution	Climate change	EMFs
Ward															
Rainham and Wenningham	-	-	-	-	N/A	-	-	-	✓	-	✓/X	-	-	-	-
Gooshays	-	-	-	-	N/A	-	-	-	✓	-	✓/X	-	-	-	-
Brentwood															
Warley	-	-	-	-	N/A	-	-	-	✓	-	✓/X	-	-	-	-
South Weald	-	-	-	-	N/A	-	-	-	✓	-	✓/X	-	-	-	-
Herongate, Ingrave and West Horndon	-	-	-	-	N/A	-	-	-	✓	-	✓/X	-	-	-	-

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