national highways

Lower Thames Crossing

7.9 Transport Assessment (Tracked changes version)

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1 Executive summary

1.1.1 This Transport Assessment (TA) has been prepared as part of the Development Consent Order (DCO) application for the proposed A122 Lower Thames Crossing (the Project).

1.1.2 The A122 Lower Thames Crossing (the Project) would provide a connection between the A2 and M2 in Kent and the M25 south of junction 29, crossing under the River Thames through a tunnel. The Project route is presented in Plate 3.1.

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

1.1.4 The purpose of this TA is to present in a single document the forecast impacts of the Project on the performance of the transport system. It considers the public transport network in the area and Public Rights of Way (PRoW) as well the highway network. Consequently, it reports the forecast impacts on public transport users; walkers, cyclists and horse riders (WCH), as well as drivers of, and passengers in motorised vehicles.

1.1.5 This TA reports the impacts of the Project resulting from traffic generated during construction and the impact of the Project once in operation. The operational impacts are reported for two future years: 2030 (the opening year) and 2045 (the design year), while the construction impacts are reported across the construction period.

1.2 Assessment tools and methodology

1.2.1 The assessment methodology for this TA is based on the following approach:

a. A baseline assessment to identify the existing traffic and transport conditions.

b. An assessment of the future baseline for the proposed opening year and design year of the Project, in order to identify the forecast traffic and transport conditions without the Project.

c. An assessment of the forecast traffic and transport conditions with the Project in the proposed opening year and design year, in order to identify the forecast impacts of the completed Project on all modes of transport.

d. An assessment of the forecast impacts of construction and construction traffic on the transport network.

1.2.2 The primary analytical tool used to assess the impact of the Project on the highway network is the Lower Thames Area Model (LTAM). This is a transport model designed for use in forecasting the impact of providing a new road crossing of the River Thames between Gravesend and Tilbury. The LTAM is used to forecast the traffic flows, travel times, speeds and levels of congestion on the road network in future years.

1.2.3 A non-technical summary of the LTAM and its outputs is set out in the Traffic Forecasts Non-Technical Summary (Application Document 7.8) and the full technical details are set out in the Combined Modelling and Appraisal Report (ComMA) (Application Document 7.7).

1.3 Planning policy and guidance

1.3.1 A review of relevant national, regional and local planning policy is presented in Chapter 4. This indicates that the Project is well supported in policy at all levels, including policy from the Government, the Mayor of London, host authorities and neighbouring regional and local authorities.

1.3.2 This TA was developed in accordance with the wide range of relevant guidance produced by the Department for Transport (DfT); the Ministry of Housing, Communities and Local Government (now the Department for Levelling Up, Housing and Communities); National Highways; and Transport for London (TfL). Chapter 11 presents an explanation of how this has been considered in this TA and how it complies with relevant policy and guidance.

Baseline assessment

1.3.3 A review of the current performance of the transport network near the Project is provided in this TA. This includes an assessment of current usage and issues and sets out the baseline against which changes in traffic flows and impacts are considered.

1.3.4 The data collection for the LTAM was undertaken in 2016, at the start of the model building process, and so the baseline year used for the highway network is 2016.

1.3.5 The consideration of the public transport network and provision for WCH is based on a review of the infrastructure and services available in autumn 2019.

Highway network

1.3.6 The Project would have a direct connection on the following principal roads:

a. The M25

b. The A13

c. The A1089

d. The A2

1.3.7 A key objective of the Project is to relieve the congested Dartford Crossing which currently experiences levels of demand well in excess of its design capacity. The Dartford Crossing is part of the A282 and is the only non-motorway section of the M25 orbital motorway that runs around London. It is the only crossing of the River Thames between Kent, Thurrock and Essex and the level of demand by cars and goods vehicles to use the crossing is forecast to continue to grow.

Public Rights of Way

1.3.8 The Project would cross numerous existing PRoW and footpaths along local roads that are used by WCH. Some of these would be temporarily impacted during construction and may be closed, diverted or impacted by construction traffic. There would be some PRoW and footpaths that would be impacted permanently, although only Hornsby Lane in Grays would be permanently closed.

1.3.9 In order to assist in understanding the impact of the temporary closures of PRoW during construction and the permanent diversion of any routes, surveys were undertaken in August and September 2019 in key locations likely to be affected by the Project, to establish the baseline level of usage.

1.3.10 These surveys indicated that the majority of the PRoW crossing the route are lightly used, with fewer than 10 people a day recorded on 12 out of the 35 PRoW surveyed.

1.3.11 South of the River Thames, the PRoW with the greatest usage recorded were footpaths NS169 (75 walkers, six cyclists and zero horse riders) and NS174 (40 walkers, two cyclists and zero horse riders).

1.3.12 North of the River Thames, the PRoW recorded with the greatest usage were footpaths FP230 (171 walkers, 42 cyclists and zero horse riders) and FP146/NCR13 (40 walkers, 36 cyclists and zero horse riders).

Rail network

1.3.13 This TA considers all railway lines that would cross the alignment of the Project or that would lie close to the Project. These are as follows:

a. The North Kent railway line from London Charing Cross to Strood, which is used by Southeastern services from Kent into London and Thameslink Services which run from Kent and cross London to destinations north including St Albans, Luton and Bedford.

b. High Speed 1 (HS1) from London St Pancras to destinations in Kent and Europe.

c. The Upminster and Grays branch/Tilbury Loop railway line from Fenchurch Street to Southend Central, which is used by C2C railway services from Essex into London via Grays.

d. The Shoeburyness railway line from Fenchurch Street to Shoeburyness, which is used by C2C railway services from Essex into London via Basildon.

1.3.14 The Project route would cross the railway at the following locations:

a. Tunnel near Gravesend (under the North Kent railway line).

b. Overpass near West Tilbury (over the Tilbury Loop railway line).

c. Footpath near North Ockendon (over the Upminster and Grays branch railway line).

d. M25 upgrade near North Ockendon (over the Upminster and Grays branch railway line).

Bus and coach network

1.3.15 The existing bus and coach networks near the Project are as follows:

a. Long-distance coach routes, including commuter services into London.

b. Local bus routes in Thurrock.

c. Local bus routes in Gravesham.

1.3.16 Local bus routes in Thurrock include services along routes that would cross the Project's alignment and along sections of the strategic road network (SRN) that connect to the Project.

1.3.17 Affected bus routes in Gravesham serve local destinations (to the east of Gravesend, Chalk, Riverview Park), the Medway Towns and Maidstone via the A226 and A2.

1.4 Operational assessment

Highway network impacts

1.4.1 The Project would relieve congestion on the Dartford Crossing by reducing the level of traffic using the Dartford Crossing.

1.4.2 There is also forecast to be a decrease in the number of Heavy Goods Vehicles (HGVs) using the Dartford Crossing and the percentage of HGVs in the overall traffic at the Dartford Crossing would fall.

1.4.3 The provision of the Lower Thames Crossing would allow users to change their travel patterns and for more people to cross the River Thames. It is forecast that more vehicles would cross the River Thames once the Project is built.

1.4.4 The capacity of each part of the road network is given as the number of Passenger Car Units (PCUs) that can use each road link in the model each hour, which is an industry standard approach. Cars and vans are defined as 1 PCU and HGVs are equivalent to 2.5 PCUs because they take up more road space.

1.4.5 In 2016, there were a total of 14,430, 11,790 and 12,830 PCUs using the Dartford Crossing in the AM, inter-peak (IP) and PM peak hours respectively.

1.4.6 In 2030, this is forecast to increase to a total of 21,320, 17,290 and 20,010 PCUs using either the Dartford Crossing or the Lower Thames Crossing in the AM, IP and PM hours respectively.

1.4.7 In 2045, the total peak flows across both the Dartford Crossing and the Lower Thames Crossing would be 23,810, 20,460 and 22,370 PCUs in the AM, IP and PM hours.

1.4.8 As well as improving journey times for trips that cross the river at the Dartford Crossing and the Project, the performance of the sections of the SRN that would be relieved by the Project would also improve. These sections would be the M25 between junction 29 and junction 2, the M20 west of the Project, the A2 west of the Project and the A13 west of the Project.

1.4.9 The change in travel patterns would result in an increase in traffic flows and journey times on parts of the network used to access the Project. This would include the A228 and the A229, the M2, the A13 east of the Project, and the M25 north of the Project.

Walkers, cyclists and horse riders

1.4.10 There are a number of changes proposed to WCH routes as a result of the Project. These are shown in detail in the Rights of Way and Access Plans (Application Document 2.7).

1.4.11 To the south of the River Thames, the only footpath that would be permanently closed is the NS367 footpath, south of the A2. This is a cul-de-sac that currently terminates at the edge of the A2.

1.4.12 To the north of the River Thames, the following footpaths would be permanently closed either in full or partially:

a. FP97: This is a cul-de-sac that is already closed at the A13 and would be shortened as a result of the Project.

b. Footpath (FP) 251

1.4.13 There would be a number of permanent PRoW and footway diversions around the Project infrastructure, although most PRoW and footways along local roads would be re-provided along their current routes when the Project is open.

1.4.14 In addition to footpath closures, Hornsby Lane and Low Street would be permanently stopped up as a result of the Project. Although dedicated WCH facilities are not provided on these roads, the movement of WCH will be impacted

1.4.15 All other footpaths would remain along their current routes when the Project is open.

1.4.16 There would be a comprehensive provision of new footpaths, bridleways and cycleways as a result of the Project. This amounts to approximately 1.4km of new cycle track, 26km of new shared track (walkers and cyclists), 3km of new bridleways and 1.2km of new unmade footpaths.

Rail network impacts

1.4.17 There are no forecast impacts on users of the rail network when the Project is in operation.

Bus and coach network impacts

1.4.18 The are no major adverse impacts forecast on coach and bus services when the Project is in operation. There would be a major beneficial impact for the X80 bus service from Chafford Hundred to Bluewater which uses the Dartford Crossing.

Wider network impacts

1.4.19 The Wider Network Impacts Management and Monitoring Plan (Application Document 7.12) presents the approach to monitoring the traffic impacts of the Project on the wider road network once the Project is operational, and the provision of this data to the relevant highway authority(s).

1.4.20 National Highways would monitor the impacts of the Project on the road network at a number of agreed locations and, in accordance with the framework set out in the Wider Network Impacts Management and Monitoring Plan (Application Document 7.12), provide this data to local and highway authorities. This monitoring would be undertaken within the year before opening of the Project, a year after opening and five years after opening (in alignment with National Highways Post Opening Project Evaluation (POPE) timescales).

1.5 Construction assessment

1.5.1 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.

1.5.2 Construction would take approximately six years, but as with all large projects there is a level of uncertainty over the construction programme, which would be refined when contractors are appointed and as the detailed design is developed

Highway network impacts

1.5.3 There would be additional vehicles on the network during the construction of the Project. These are primarily vehicles used by the workforce to access the compounds and goods vehicles used for moving materials to and from the site. There would also be HGV movements associated with the earthworks.

1.5.4 The Project is proposed to be mainly constructed offline from the existing highway network, although some short-term road closures would be needed when the Project is connected to the existing highway network and for the removal and construction of new bridges.

1.5.5 There would be temporary delays due to traffic management measures, particularly the use of traffic signals and contraflow traffic on the local road network and narrow lane running on the SRN. Wherever it is safe to do so, the speed limit through roadworks on the SRN would be set to 60mph.

Walkers, cyclists and horse riders

1.5.6 During the construction period, the PRoW that cross the proposed alignment of the Project, construction works and construction compounds would be closed. These closures would be temporary and only for the duration of works in the local area of the affected PRoW.

Rail network impacts

1.5.7 South of the River Thames, there would be some temporary impact on rail users of the North Kent railway line during the construction period. North of the Thames, there would be some temporary impacts on services that use the Tilbury Loop and Shoeburyness railway lines while the Project builds over them. These impacts would be managed by timing the railway works to minimise the inconvenience caused to passengers.

1.5.8 The impact of the construction works near to existing railway lines, including HS1 which is close to the new M2/A2/A122 Lower Thames Crossing junction, would be monitored to ensure that safety requirements are met.

Bus and coach network impacts

1.5.9 There would be a number of routes that would see an adverse impact during construction (over a two minute increase in journey time), and routes that use Rectory Road, the B187 where it passes under the M25 and Brewers Road would be diverted as a result of construction. Not all journeys on these routes would be impacted however, as the delays would not affect every part of the route.

2 Introduction

2.1 Purpose of this document

2.1.1 National Highways (the Applicant) has submitted an application under section 37 of the Planning Act 2008 for an order to grant development consent (a DCO) for the A122 Lower Thames Crossing (the Project).

2.1.2 This Transport Assessment (TA) has been prepared as part of the DCO application. The purpose of the document is to summarise the transport impacts of the Project. It brings together into a single document technical work reported in other documents that identifies impacts of the Project on the transport system. It supplements this with additional information in order to report the impacts on all main modes of transport in the Lower Thames area.

2.1.3 The environmental, social and economic impacts of the Project are reported in the Environmental Statement (Application Documents 6.1 to 6.3) and Appendix D: Economic Appraisal Package of the ComMA (Application Document 7.7). The transport impacts of the Project are reported in this TA and consider the performance and safety of the transport system.

2.1.4 The transport modes covered within this TA are:

a. cars and goods vehicles using the highway

b. rail

c. buses and coaches

d. walking, cycling and horse riding

2.1.5 The impacts of the Project are considered for both when the Project is open (the operational assessment (Chapter 7)) and during the construction of the Project (the construction assessment (Chapter 8)). The construction assessment includes impacts caused by:

a. traffic generated by the Project during construction

b. the temporary closure of roads and PRoW near the construction compounds and works

c. traffic management measures implemented on the existing road network during the construction phase

2.1.6 The Project would form part of the SRN and would have a widespread geographical impact on the performance of the SRN. The TA presents a scoring criterion which has been developed to determine the level of the impact of the Project on the performance of each part of the network. These impacts are reported in both the operational and construction assessments.

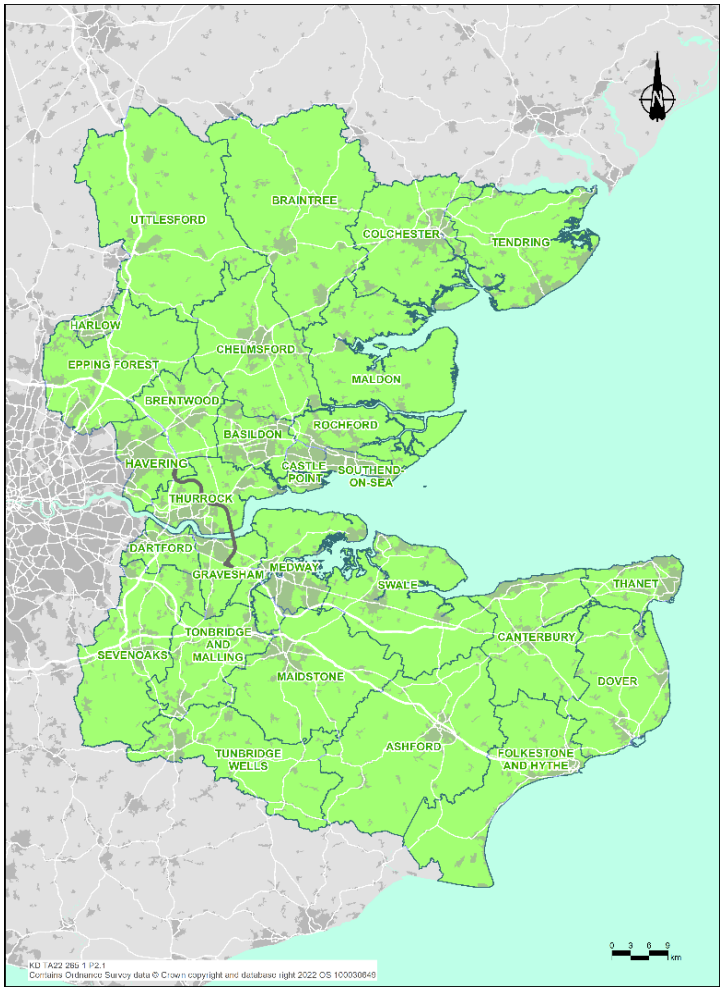
2.1.7 For the purposes of reporting the spatial aspects of the more local transport impacts, the study area is divided by the River Thames into two areas. These areas are shown in Plate 2.1, which also indicates the Project route with a grey line.

2.1.8 The administrative areas that together constitute the study area are:

a. South of the River Thames – Kent County Council, Dartford Borough Council, Gravesham Borough Council and Medway Council.

b. North of the River Thames – Essex County Council, Thurrock Council, Brentwood Borough Council and the London Borough of Havering.

Plate 2.1 Local authorities



2.2 Relationship with other application documents

2.2.1 This TA presents outputs from the Project's transport model core scenario (more information on this is contained in Section 5.7 of this TA) during both the construction and operational phases of the Project.

2.2.2 Outputs from the Project's transport model are used to support other assessments within the application, notably those contained within the Environmental Statement (ES) (Application Document 6.1 – 6.3). This includes the air quality, noise and vibration and climate chapters whose assessments within the ES use the same core scenario data.

2.2.3 In addition, for the construction phase, outputs from the construction assessment have been used in the development of the following control documents:

a. The outline Traffic Management Plan for Construction (oTMPfC) (Application Document 7.14)

b. The Framework Construction Travel Plan (FCTP) (Application Document 7.13)

c. The outline Materials Handling Plan (oMHP) (Application Document 6.2)

2.2.4 The construction impact assessment presented in this TA and the oTMPfC have been developed to help refine the anticipated resource levels and to identify particular locations where the Contractors should focus their efforts to reduce the forecast impacts on the road network. The detailed construction plans and travel plans for staff would be developed once the Contractor has been appointed. As these are developed, further work would be undertaken to refine the construction planning and reduce the impacts of the works. The oTMPfC contains a number of specific measures, such as HGV bans, that have been requested by local authorities, and which are reflected into the modelling set out in this TA. To provide control over the works as the detailed construction plans are developed, the oTMPfC sets out a framework within which National Highways will work with local authorities to monitor and control the works.

2.2.5 The FCTP has made use of the outputs from the Project's transport model with regards to the assumptions of where staff would travel to work from, and the baseline mode share assumptions for each compound or Utility Logistics Hub.

2.2.6 This TA has been produced in line with the assumptions contained within the oMHP, including the baseline commitment of the percentage of material to be imported to the northern tunnel entrance compound from nearby port facilities.

2.3 Structure of this document

2.3.1 This document comprises 12 chapters, as described below:

a. Chapter 1 – executive summary

b. Chapter 2 – introduces the TA

c. Chapter 3 – describes the Project

d. Chapter 4 – summarises the planning context

e. Chapter 5 – describes the methodology used in the TA

f. Chapter 6 – presents the baseline assessment of the transport network

g. Chapter 7 – assesses the impacts of the Project once operational

h. Chapter 8 – assesses the impacts of the Project during construction

i. Chapter 9 – considers the safety of users of the transport system

j. Chapter 10 – presents the management of impacts

k. Chapter 11 – concludes the TA

2.3.2 This document contains the following appendices:

a. Appendix A - Public Rights of Way summary tables

b. Appendix B - Journey time changes 2030

c. Appendix C - Journey time changes 2045

d. Appendix D - Scale of impacts maps

e. Appendix E - Construction traffic assessment supporting information

f. Appendix F - Wider Network Impacts policy review

g. Appendix G - Construction percentage change in flows by phase

h. Appendix H - Construction journey time maps

i. Appendix I - Policy Compliance

2.3.3 A list of references and a glossary of the abbreviations and terms used within this document is also provided.

3 The Project

3.1 Project description

Project route

3.1.1 The A122 Lower Thames Crossing (the Project) would provide a connection between the A2 and M2 in Kent and the M25 south of junction 29, crossing under the River Thames through a tunnel. The Project route is presented in Plate 3.1.

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

3.1.3 Junctions are proposed at the following locations:

a. New junction with the A2 to the south-east of Gravesend.

b. Modified junction with the A13/A1089 in Thurrock.

c. New junction with the M25 between junctions 29 and 30.

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

a. link roads

b. stretches of the carriageway through junctions

c. the southbound carriageway from the M25 to the junction with the A13/A1089, which would be two lanes

3.1.5 In common with most A-roads, the A122 would operate with no hard shoulder but would feature a 1m hard strip on either side of the carriageway. It would also feature technology including stopped vehicle and incident detection, lane control, variable speed limits and electronic signage and signalling. The A122 design outside the tunnel would include emergency areas. The tunnel would include a range of enhanced systems and response measures instead of emergency areas.

3.1.6 The A122 would be classified as an ‘all-purpose trunk road’ with green signs. For safety reasons, walkers, cyclists, horse riders and slow-moving vehicles would be prohibited from using it.

Junction modifications

3.1.7 Alterations would be required to both the M25 at the northern limits of the route and on the A2 at the southern end. The existing A13/A1089 junction would also require modifications to connect to the Project route.

Vertical alignment

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

Local roads

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

Tunnel

3.1.10 It is currently assumed that two tunnel boring machines (TBMs) would be used to construct the tunnel, one for each bore.

3.1.11 Emergency access and vehicle turn-around facilities would be provided at the tunnel portals. Cross-passages providing a connection between the two tunnels would be provided for emergency incident response and tunnel user evacuation. Tunnel portal structures would accommodate service buildings for control operations, mechanical and electrical equipment, drainage and maintenance operations.

Highway crossings

3.1.12 Approximately 50 new highway crossings would be required, comprising road bridges, underpasses, green bridges and footbridges. In addition, widening and other modification of existing highways crossings would be required.

Highway drainage

3.1.13 South of the River Thames, the highway drainage system would discharge into vegetated drainage comprising infiltration basins with lined sediment forebays, ditches and swales. The intention is that these would outfall from the drainage systems to ground.

3.1.14 North of the River Thames, the highway drainage system would discharge into vegetated drainage comprising wetland-type retention ponds with sediment forebays, ditches and swales within an infiltration basin at the A13 junction. Existing dry retention ponds located along the M25 would be upgraded to wetland-type retention ponds with sediment forebays. The outfall from these ponds would discharge into watercourses and ditches.

Road user charging

3.1.15 In December 2014, the Government stated in the National Policy Statement for National Networks (NPSNN) (Department for Transport, 2014) that the '*Government will consider tolling as a means of funding new road capacity on the SRN. River and estuarial crossings will normally be funded by tolls or road user charges*'.

3.1.16 To align with NPSNN policy and to help the Project meet the Scheme Objectives, it is proposed that road user charges would be levied in line with the Dartford Crossing. Vehicles would be charged for using the new tunnel.

Safety and security

3.1.17 The A122 would include the following:

a. Modern safety measures and design standards with technology to manage traffic and provide better information to drivers.

b. Variable Message Signs to display variable speed limits, travel information, hazard warnings and both advisory and mandatory signage to drivers.

c. CCTV cameras and detection equipment to monitor and manage network usage, for alerting and investigating incidents (e.g. stopped vehicles), for maintenance and asset protection, and for detection of crime.

d. Above-ground traffic detection to control automatic traffic management systems (e.g. variable speed limits) and to collect data on traffic flows.

e. Free-flow road user charging infrastructure.

f. Equipment within the tunnel to monitor and control the tunnel environment during normal and emergency operations.

Walkers, cyclists and horse riders

3.1.18 Where the Project affects existing PRoW, these would be reinstated with provision of under- or overbridges, or a suitable alternative provision would be made. The Project proposes a number of new, diverted, upgraded and reinstated routes for walkers, cyclists and horse riders.

Environmental design

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

Construction compounds and Utility Logistics Hubs

3.1.20 While the Project is being built, construction compounds would be located along the Project route. Larger compounds would be required at the northern and southern tunnel portals to allow for tunnelling operations and materials management. Utility Logistics Hubs would be needed for specific utility works.

Haulage routes and construction traffic management

3.1.21 Where there is no direct access from the strategic road network, suitable local roads would initially be used to access the construction worksites and compounds. Following this, temporary haul routes would be constructed off the strategic road network early in the programme where possible to access the construction worksites and compounds and further reduce usage of the local road network. In some instances, the temporary haul roads may need to connect to the existing local road network. Traffic management measures would be used to control the impacts of construction on the local and strategic road network.

Services and utility installations and diversions

3.1.22 To accommodate the construction and operation of the Project, it would be necessary to install and divert multiple utilities including overhead electricity powerlines, high-pressure gas pipelines and other utility networks and their associated infrastructure including cabinets, substations and maintenance compounds. New utility connections would be installed to the compounds and to the tunnels.

Land required

3.1.23 The Project would require land on a permanent basis for the road and tunnel, along with other operational infrastructure, and environmental mitigation and compensation.

3.1.24 On a temporary basis, land would be required for construction compounds, logistics areas and other construction activities. The utility installations and diversions, some environmental works and flood compensation requirements would require land to be taken on a temporary basis, and for permanent rights to be acquired for the operation and maintenance of any utility infrastructure, and to secure environmental works and flood compensation.

3.1.25 The full land requirement for the Project is shown on the Land Plans (Application Document 2.2), and set out in the Statement of Reasons (Application Document 4.1).

3.1.26 The Project would also require both permanent acquisition and temporary use of areas of special category land, which includes common land and public open space. Replacement land would be provided for some of this special category land. In other cases, in accordance with the Planning Act 2008, replacement land has not been included, for example, because it is only proposed to install and divert utilities through the land and the land would not be permanently impacted. This means that its previous use can continue once the works are finished.

3.1.27 Consultation with relevant landowners, occupiers and agents remains an ongoing focus through the development of the Project. Compensation for affected parties follows the statutory Compensation Code.

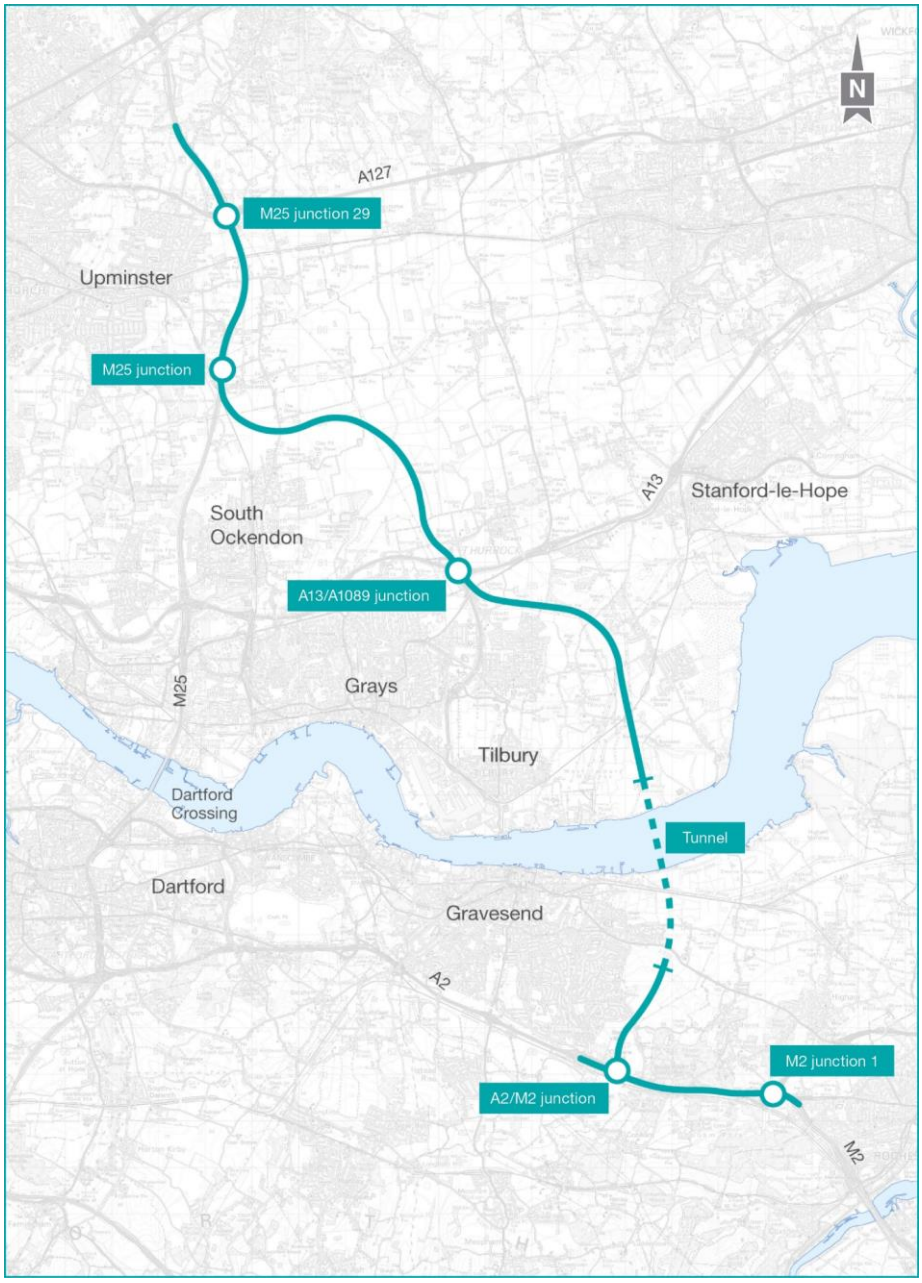
Operations and maintenance

3.1.28 Following completion, the A122 would be part of the strategic road network.

3.1.29 To carry out inspection, certain specified maintenance activities in the tunnel and periodic emergency exercises, a periodic full closure of the relevant tunnel(s) would be required. These would be planned to minimise disruption, and where feasible lane closures would be used instead.

3.1.30 A full description of the Project is available in Environmental Statement (ES) Chapter 2: Project Description (Application Document 6.1). Drawings of the route are available in the General Arrangement drawings (Application Document 2.5).

Plate 3.1 Lower Thames Crossing route



4 Policy and guidance

4.1 Introduction

4.1.1 This section summarises the key traffic and transport policy and guidance relevant to the Project. It examines the national, regional and local policy and guidance that underpin the development of the Project.

4.1.2 Chapter 11 provides details of compliance with relevant policies and guidance within this TA. A full assessment of compliance of this Project with policy is provided in the Planning Statement (Application Document 7.2).

4.1.3 A Wider Network Impacts policy review is contained within Appendix F.

4.1.4 A policy compliance review is contained within Appendix I.

4.2 National policy

4.2.1 The Project is required to be assessed against the National Policy Statement for National Networks (NPSNN) (DfT, 2014) as well as the Overarching National Policy Statement for Energy (EN-1) (Department of Energy and Climate Change (DECC), 2011), National Policy Statement for Gas Supply Infrastructure and Gas and Oil Pipelines (EN-4) (DECC, 2011a) and National Policy Statement for Electricity Networks Infrastructure (EN-5) (DECC, 2011b). The NPSNN forms the case making element of the Project and the utilities diversions are a direct result of the road element of the Project. Notwithstanding this element, the National Policy Statements (NPSs) have been applied with equal weight. All NPSs conform to the same legislation requirements, guidance and international obligations, and accordingly, there is consistency across them. The review below refers solely to the NPSNN; however cross-references and individual responses (where necessary) to the relevant sections within the suite of Energy National Policy Statements can be seen in Appendix B: National Policy Statements for Energy Infrastructure Accordance Tables of the Planning Statement (Application Document 7.2).

National Policy Statement for National Networks

4.2.2 The NPSNN (DfT, 2014) sets out the need for, and the Government's policies to deliver, development of Nationally Significant Infrastructure Projects (NSIPs) on the national road and rail networks in England. It provides planning guidance for those organisations promoting NSIPs and is used as the basis for the examination of DCO applications for NSIPs.

4.2.3 The NPSNN recognises pressure on England's transport networks is likely to grow as the long-term drivers for travel demand increase. It also recognises the need to improve the integration between transport modes, including linkages to ports and airports.

4.2.4 It sets out that any development would need to address safety issues, enhance the environment and enhance accessibility for WCH. It recognises that severance can be a problem in some locations and states that projects should seek to deliver improvements that reduce community severance and improve accessibility.

4.2.5 The NPSNN states that for road and rail developments which are likely to have significant environmental impacts arising from impacts on transport networks, the applicant's environmental statement should describe those impacts and mitigating commitments. This should include a proportionate assessment of the transport impacts on other networks as part of the application.

4.2.6 The NPSNN also notes that PRoW, National Trails, and other rights of access to land are important recreational facilities. Projects are expected to take appropriate mitigation measures to address adverse effects on National Trails, other PRoW and open access land and to consider what opportunities there may be to improve access.

4.2.7 The following sections of the NPSNN are of particular relevance to the Project:

a. NPSNN Chapter 2: The need for development of the national networks and Government's policy. This sets out the Government's vision and strategic objectives for the national networks. This includes the need to improve these so as to meet the country's long-term needs, supporting the economy and quality of life as part of the wider transport system. This means:

   i. Networks with the capacity, connectivity and resilience to support national and local economic activity and facilitate growth and create jobs.

   ii. Networks which support and improve journey quality, reliability and safety.

   iii. Networks which support the delivery of environmental goals and the move to a low carbon economy.

   iv. Networks which join up our communities and link effectively to each other.

b. NPSNN Chapter 3: Wider Government policy on the national networks

   i. 3.16 and 3.17 – Sustainable transport: There is a direct role for the national road network to play in helping walkers and cyclists. The Government expects applicants to use reasonable endeavours to address the needs of cyclists and walkers in the design of new Schemes.

   ii. 3.19 and 3.22 – Accessibility: The Government is committed to creating a more accessible and inclusive transport network. There is also a focus on reducing community severance as part of new Schemes.

c. NPSNN Chapter 4: Assessment principles

   i. 4.6 – Road and rail projects should be supported by a local transport model to provide sufficiently accurate detail of the impacts of a project.

d. NPSNN Chapter 5: Generic impacts

i. 5.184 – Land use including open space, green infrastructure and Green Belt: PRoW, National Trails, and other rights of access to land (e.g. open access land) are important recreational facilities for walkers, cyclists and horse riders. Applicants are expected to take appropriate mitigation measures to address adverse effects.

ii. 5.203 to 5.208 and 5.216 – Impact on transport networks: Developments should consider local transport policies and schemes by including consultation with relevant local highways authorities. They should also include consideration of supporting other transport modes while developing infrastructure. Schemes should prepare a travel plan to mitigate transport impacts and proposed measures to improve access by public transport and sustainable modes.

National Planning Policy Framework (2021)

4.2.8 The National Planning Policy Framework (NPPF) (Ministry of Housing, Communities and Local Government (MHCLG), 2021) sets out government's planning policies for England and how it expects these to be applied. It constitutes policy for local planning authorities and decision-makers when drawing up plans and is a material consideration in determining applications, including, where relevant, applications for development consent. The NPSNN states that '*However, the NPPF makes clear that it is not intended to contain specific policies for NSIPs where quite particular considerations can apply. The National Networks NPS will assume that function and provide transport policy which will guide individual development brought under it.' (Paragraph 1.19).*

4.2.9 The NPPF indicates (Section 9, paragraph 104) that '*Transport issues should be considered from the earliest stages of plan-making and development proposals, so that:*

a. the potential impacts of development on transport networks can be addressed

b. opportunities from existing or proposed transport infrastructure, and changing transport technology and usage, are realised – for example in relation to the scale, location or density of development that can be accommodated

c. opportunities to promote walking, cycling and public transport use are identified and pursued

d. the environmental impacts of traffic and transport infrastructure can be identified, assessed and taken into account – including appropriate opportunities for avoiding and mitigating any adverse effects, and for net environmental gains

e. patterns of movement, streets, parking and other transport considerations are integral to the design of schemes, and contribute to making high quality places.'

4.2.10 When considering development proposals, paragraph 110 sets out that it should ensure that any significant impacts from the development on the transport network (in terms of capacity and congestion), or on highway safety, can be cost-effectively mitigated to an acceptable degree.

4.2.11 Paragraph 111 states that development should only be prevented or refused on highways grounds if there would be an unacceptable impact on highway safety, or the residual cumulative impacts on the road network would be severe.

4.2.12 The NPPF states in paragraph 106(e) that planning policies should provide for any large scale transport facilities that need to be located in the area, and the infrastructure and wider development required to support their operation, expansion and contribution to the wider economy.

Circular 02/13 – The Strategic Road Network and the Delivery of Sustainable Development

4.2.13 Circular 02/13 (DfT, 2013), was published in September 2013 as the response to the changes brought about by the Localism Act 2011 and the NPPF, which established a new remit for National Highways to promote sustainable development. The Circular explains how National Highways will engage with the planning system and how it will fulfil its remit as a delivery partner for sustainable economic growth while maintaining, managing and operating a safe and efficient SRN.

4.2.14 A draft update to the circular is currently out for consultation, the revised text reflects changes to the planning system since the circular's publication in 2013 and the government's transport decarbonisation plan, among other minor changes.

Transport Investment Strategy

4.2.15 The Transport Investment Strategy was published by DfT in July 2017 and seeks to:

a. 'create a more reliable, less congested and better-connected transport network that works for the users who rely on it

b. build a stronger, more balanced economy by enhancing productivity and responding to local growth priorities

c. enhance our global competitiveness by making Britain a more attractive place to trade and invest

d. support the creation of new housing'

4.2.16 The Transport Investment Strategy sets out that good progress is being made on tackling some of the worst bottlenecks through the Road Investment Strategy (DfT, 2015a), of which the Lower Thames Crossing is a part.

National Infrastructure Delivery Plan 2016-2021

4.2.17 The National Infrastructure Delivery Plan (NIDP) (Infrastructure and Projects Authority, 2016) sets out in its executive summary that:

'*Infrastructure is the foundation upon which our economy is built. The government remains determined to deliver better infrastructure in the UK to grow the economy and improve opportunities for people across the country*'.

4.2.18 The NIDP highlights the Government's commitment to invest over £100 billion by 2020/21. The Lower Thames Crossing is noted within the NIDP as a priority project.

Road Investment Strategy

4.2.19 The Government has published two Road Investment Strategies (RIS), one which covers the 2015/16 – 2019/20 road period (RIS 1) (DfT, 2015a) and one which covers the 2020/21 – 2024/25 road period (RIS 2) (DfT, 2020). These set out the Government's investment plan in the road network and particularly the SRN.

4.2.20 The RIS documents set out a Strategic Vision for the SRN, to '*revolutionise our roads to create a modern SRN that supports a modern Britain*'. It recognises that the SRN is vital to British business and local and national economies, but capacity problems leading to increased congestion have become a major issue.

4.2.21 The Lower Thames Crossing is identified within both RIS 1 and RIS 2, with RIS 2 stating that construction will commence within the current road period.

Gear Change: A bold vision for cycling and walking

4.2.22 The Government (DfT, 2020a) has set out how they want and need to see a step change in cycling and walking and that there is a unique opportunity to transform the role that both modes play in our transport system.

4.2.23 The document sets out that better cycling and walking infrastructure allows more efficient use of road space and that if cycling and walking measures are no longer an afterthought, they can provide great connectivity to the wider transport system.

4.2.24 The document commits to a number of actions to meet these goals, including putting cycling and walking at the heart of transport policy. It sets out that for local highway schemes where the main element is not cycling or walking, those schemes should still deliver or improve the cycling infrastructure.

4.3 Regional and local policy

4.3.1 The current policies from Local Authorities near the Project have been reviewed. A summary is presented here of the identified policies which are relevant to the Project. An assessment of the compliance of the Project with these policies is presented in Chapter 11 of this TA and draws on the evidence of the transport impacts of the Project described in this document. The full assessment of compliance with regional and local policies is set out in Appendix C: Local Authority Policy Review Table of the Planning Statement (Application Document 7.2).

4.3.2 A summary of the relevant regional and local policies is presented below:

Maidstone Borough Local Plan 2011-2031 (Adopted 2017):

a. SS1: Maidstone Borough Spatial Strategy. Protection will be given to the rural character of the borough. The green and blue network of multi-functional open spaces, rivers and water courses, the Kent Downs Area of Outstanding Natural Beauty and its setting, the setting of the High Weald Area of Outstanding Natural Beauty, and landscapes of local value will be conserved and enhanced. Infrastructure schemes that provide for the needs arising from development will be supported.

b. SP17: The Countryside. Development proposals in the countryside will not be permitted unless they accord with other policies in this plan and they will not result in harm to the character and appearance of the area. Account should be taken of the Kent Downs Area of Outstanding Natural Beauty Management Plan and the Maidstone Borough Landscape Character Guidelines Supplementary Planning Document.

Medway Local Transport Plan 2011-2026 (Medway Council, 2011)

a. Priority 1: Regeneration and economic competitiveness. To support Medway's regeneration, economic competitiveness and growth by securing a reliable and efficient local transport network.

b. Priority 3: Connectivity. To ensure Medway has good quality transport connections to key markets and major conurbations in Kent and London.

c. Priority 5: Safety, security and public health. Ensure Medway benefits from improved pedestrian access to local facilities, including public rights of way, footways and cycleways.

Gravesham Local Plan Core Strategy (adopted September 2014)

a. Policy CS01: Sustainable Development. Planning applications that accord with the policies in the development plan for Gravesham will be approved without delay, unless material considerations indicate otherwise.
The Council will take a positive approach that reflects the presumption in favour of sustainable development contained in the National Planning Policy Framework and in this Core Strategy. It will work proactively with applicants jointly to find solutions which mean that proposals can be approved wherever possible, and to secure development that improves the economic, social and environmental conditions in the area.

b. Policy CS10: Physical and Social Infrastructure. Support will be given to proposals and activities that protect, retain or enhance existing physical and social infrastructure, or lead to the provision of additional infrastructure that improves community well-being. Where there is the threat of loss of existing infrastructure, consideration will be given to viability and whether sufficient alternative provision is available. Where new development leads to the

need for new or improved physical or social infrastructure, developers will be required to provide or contribute towards this subject to viability considerations. Such infrastructure will be put in place in a timely manner to support new development. All new development should make the most efficient use of new and existing infrastructure.

c. Policy CS11: Transport. New developments should mitigate their impact on the highway and public transport networks as required. As appropriate, transport assessments and travel plans should be provided and implemented to ensure the delivery of travel choice and sustainable opportunities for travel. Transport assessment work is required to be undertaken in accordance with national and local policy guidance, and to identify detailed highway and public transport network requirements and management arising from the development. The Council will seek improvements to walking and cycling facilities and networks in the Borough including provision in new development as appropriate. Land required for the possible future extension of Crossrail and to protect the High Speed 1 (HS1) railway is safeguarded on the Policies Map and proposals that would prejudice these will be refused.

d. Policy CS19: Development and Design Principles. New development will be visually attractive, fit for purpose and locally distinctive. It will conserve and enhance the character of the local built, historic and natural environment, integrate well with the surrounding local area and meet anti-crime standards. The design and construction of new development will incorporate sustainable construction standards and techniques, be adaptable to reflect changing lifestyles, and be resilient to the effects of climate change.

Core Strategy and Policies for Management of Development (Thurrock Council, 2015)

a. CSTP15: Transport in Greater Thurrock. Public Rights of Way affected by the proposed scheme should either be diverted or improved. Assessment should also be undertaken of the existing public transport network and any appropriate mitigations be provided.

b. CSTP16: National and Regional Transport Networks. Improvements to national and regional transport networks should be supported to ensure growth does not result in routes being above capacity.

c. CSTP17: Strategic Freight Movement and Access to Ports. The Council aims to support the logistics and ports sector by reducing the adverse impact of congestion caused by road freight on the A13, A1089 and A1306.

d. PMD9: Road Network Hierarchy. For routes of all levels, the Council will only permit the new development of accesses or increased use of

existing accesses under eight specific criteria. For level 1 routes (corridors of movement) four additional principles apply.

e. PMD10: Transport Assessments and Travel Plans. Transport Assessments, Transport Statements and Travel Plans must accompany planning applications in accordance with the DfT guidance.

f. CSTP28: River Thames. The Council and Partners will ensure that the economic and commercial function of the river will continue to be promoted through safeguarding existing and promoting new jetties and wharves facilities where appropriate for transport of goods and materials.

Core Strategy and Development Control Policies Development Plan Document (London Borough of Havering, 2008)

a. CP10: Sustainable Transport. A choice of sustainable transport modes, where travel is necessary, should be promoted.

b. DC32: The Road Network. New development which has an adverse impact on the functioning of the road hierarchy will not be allowed.

c. DC34: Walking and DC35: Cycling. Detailed assessment to be undertaken of all diverted, improved and new Public Rights of Way and other new facilities for walking and cycling and other WCH.

Havering Local Plan 2016-2031 (November 2021)

a. Policy 23: Transport Connections. The Council supports development which ensures safe and efficient use of the highway and demonstrates that adverse impacts on the transport network are avoided or, where necessary, mitigated. Major planning applications will require a transport assessment in line with TfL's Transport Assessment Best Practice Guidance. Also providing residents with options to travel sustainably and enabling walking and cycling.

Brentwood Local Plan (2016 -2033) (Brentwood Borough Council, 2022)

a. BE10: Sustainable Passenger Transport. The council will facilitate and support sustainable passenger transport services operating in Brentwood to help deliver the vision of the Local Plan.

b. BE12: Mitigation the Transport Impacts of Development. Developments must not have an unacceptable impact on the transport network in terms of safety, capacity and congestion. They must be accompanied by a Travel Plan, Transport Assessment and where necessary make reasonable and proportionate financial contributions or take reasonable measures to mitigate the cumulative transport impact and accommodate the use of sustainable modes of transport.

c. BE14: Creating Successful Places. Proposals will be required to meet high design standards and make efficient use of land and infrastructure, creating permeable accessible and multifunctional streets and places that promote active lifestyles.

d. E11: Brentwood Enterprise Park – Land south-east of M25 junction 29 is allocated for around 25.85ha of land for employment.

Kent Minerals and Waste Local Plan (2013-2030) (Adopted September 2020)

a. Policy CSW 3: Waste Reduction. All new development should minimise the production of construction, demolitions and excavation waste and manage any waste in accordance with the objectives of Policy CSW 2. The following details shall be submitted with the planning application, except for householder applications:

   i. The measures to be taken to show compliance with this policy.

   ii. The details of the nature and quantity of any construction, demolition and excavation waste and its subsequent management.

b. New development should include detailed consideration of waste arising from the occupation of the development including consideration of how waste will be stored, collected and managed.

Kent Local Transport Plan (2016-2031) (Kent County Council, 2016)

a. Outcome 1: Economic growth and minimised congestion. Deliver resilient transport infrastructure and schemes that reduce congestion and improve journey time reliability.

b. Outcome 2: Affordable and accessible door-to-door journeys. Promote affordable, accessible and connected transport.

c. Outcome 3: Safer travel. Provide a safer road, footway and cycleway network to reduce the likelihood of casualties.

d. Outcome 4: Enhanced environment. Deliver schemes to reduce the environmental footprint of transport and enhance the historic and natural environment.

e. Outcome 5: Better health and wellbeing. Promote active travel choices to improve local air quality.

f. New Lower Thames Crossing. '[Kent County Council] *are clear that a new Lower Thames Crossing, to the east of Gravesend, is required to unlock growth, improve journey time reliability, improve network resilience, and*

enable opportunities for regeneration. In the 2016 consultation, [Kent County Council's] *response was adamant that the Western Southern Link should be chosen and that with careful route alignment and tunnelling, the environmental and heritage impacts could be substantially minimised. As part of the project to deliver the new Lower Thames Crossing the A229 between M2 Junction 3 and M20 Junction 6 should be upgraded (what has previously been called Option C 'variant') along with improvements to the A249 and other links between the two motorways and the upgrades identified for 'bifurcation of port traffic"*.

Essex Transport Strategy: The Local Transport Plan for Essex (Essex County Council, 2011):

a. Policy 5: Connectivity. Transport networks will be strengthened to support a vibrant, successful and sustainable future for Essex.

b. Policy 6: Freight Movement. The Council will manage the efficient movement of freight within the county by working with operators to (…) ensure that heavy goods vehicles use identified routes and that other freight traffic uses the most appropriate routes.

c. Policy 9: The Natural, Historic and Built Environment. The County Council will protect the natural, historic and built environment from the harmful effects of transport.

d. Policy 10: Road Safety. The County Council will work to reduce the incidence and severity of road traffic collisions on roads in Essex.

e. Policy 14: Cycling. The County Council will encourage cycling by promoting the benefits of cycling; improving access to existing services and developing the existing network to offer appropriate solutions.

f. Policy 15: Walking and Public Rights of Way. The County Council will promote walking and use of the Public Rights of Way network, ensuring it is well maintained and easy to use.

Mayor's Transport Strategy (Greater London Authority, 2018)

a. The document notes that the Lower Thames Crossing could help to reduce the enormous pressure on the Dartford Crossing, which it states is an important link.

b. Proposal 95 states that only after delivery of the Lower Thames Crossing (among other proposed crossings) will further road crossings of the River Thames to the east of London be considered.

The London Plan (Greater London Authority, 2021)

a. Policy SD3: Growth locations in the Wider South-East (WSE) and beyond – The Mayor will work with strategic and local authorities, Government and other interested partners to realise the growth potential of the WSE and beyond through investment in strategic infrastructure. The Lower Thames Crossing is listed as a priority infrastructure project.

b. Policy T4: Assessing and mitigating transport impacts.

   i. Development Plans and development proposals should reflect and be integrated with current and planned transport access, capacity and connectivity.

   ii. When required in accordance with local or national guidance, transport assessments should be submitted with development proposals to ensure that impacts on the capacity of the transport network (including impacts on pedestrians and the cycle network) at the local, network-wide and strategic level, are fully assessed. Transport assessments should focus on embedding the Healthy Streets Approach within, and in the vicinity of, new development. Travel Plans, Parking Design and Management Plans, Construction Logistics Plans and Delivery and Servicing Plans will be required having regard to Transport for London guidance.

   iii. Where appropriate, mitigation, either through direct provision of public transport, walking and cycling facilities and highways improvements or through financial contributions, will be required to address adverse transport impacts that are identified.

   iv. Where the ability to absorb increased travel demand through active travel modes has been exhausted, existing public transport capacity is insufficient to allow for the travel generated by proposed developments, and no firm plans and funding exist for an increase in capacity to cater for the increased demand, planning permission will be contingent on the provision of necessary public transport and active travel infrastructure.

   v. The cumulative impacts of development on public transport and the road network capacity including walking and cycling, as well as associated effects on public health, should be taken into account and mitigated.

   vi. Development proposals should not increase road danger.

4.4 Guidance

4.4.1 Guidance on the preparation of supporting documentation in highway assessments is provided within the Government's Planning Practice Guidance suite of documents originally published in 2012 and updated in 2021 (MHCLG, 2021). This Planning Practice Guidance is expanded in the Travel Plans, Transport Assessments and Statements guidance published by MHCLG (2014).

4.4.2 This guidance relates to the role of Travel Plans, Transport Assessments and Statements in relation to what they should contain. They are presented as ways of assessing and mitigating the negative transport impacts of development and are required for all developments which generate significant amounts of movements.

4.4.3 The guidance was not specifically written for the assessment of the impact of new major transport schemes, but the principles in the document are of assistance in determining appropriate content of such a transport assessment.

4.4.4 The guidance on Travel Plans, Transport Assessments and Statements sets out that the '*key issues to consider at the start of preparing a Transport Assessment or Statement may include:*

a. The planning context of the development proposal

b. Appropriate study parameters (ie area, scope and duration of study

c. Assessment of public transport capacity, walking/cycling capacity and road network capacity.

d. Road trip generation and trip distribution methodologies and/or assumptions about the development proposal

e. Measures to promote sustainable travel

f. Safety implications of development; and

g. Mitigation measures (where applicable) – including scope and implementation strategy.'

4.4.5 The guidance also identifies the importance of considering '*the cumulative impacts arising from other committed development (i.e. development that is consented or allocated, where there is a reasonable degree of certainty it will proceed within the next 3 years)*'.

4.4.6 In relation to traffic growth the guidance states that '*projections should use local traffic forecasts such as TEMPRO* [Trip End Model Presentation Program software] *drawing where necessary on National Road Traffic Forecasts for traffic data*'.

4.4.7 Other guidance documents have been consulted in the preparation of this TA. These are:

a. Design Manual for Roads and Bridges (DMRB) LA 112 Population and Human Health (Highways England, 2020)

b. DMRB LA 105 Air Quality (Highways England, 2019)

c. Transport Analysis Guidance (TAG) (DfT, 2019)

d. Guidance on Transport Assessments (DfT, 2007, withdrawn)

e. Transport Assessment Guidance (Transport Scotland, 2012)

f. Construction Logistics Plan Guidance v3.0 (Construction Logistics, 2017)

4.5 Feedback on the Environmental Scoping Report

4.5.1 An Environmental Scoping Report was produced to seek the opinion of the Planning Inspectorate and relevant stakeholders regarding National Highways proposals for the Project's Environmental Impact Assessment.

Feedback from the Planning Inspectorate

4.5.2 A Scoping Report (Highways England, 2017) was issued to the Planning Inspectorate on 2 November 2017, setting out the proposed approach to the Environmental Impact Assessment. A Scoping Opinion was received from the Secretary of State on 13 December 2017 (Planning Inspectorate, 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 response is set out in ES Appendix 4.1: The Inspectorate's Scoping Opinion and National Highways Responses (Application Document 6.3).

4.5.3 The Scoping Opinion identified the requirement for a separate Transport Assessment in order to determine the transport impacts of both the construction and operation of the Project.

Feedback from Local Authorities

4.5.4 Responses to the Scoping Report which relate to the TA were received from Essex County Council, the London Borough of Havering, Thurrock Council and TfL. These are set out below.

4.5.5 The specific points from the local authorities, with the exception of a request from TfL relating to the use of GLA growth forecasts in place of DfT's National Trip End Model (NTEM), have been considered and included within the relevant sections of this TA.

Essex County Council

4.5.6 Essex County Council noted the absence of a dedicated transport section and requested that a full TA be undertaken to assess the impact of the Project on the immediate south Essex highway network and the wider Essex highway network, including National Highways' own transport projects in Essex.

4.5.7 They requested the scope of the TA to include the following:

a. The changes in route assignment from origins in central and to the north of Essex/East Anglia.

b. Key routes and junctions which may come under pressure such as the A12, A127, A13; and junctions including routes involving M25 junctions 27, 28, 29 and 30; M11 junctions 6, 7 and 8; A127 all junctions in Essex, A13 Sadlers Farm (A13/A130), A127 Fairglen Interchange (A127/A130); A12 Howe Green junction (A12/A130).

c. Mitigation where changes in route choice have a detrimental effect on performance.

d. Assessment of the provision of further Thames river crossings in east London and Tilbury2

4.5.8 This TA shows the changes in traffic flows in the Lower Thames area and provides information about the forecast performance of roads and junctions in the Lower Thames area, which includes parts of Essex. Information has been provided to the authority from the Project's transport model to enable them to consider the forecast changes in traffic on their road network. The Project's approach to managing impacts on the wider road network is set out in Chapter 10 of this TA. The Project's transport model includes the Silvertown Tunnel and Tilbury2.

London Borough of Havering

4.5.9 The London Borough of Havering noted that '*the Scoping Report does not include a specific section addressing traffic and transport. This is an important omission and must be rectified in the ES*'.

4.5.10 The London Borough of Havering highlighted the following concerns for consideration in the TA:

a. 'Satellite' compounds or worksites requiring access from borough roads in Havering have the potential to be a safety risk for other road users (including pedestrians).

b. During the period when the new link road for the crossing is 'tied' into the M25 motorway, there will be the likelihood that partial or full closures of the motorway may impact on the adjoining borough highway network.

4.5.11 These concerns have been addressed in this TA.

Thurrock Council

4.5.12 Thurrock Council commented that '*The Council recommends that traffic counts are carried out at the site of PRoWs, using video monitoring at set times to identify the traffic at these routes. The data should then be used to identify the number of people affected by the changing journey length. This needs to be carried out in line with DMRB Vol 11 Section 3 Part 8 by relevant transport planning specialists*.'

4.5.13 Surveys were undertaken on PRoWs. These are reported in Chapter 13: Population and Human Health of the Environmental Statement (Application Document 6.1).

Transport for London

4.5.14 TfL provided a number of requests regarding the scope of the modelling and the TA:

a. The base year model with Local Model Validation Report should be in line with the TAG/DMRB criteria.

b. The traffic model should be suitable to examine the traffic impacts for East London as changes on the M25 would affect London traffic. The outputs should allow TfL to understand the impacts within London, e.g.specific forecast changes in flows, congestion and delays on all links on the Transport for London Road Network (TLRN), trunk roads, M25 on and around London's eastern boundary, especially the A127 which would be most directly impacted.

c. Modelled periods should be at least weekday AM peak, weekday inter-peak and weekday PM peak.

d. TfL requested that National Highways adopt the GLA forecast for population and employment growth and liaise with TfL on highway growth.

e. Trip forecasts within London should reflect the TfL Highway Assignment Model (HAM).

f. TfL requested that National Highways consult on a list of schemes to be included within the traffic modelling to ensure compatibility with TfL traffic modelling. Sensitivity tests should include the proposed Silvertown Tunnel and associated Blackwall user charging from 2023 (to be reviewed following the DCO decision anticipated in 2018).

g. The modelling should include examination of induced traffic effects.

4.5.15 The requests were considered and included into the modelling and assessment except for the request to use the GLA population and employment growth forecasts. In accordance with DfT requirements, the NTEM was used.

4.6 Feedback from consultations

Consultation programme

4.6.1 The Project has undertaken the following public consultations since the Preferred Route Announcement:

a. Statutory Consultation from 10 October 2018 to 20 December 2018.

b. Supplementary Consultation from 27 January 2020 to 2 April 2020.

c. Design Refinement Consultation from 14 July 2020 to 12 August 2020.

d. Community Impacts Consultation from 14 July 2021 to 8 September 2021.

e. Local Refinement Consultation from 12 May 2022 to 20 June 2022.

4.6.2 More detail on the Project's consultation programme and the Project's responses to the views received are contained within the Consultation Report (Application Document 5.1).

Statutory Consultation

4.6.3 The Statutory Consultation provided the public and stakeholders an opportunity to review and comment on all aspects of the Project including the development work on the Project design carried out since the Preferred Route Announcement in 2017.

4.6.4 In relation to transport, a Traffic Forecasts Non-Technical Summary (Highways England, 2018) was presented which explained how the traffic modelling was carried out and presented maps showing the future forecast traffic flows with and without the Project. Detailed technical reports were also published, the Local Model Validation Report (Highways England, 2018a) and the Traffic Forecasting Report (Highways England, 2018b), which provided further details of the methods used to forecast the future impacts of the Project on the highway network. The reports presented forecast future traffic flows and journey times with and without the Project.

4.6.5 The issues raised by stakeholders and the public in response to statutory consultation included concerns over the transport modelling and forecasts, concerns over adverse impacts on the transport network and the perceived lack of details as to how any adverse impacts would be addressed.

4.6.6 Concerns over the transport modelling and forecasts concerned the level of housing growth in the model, the accuracy with which the model reflects current conditions on the road network, that the transport modelling does not reflect true driver behaviours, that only average months had been modelled and that the impact of incidents on the network have not been modelled.

4.6.7 Further information is contained within Chapters 4 and 11 of the Consultation Report (Application Document 5.1), which sets out the full range of issues, including those concerning traffic forecasting, raised by respondents to the Statutory Consultation and how National Highways has considered and had due regard to each response.

Supplementary Consultation

4.6.8 Supplementary Consultation occurred in early 2020. This presented several changes to the Project made as a result of feedback from Statutory Consultation, engagement with stakeholders and ongoing design development.

4.6.9 An updated version of the Lower Thames Area Model (LTAM) was used to inform proposals at Supplementary Consultation. Updated details for the model and revised traffic forecasts were summarised in the Traffic Modelling Update (Highways England, 2020a).

4.6.10 In relation to transport, the changes proposed did not significantly alter the scale and nature of impacts reported at Statutory Consultation.

4.6.11 The issues raised at Supplementary Consultation concerning traffic modelling covered similar themes to those raised at Statutory Consultation.

4.6.12 Further information is contained within Chapters 6 and 12 of the Consultation Report (Application Document 5.1), which sets out the full range of issues, including those concerning traffic forecasting, raised by respondents to the consultation.

Design Refinement Consultation

4.6.13 A design refinement consultation took place between July and August 2020 which included several minor design and alignment changes. None of these changes had any impact on the transport model forecasts or the findings of this TA.

4.6.14 Further information is contained within Chapters 7 and 13 of the Consultation Report (Application Document 5.1), which sets out the full range of issues, including those concerning traffic forecasting, raised by respondents to the consultation.

Community Impacts Consultation

4.6.15 A community impacts consultation took place between July and September 2021. The consultation materials presented detailed information about the Project proposals, during both construction and operation, with much available at a ward level.

4.6.16 This included detailed information about the operational traffic forecasts as well as descriptive information about the likely impacts of the construction of the Project on the road network.

4.6.17 The consultation included changes to the Project's Order Limits and utilities proposals, none of which had any impact on the transport model forecasts or the findings of this TA.

4.6.18 Further information is contained within Chapters 8 and 14 of the Consultation Report (Application Document 5.1), which sets out the full range of issues, including those concerning traffic forecasting, raised by respondents to the consultation.

Local Refinements Consultation

4.6.19 A local refinement consultation took place between May and June 2022. This included a number of local refinements to the proposed design and operation of the Project.

4.6.20 One area consulted upon was a new link road which would provide connectivity between the new road and A13 westbound to the A1089, via the Orsett Cock junction. This new link road has been included within the LTAM and the results shown in this TA.

4.6.21 Further information is contained within Chapters 9 and 15 of the Consultation Report (Application Document 5.1), which sets out the full range of issues, including those concerning traffic forecasting, raised by respondents to the consultation.

4.7 Technical engagement

4.7.1 Alongside the formal consultation with relevant parties as set out above, the Project has held technical engagement with both the local planning authorities and local highway authorities that would be impacted by the Project. This engagement has been undertaken over a number of years and has taken the form of meetings with groups of authorities, meetings with individual authorities and the sharing of information to enable authorities to make detailed consideration of the impacts forecasted by the Project's transport model on the road network.

4.7.2 Since October 2020 the Project have met with local authorities and local highway authorities on a number of occasions to discuss their concerns and provide more information about the forecast impacts on the road network as a result of the Project in operation and construction.

4.7.3 In addition, GIS shapefiles and cordons of the Project's transport model have been provided to enable examination of the forecast impacts and draft copies of the control documents have been shared to enable feedback and changes to be made to them in response to local authority concerns.

4.7.4 The Statement of Engagement (Application Document 5.2) provides details of the engagement undertaken outside of the formal consultation periods by the Project.

4.8 Project response to consultation and engagement

4.8.1 This TA has been written in response to the requests for such a document. The scope of the TA has been developed over time, in response to the key issues raised during the formal and informal consultation with the Planning Inspectorate and the relevant highway authorities. The TA considers the transport impacts of the Project during construction and typical operation. It is written to complement the Environmental Statement (Application Document 6.1 to 6.3) and the Combined Modelling and Appraisal Report (ComMA) (Application Document 7.7).

4.8.2 The Environmental Statement addresses the environmental effects of the operation and construction of the Project on the transport networks with respect to people and communities, air quality and noise.

4.8.3 Appendix D: Economic Appraisal Package of the ComMA (Application Document 7.7), sets out the economic impacts of the Project in detail and summarises the environmental, social and economic impacts together in the Appraisal Summary Table Report. The economic appraisal quantifies the overall change in travel times and costs by users of the highway network as a result of the provision of the Project. It also presents evidence of the longer-term wider economic impacts of the Project.

5 Methodology

5.1 Assessment methodology

5.1.1 The assessment methodology for this TA is based on the following approach:

a. Prepare a baseline assessment of the current state of the transport system to identify the existing traffic and transport conditions.

b. Prepare forecasts of the traffic flows and performance of the transport system in the future without the Project for the proposed opening year of the Project and the design year (15 years after opening).

c. Prepare a future year baseline assessment of the transport system in the opening and design years, without the Project.

d. Prepare forecasts of the traffic flows and performance of the transport system in the future with the Project, for the proposed opening year of the Project and the design year (15 years after opening).

e. Identify the operational impacts of the Project on all modes of transport and compare the differences in the performance of the transport network as a consequence of the provision of the Project.

f. Prepare an assessment of the impacts of construction and construction traffic on the transport network.

5.2 Assessment tools

5.2.1 The main assessment tool is the LTAM. This transport model contains a detailed representation of the road network in the area and information on where people travelled to and from in an average month (March 2016). It uses an industry-recognised method of predicting future traffic flows and conditions, both with and without the Project.

5.2.2 The transport model shows the number of people choosing to travel by road and rail and the route they use now, and the route they are forecast to use. This enables predictions to be made as to how many vehicles would be using each part of the road network in the future and how long it would take to complete a journey.

5.2.3 The transport modelling process and the forecasts produced are presented at three levels of detail in the DCO Application Documents.

5.2.4 The first is the Traffic Forecasts Non-Technical Summary (Application Document 7.8) which briefly describes the transport model of the Lower Thames area and presents maps illustrating the traffic forecasts produced using the model.

5.2.5 The second is the ComMA (Application Document 7.7) which summarises the transport modelling, forecasting and appraisal work undertaken for the Project.

5.2.6 The third is a set of detailed technical reports, which are available as appendices to the ComMA (Application Document 7.7). These are as follows:

a. The Transport Data Package (Application Document 7.7, Appendix A) which sets out the datasets used in the building of the LTAM and the assessment of transport impacts.

b. The Transport Model Package (Application Document 7.7, Appendix B) which contains a technical description of the methods used to build the transport model, to calibrate it to match the real world transport system which it aims to model, and the results of the validation of the model.

c. The Transport Forecasting Package (Application Document 7.7, Appendix C) which presents the forecasts of the future state of the transport system in the Lower Thames area, both without and with the Project.

d. The Economic Appraisal Package (Application Document 7.7, Appendix D) which consists of four reports:

i. The Economic Appraisal Report describes the methods used to assess the impacts of the Project and presents the wide range of economic, environmental and social impacts of the Project.

ii. The Distributional Impact Appraisal Report considers the extent to which the social, environmental and economic impacts occur to a different level of severity or benefit on vulnerable groups of people.

iii. The Appraisal Summary Table presents a 'view on a page' of the impacts of the Project.

iv. The Level 3 Wider Economic Impacts Report presents an examination of the economy of the Lower Thames area and the anticipated wider economic impacts of the Project.

5.2.7 A short description of the LTAM and its key features and assumptions is presented in Section 5.7.

5.2.8 The assessment of accident rates in the future on the highway network has been undertaken using DfT's COst and Benefits to Accidents - Light Touch (COBALT) software version 2.3 (May 2022). This software is used to forecast the total numbers of personal injury accidents and casualties by severity of injury (fatal, serious and slight) on the network given the number of vehicle kilometres being driven on each part of the network in the future and the accident rates for each road type.

5.3 Baseline assessment

5.3.1 The baseline assessment for the highway network has been prepared for 2016 as this is the base year used in the transport model, LTAM. The model for that year shows where people are travelling to and from in 2016, how long their journeys take and how many vehicles use each part of the highway network. The model accords with guidance published in the DfT's Transport Appraisal Guidance. This is further explained in paragraphs 5.7.36 to 5.7.38.

5.3.2 The baseline assessment for the existing transport networks for other modes is based on information from mid-2022. The other parts of the transport network are:

a. railways

b. waterways and canals

c. bus and coach networks

d. cycle routes

e. PRoW

5.4 Operational assessment

5.4.1 The operational year assessment methodology for this TA is based on the following approach:

a. Review the changes in traffic flows and journey times on the road network as result of the Project.

b. Assess the impact of these changes on highway users.

c. Assess the impact of the Project on other modes of transport.

d. Assess the impact of diversions and creation of new PRoW, as a result of the Project.

5.4.2 The impact of a change in traffic flow depends on the size of the change in traffic flow and the amount of unused or spare capacity on that road.

5.4.3 In the LTAM, the capacity of each part of the road network is given as the number of Passenger Car Units (PCU) that can use each road link in the model each hour, which is an industry standard approach:

a. Cars and vans are defined as 1 PCU.

b. HGVs are considered to be equivalent to 2.5 PCUs, because they take up more road space.

5.4.4 The capacity of a road depends on the type of road, the speed limit, the number of lanes and the road layout. For example, the capacity is often reduced on a motorway where traffic changes lane to leave or join the road at the next junction.

5.4.5 The assessment of the transport impacts of the Project are based on the following criteria:

a. The absolute and percentage change in traffic flows.

b. The baseline percentage of volume to capacity for the road and the forecast volume to capacity with the Project.

5.4.6 The assessment is carried out for the opening year (2030) and the design year (2045). In each assessment the baseline is the forecast conditions on the network in that year without the Project. This is compared with the forecast performance of the network with the Project.

5.5 Construction assessment

5.5.1 The construction assessment analyses the impact of the construction of the project over the entire construction phase.

5.5.2 The construction assessment methodology for this TA considers the combined impacts of:

a. the additional construction traffic on the network

b. traffic management measures associated with the construction works

5.5.3 The assessment of the transport impacts of the Project's construction are based on the following criteria:

a. The change in traffic flows.

b. The baseline percentage of volume to capacity for the modelled road network and the forecast percentage of volume to capacity with the construction of the Project.

c. The change in travel speeds.

5.5.4 The impacts on changes in journey times for vehicles, and bus and coach services in the area is detailed.

5.5.5 This TA also sets out the proposed closures and diversions of PRoW during construction and the impact on their users.

5.5.6 The impact on rail users is covered by presenting details of proposed closures of railway lines in the area and any other impacts of the performance of the rail network.

5.5.7 Construction may take approximately six years, with the anticipated opening date for the Project being in 2030. For the purposes of the transport modelling which informs the assessment, the construction programme has been divided into 11 phases. The conditions on the network in each phase are reported.

5.5.8 Further information on the construction assessment is set out in Chapter 8 of this TA.

5.6 Safety review

5.6.1 The assessment of the safety impacts of the Project set out in this TA considers the design of the Project, the measures that have been taken at the design stage, and those that would be taken during construction and operation to minimise the safety risks associated with the Project.

5.6.2 The future rate of accidents on the highway network for the 60 years post opening of the Project is assessed using DfT's COBALT software.

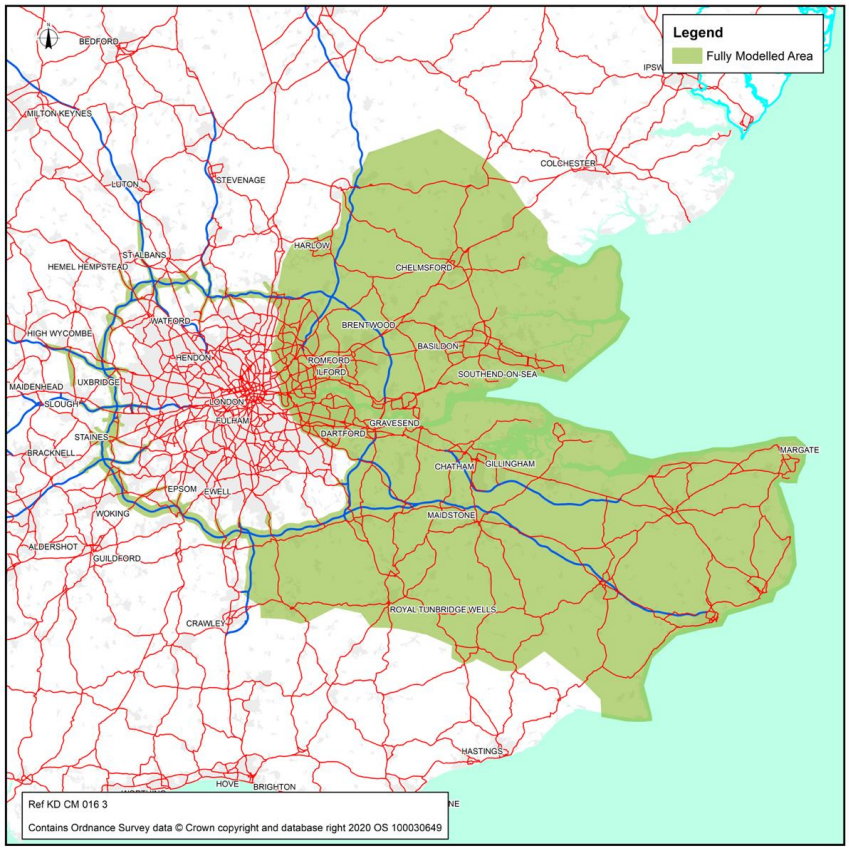
5.7 Lower Thames Area Model

5.7.1 A brief description of the LTAM is provided in this section. More detail is available in the ComMA (Application Document 7.7), and in particular in Appendix B: Transport Model Package (Application Document 7.7).

Geographical scope

5.7.2 The geographical scope of the LTAM was developed to cover the area that would be affected by the Project. The Fully Modelled Area is shown in Plate 5.1.

Plate 5.1 The LTAM Fully Modelled Area



Data collection

5.7.3 The traffic data for the LTAM was collected from various sources including mobile phone data and traffic surveys. The transport data collected for the Project is described in Appendix A: Transport Data Package of the ComMA (Application Document 7.7).

Modelled month and hours

5.7.4 The base year of the LTAM represents the transport system in the Lower Thames area as it was in March 2016. This month was chosen to represent an average month in the Lower Thames area. More information on how the modelled month and year were selected are set out in the Transport Model Package, Appendix B of the ComMA (Application Document 7.7).

5.7.5 The hours modelled in the LTAM are from 07:00 – 08:00 (the morning peak) and 17:00–18:00 (the evening peak) as these are the busiest times of day on the main roads in the area. A typical hour in the middle of the day is also modelled (the inter-peak).

Modelled years

5.7.6 The LTAM is used to predict the traffic flows, speeds and journey times on the road network in the Lower Thames area in the future. The model is first used to predict what is called the 'Do Minimum' scenario, which is where the Project is not built, but where any changes to the road network and planned development that are forecast to go ahead (whether the Project is built or not) are included. Then the Project is added to the model, this is known as the 'Do-Something' scenario.

5.7.7 The forecast years are:

a. 2030, the Project's opening year

b. 2037, an interim year used in the economic appraisal

c. 2045, the Project's design year being 15 years after opening

d. 2051, the final forecast year. This is the furthest year into the future for which DfT publishes traffic growth forecasts

National Trip End Model (NTEM)

5.7.8 The traffic growth forecasts used in LTAM are taken directly from DfT's NTEM (2017a). These forecasts are produced at the Middle Super Output Area geography in England and Wales. There are 7,201 Middle Super Output Areas in England and Wales, of which 1,108 are in south-east England.

5.7.9 The NTEM has three component parts:

a. Scenario generator – this produces detailed estimates of the future population in the UK. The population is divided into segments based on geographical location, gender, age group, employment status, household size and area type, for example metropolitan area or rural.

b. National car ownership model – this produces estimates of levels of car ownership by different household types. This allows the population forecast produced by the scenario generator to be further sub-divided according to the number of cars owned by each household. The model estimates whether each household has no cars, one car, two cars or three or more cars.

c. CTripEnd – this applies a trip rate, which shows the number of trips by all modes that a person in each of the population segments will make, to the number of people in each of the population segments. These trips are then divided into weekday and weekend trips, by mode and time of day to produce estimates of the number of trips produced by people. This is known as the number of trip productions.

5.7.10 The destination of these trips is determined by the number and type of jobs in an area, and other factors such as the size of the population in an area. This is known as the number of trip attractions.

5.7.11 The number of trip attractions is then factored over a wide area to match the number of trip productions.

5.7.12 The NTEM is run for every five years from 2011 to 2051. The growth factors produced by NTEM can be accessed using a bespoke software package known as TEMPro, which can be downloaded for free from the DfT website.

5.7.13 NTEM takes a diverse set of input data, based on official government datasets and forecasts. Details of these datasets are described in the NTEM Planning Data, Version 7.2 – Guidance Note (DfT, 2017b).

5.7.14 There are several points to note about the traffic growth forecasts produced by TEMPro:

a. The traffic growth forecasts are consistent with Scenario 1 of traffic growth forecasts produced by the DfT's National Transport Model and are based on common assumptions for factors such as GDP growth, fuel prices, fuel mix and engine efficiency of the vehicle fleet.

b. The forecasts are for personal travel in cars. Growth factors for Light Goods Vehicle (LGV) and HGV traffic are published by DfT ifn its Road Traffic Forecasts (DfT, 2018), for a coarser geography, produced using their National Transport Model.

c. The forecasts do not take into account the delivery, or not, of any particular future development proposal.

d. The Office for National Statistics (ONS) forecast population living in communal establishments is excluded from the population forecasts used in NTEM.

e. NTEM uses the ONS population projections published in 2014. These are only available at a local level until 2037 for England and thereafter national growth projections are used.

f. Where the projected growth in population in an area exceeds the projected growth in the number of new dwellings, then some of the population is assumed to form larger household sizes within the available dwellings in the area and some of the population move away to another area with surplus housing. For these two reasons the final population estimates by NTEM zone may not exactly match the original ONS forecasts input into NTEM.

g. The estimates of the growth in the provision of new dwellings in an area are taken from a variety of documents, such as Annual Monitoring Reports and Local Plans. The documents used in NTEM are listed in Appendix F to the NTEM Planning Data, Version 7.2 – Guidance Note (DfT, 2017b).

LTAM traffic growth factors

5.7.15 The growth in car trips in the LTAM is taken from the DfT (2017a) NTEM forecasts, known as TEMPro 7.2 and published in February 2017.

5.7.16 The growth in the number of trips made by LGVs and HGVs is taken from the DfT (2018) Road Traffic Forecasts 2018.

5.7.17 More detailed information on the spatial location of this traffic growth is obtained by examining the location of new developments which have been constructed since the model's base year of 2016 and those which have been granted planning permission.

5.7.18 Information on these developments was obtained by contacting the Local Authorities in the area and viewing their online planning portals for information on planning applications.

5.7.19 The developments explicitly included in the future year trip matrices are listed in the Uncertainty Log which is provided in Appendix C: Transport Forecasting Package of the ComMA (Application Document 7.7). Owing to the length of time required to build trip matrices for use in LTAM, the Uncertainty Log was produced at the end of September 2021 and reflects knowledge of the known future developments at that time.

5.7.20 Two proposed developments that met the above criteria for inclusion have not been added to the Uncertainty Log. They have been excluded on the basis that the development proposals do not include necessary highway interventions that would maintain the integrity of the road network. The developments are:

a. Highsted Park (21/503906/EIOUT and 21/503914/EIOUT)

b. MedwayOne (MC/21/0979)

5.7.21 National Highways is working with the promotors of these developments to consider potential ways forward. The Uncertainty Log gives the assumed size of each development, e.g. number of houses, and the trip rate used for each development, e.g. the number of car trips per 100 houses into and out of the site by time of day.

5.7.22 The major developments are shown in Plate 5.2 and Plate 5.3.

5.7.23 DfT's transport analysis guidance (TAG) on the building of future year trip matrices is set out in TAG unit M4 forecasting and uncertainty (DfT, 2019a). The LTAM matrices are built for what is known as the 'Core' Scenario. Developments that are classified as 'near certain' or 'more than likely' in the Uncertainty Log are explicitly included in the model. These developments are those that are already under construction, have planning permission, the development application is within the consent process or planning consent is imminent.

5.7.24 However, in accordance with DfT guidance, if developments are explicitly included in the forecasts, then the growth of trips elsewhere in the relevant Local Authority or local area is reduced so that the overall level of traffic growth matches the NTEM forecasts.

5.7.25 The inclusion of specific developments in the model therefore only provides much more detailed spatial information on the location of new trips and does not affect the overall level of traffic growth in the model.

5.7.26 For the purposes of this TA and the economic appraisal, a high and low growth scenario were also produced. These forecasts reflect national uncertainty in forecasts of input data into the National Transport Model and NTEM, such as future levels of economic growth and fuel prices.

5.7.27 The high and low growth matrices are produced by factoring up or down the core scenario matrices. For vehicle trips the factor is 2.5 times the square root of the number of years between the model's base year and the forecast year.

5.7.28 This means that the difference in the number of trips in the high/low growth scenarios compared to the core scenario increases over time.

5.7.29 A comparison is provided by Lyons *et al*. (2019) of the range on future levels of demand provided by this methodology compared to all seven future scenarios tested by the DfT in the National Transport Model. In all cases, except for the far future in scenario 6, the range of demand produced by the DfT methodology bounds the variation in demand in the seven National Transport Model scenarios. Scenario 6 is an extreme scenario where the trip rates per person decline continuously into the future.

5.7.30 DfT (2019a) in TAG unit M4 state that the core scenario '*represents the best basis for decision-making given current evidence*'. The inclusion of an analysis of the transport impacts with the high and low growth scenarios is provided in the TA to show how levels of national uncertainty would affect the forecast impact of the Project on the performance of the highway network.

5.7.31 The DfT has released an updated version of NTEM (version 8) in August 2022 as a forthcoming change that would apply from November 2022. At the time of producing this report, the available data had not been finalised and so could not be used to forecast the growth on the road network.

Plate 5.2 Main future development areas included in the transport model for 2030

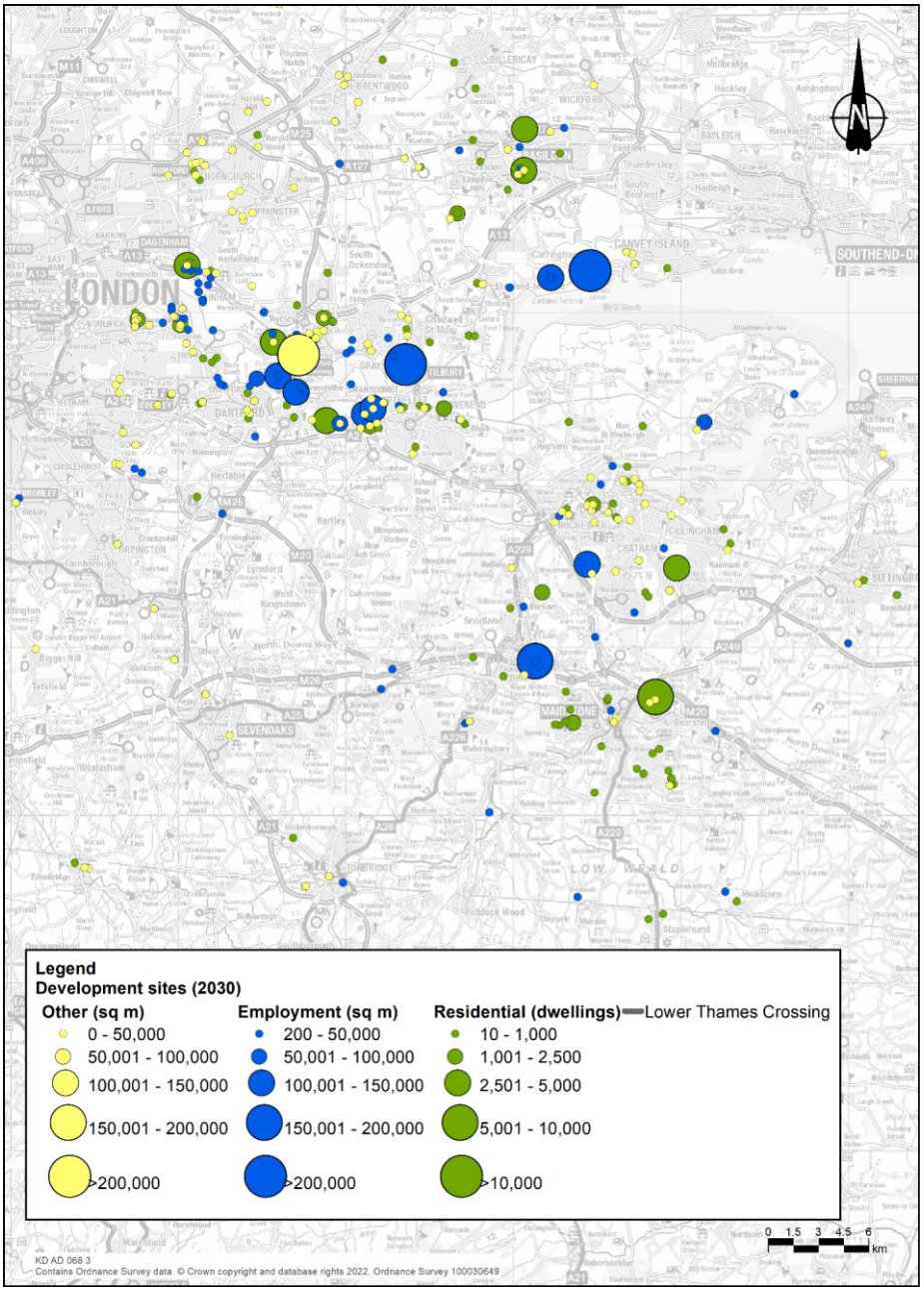
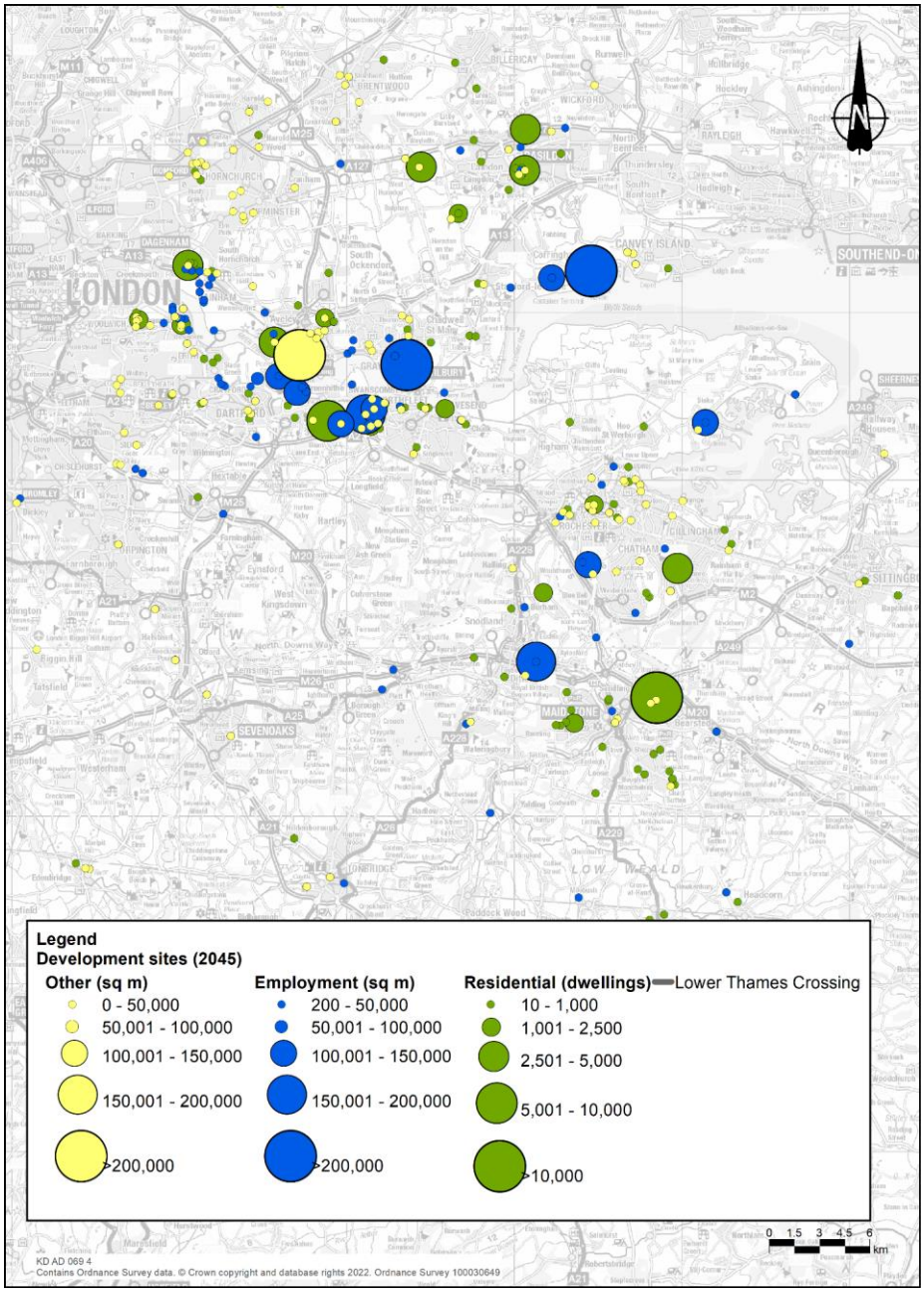


Plate 5.3 Main future development areas included in the transport model for 2045



Future year road network

5.7.32 The road network in the LTAM has been updated for the future years to include road schemes that have been completed since 2016, or are likely to be built, regardless of whether the Lower Thames Crossing is built or not. This information was based on information available from the highway authorities in the area in September 2021.

5.7.33 An earlier version of the transport schemes to be included in the LTAM was consulted upon at the Community Impacts Consultation in July 2021. The list has been subsequently updated to what is detailed below.

5.7.34 The schemes identified are shown in Plate 5.4, Plate 5.5, Plate 5.6 and Table 5.1. It has been assumed that all these schemes would be completed before 2030.

Plate 5.4 Future highway schemes (1 of 3)

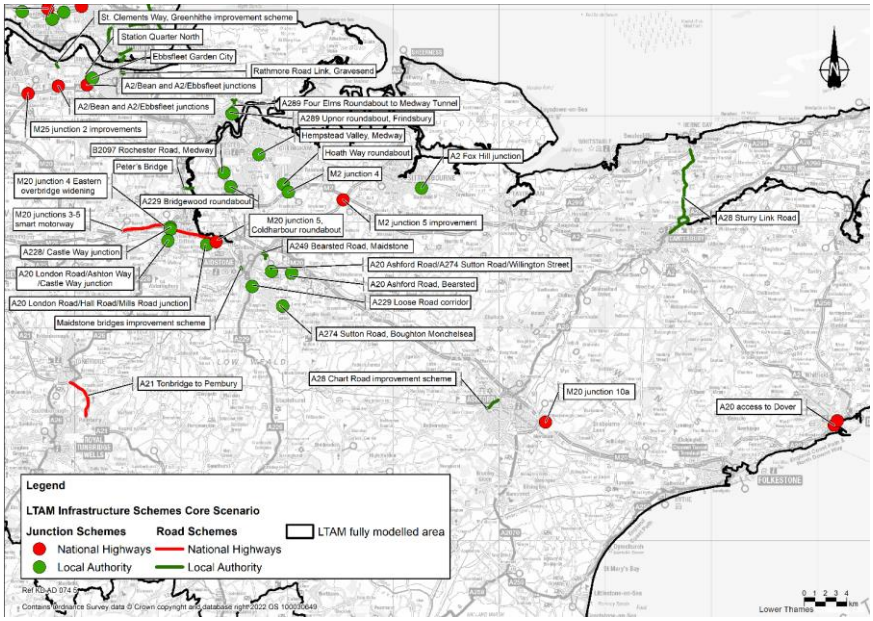


Plate 5.5 Future highway schemes (2 of 3)

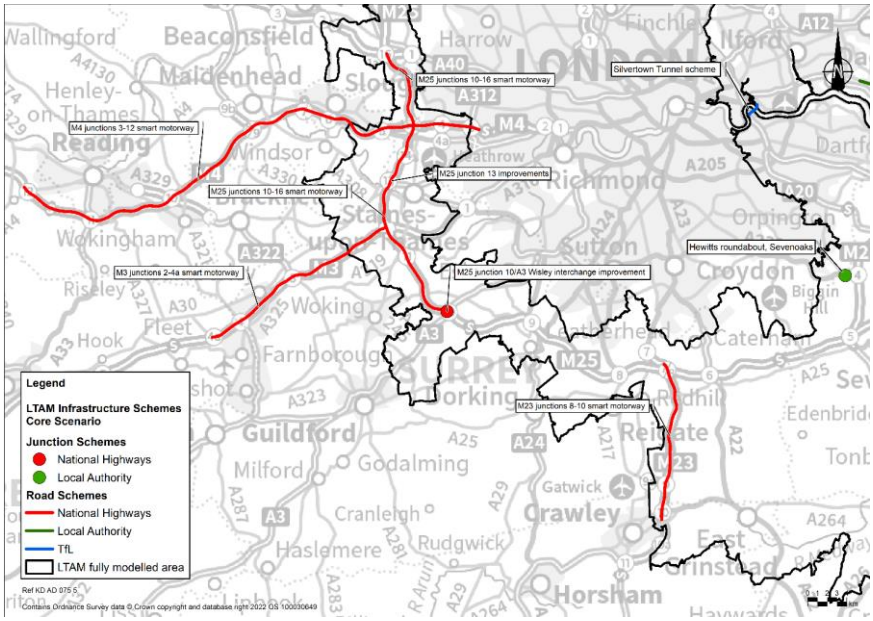


Plate 5.6 Future highway schemes (3 of 3)

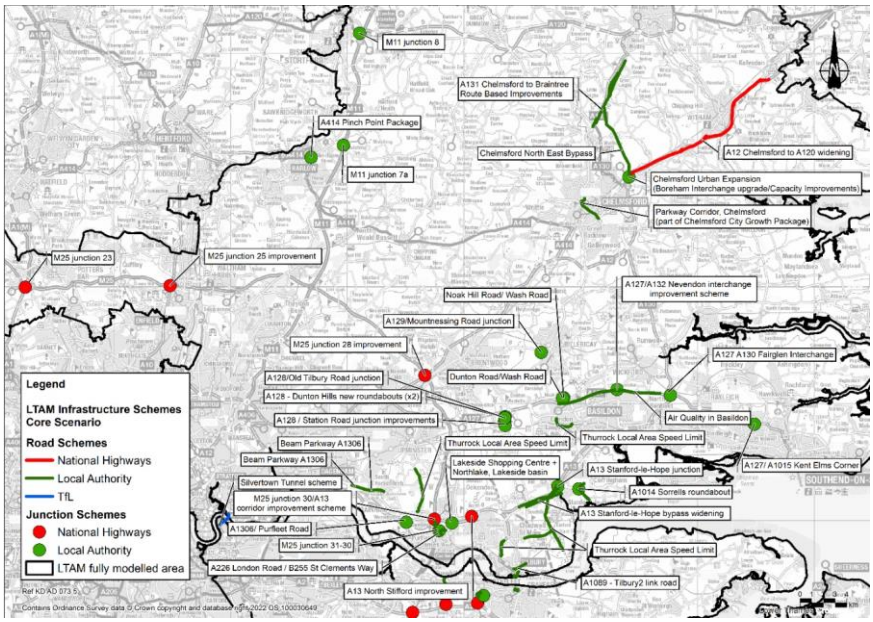


Table 5.1 Road schemes included in the LTAM

Scheme Name	Scheme Type
A1014 Sorrells roundabout	Junction improvement
A1089 - Tilbury2 link road	New link road
A12 Chelmsford to A120 widening scheme	Carriageway widening
A127/ A1015 Kent Elms Corner	Junction Improvement
A127/A130 Fairglen Interchange	Junction improvement
A127/A130 Fairglen Interchange new link road	New link road
A127/A132 Nevendon Interchange improvement scheme	Junction improvement
A128 - Dunton Hills new roundabouts (x2)	New junction
A128/Old Tilbury Road junction	New roundabout
A128/Station Road junction improvements	Junction improvement
A129/Mountnessing Road junction	New signalised junction
A13 North Stifford improvement	Junction improvement
A13 Stanford-le-Hope bypass widening	Carriageway widening
A13 Stanford-le-Hope junction	Junction improvement
A1306/ Purfleet Road	Junction improvement
A131 Chelmsford to Braintree route improvements	Junction and carriageway improvements
A2 Fox Hill junction	New signalised junction
A2/Bean and A2/Ebbsfleet junctions	Junction improvements
A20 access to Dover	Junction improvement
A20 Ashford Road, Bearsted	New junction
A20 Ashford Road/A274 Sutton Road/Willington Street	Junction improvement
A20 London Road/Ashton Way/Castle Way junction	Junction improvement
A21 Tonbridge to Pembury	Carriageway widening
A226 London Road / B255 St Clements Way	Junction improvement

Scheme Name	Scheme Type
A228/ Castle Way junction	Junction improvement
A229 Bridgewood roundabout	Junction improvement
A229 Loose Road corridor and A20 London Road/Hall Road/Mills Road junction	Junction improvement
A249 Bearsted Road, Maidstone	Junction improvement and carriageway widening
A274 Sutton Road, Boughton Monchelsea	New junction
A28 Chart Road improvement scheme	Carriageway widening and junction improvement
A28 Sturry Link Road	New road
A289 Four Elms roundabout to Medway Tunnel (Medway)	New road
A289 Upnor roundabout, Frindsbury	Junction improvement
A414 Pinch Point Package	Junction improvements and A414 widening
Air Quality in Basildon	Carriageway improvements
B2097 Rochester Road, Medway	New junction
Beam Parkway A1306 transformational scheme	New railway station and A1306 carriageway reconfiguration
Chelmsford North East Bypass	Local bypass scheme
Chelmsford Urban Expansion (Boreham Interchange upgrade/Capacity Improvements)	Junction improvement
Dunton Road/Wash Road	Junction improvements
Ebbsfleet Garden City	New Infrastructure Serving Development
Hempstead Valley, Medway	Various improvements
Hewitts roundabout, Sevenoaks	Junction improvement
Hoath Way roundabout	Junction improvements
Lakeside Shopping Centre	New link road
M11 junction 7a	New junction on the M11 north of junction 7
M11 junction 8	Junction improvements

Scheme Name	Scheme Type
M2 junction 4	Junction improvements
M2 junction 5 improvements	Junction improvement
M20 junction 10a	New junction
M20 junction 4 eastern overbridge widening	Carriageway widening
M20 junction 5, Coldharbour roundabout	Junction improvement
M20 junctions 3-5 smart motorway	Smart motorway
M23 junctions 8-10 smart motorway	Smart motorway
M25 junction 10/A3 Wisley interchange improvement	Junction improvement
M25 junction 13 improvements	Junction improvement
M25 junction 2 improvement	Junction improvement
M25 junction 23	Junction improvement
M25 junction 25 improvements	Junction improvement
M25 junction 28 improvements	Junction improvement
M25 junction 30/A13 corridor relieving congestion scheme*	Junction improvement
M25 junctions 31-30	Junction improvements at junction 31 and mainline northbound
M25 junctions 10-16 smart motorway	Smart motorway
M3 junctions 2-4a smart motorway	Smart motorway
M4 junctions 3-12 smart motorway	Smart motorway
Maidstone bridges improvement scheme	Carriageway widening and junction improvement
Noak Hill Road/ Wash Road	New roundabout
Northlake, Lakeside basin	New junction
Parkway Corridor, Chelmsford	Junction improvements
Peters Village Medway River Crossing	New bridge across the River Medway
Rathmore Road Link, Gravesend	Carriageway and junction widening
Silvertown Tunnel scheme	New twin bore tunnel east of the Blackwall Tunnel

Scheme Name	Scheme Type
St Clements Way, Greenhithe improvement scheme	Carriageway and junction widening
Station Quarter North	New link roads
Thurrock Local Area Speed Limit Improvements	Speed Limit traffic management

Predicting the future year baseline

5.7.35 The 2016 model shows where people are travelling to and how long their journeys took in 2016. In the future, for many people these journeys would take longer (because there are more cars on the roads) but the real cost of making these journeys would decrease. This is because, although fuel prices would rise, vehicles are forecast to become more fuel efficient, and as people's incomes rise, journeys by car would feel more affordable.

5.7.36 The transport model predicts how people would react to these changes in the time and cost of their journeys. The possible changes include how often they make the same trip, a change in the time of day they travel, a switch to or from public transport, where they travel to/from or what route they choose to take.

5.7.37 Government forecasts and evidence from interventions of a similar nature suggest that, in the main, people would continue to travel by car but may change where they travel to in the future. As traffic speeds fall, or trips become more expensive, people tend to respond by making shorter journeys, and where journeys become quicker or cheaper, some people choose to travel to places further away, for example they choose employment further away from home.

COVID-19 pandemic

5.7.38 Measures put in place to tackle the COVID-19 pandemic had a major impact on the volume of passenger vehicles on the road network, compared with similar periods in 2019. Freight traffic has never stopped as there has been a continuous requirement for deliveries throughout the pandemic. Through 2020 and into 2021, the pandemic had a marked impact on everyday life, including on traffic on the road network. In early March 2020, the UK Government set out four phases in its response to coronavirus, with the first national lockdown starting on 23 March. This, and subsequent restrictions, limited the movement of people to varying degrees.

5.7.39 Information gathered during this time on road use showed the importance of the strategic road network. During the 'stay at home' period in late March and April 2020, only essential workers were allowed to go to their place of work, and travel outside of the home was severely limited. April 2020 was the month which saw the largest fall in traffic, 63% lower nationally than traffic levels in April 2019. Traffic levels then varied through the year as the constraints changed.

5.7.40 From 2021 onwards, demand rebounded and has returned to pre COVID-19 levels, although this does vary by location, and there have been some changes in the mix of vehicle types, especially during peak hours. However, the return to pre COVID-19 levels of demand demonstrate that issues exhibited pre COVID-19 at locations such as the Dartford Crossing have not been relieved by changes to traffic demand.

5.7.41 Data collection post 2019 has been affected by government restrictions and traffic patterns on the road network have not yet stabilised. As such the baseline for the Project's transport model remains as March 2016. In addition, growth forecasts do not yet take account of any long-term effects arising from the COVID-19 pandemic and it is not yet known if any of these changes will be long lasting.

Predicting the impact of the Project

5.7.42 The LTAM predicts how the travel patterns in the area would change once the Project is built and provides additional road capacity across the River Thames. These responses include changes to the frequency of making trips, the time of day at which those trips are made, the transport mode used and the destination of trips. The model then estimates the route they use, which provides information on how many vehicles are using each part of the road network and how long it takes to complete a journey.

Suitability for use in the Transport Assessment

5.7.43 DfT has issued guidelines (TAG) on how transport models such as the LTAM should be built, and the extent to which the predictions of traffic flows and journey times made by the base year model compare with real life.

5.7.44 TAG has been used as the basis for collecting data and building the model and then assessing its performance. Full details of the processes and checks undertaken are contained within Appendix A: Transport Data Package and Appendix B: Transport Model Package of the ComMA (Application Document 7.7).

5.7.45 The LTAM has been assessed by an independent specialist assessor within National Highways throughout its development. They concluded that the LTAM is suitable to assess the Project.

5.8 Summary

5.8.1 The assessment of the transport impacts of the Project considers the impacts on the transport network as a whole, not just on the road network. It covers the impact on rail and bus services, and WCH.

5.8.2 The impacts are considered for the various stages during the construction phase and for the Project once it is operational.

5.8.3 The main tool used to predict the future state of the highway network both with and without the Project is the LTAM. This is a variable demand model which predicts how people's travel behaviour would respond to changes in the transport system, such as changes in the cost of motoring and the provision of more road capacity across the River Thames.

5.8.4 The transport model was built following the principles and processes set out in DfT's TAG. This ensures that the LTAM's forecasts of future traffic flows and journey times are suitable for use in this TA, the Environmental Statement (Application Documents 6.1 to 6.3) and the economic appraisal (Application Document 7.7, Appendix D: Economic Appraisal Report within the Economic Appraisal Package of the ComMA) of the Project.

6 Baseline assessment

6.1 Introduction

6.1.1 The baseline assessment for the highway network is for 2016 as this is the base year used in the LTAM.

6.1.2 The baseline for provision for WCHs and the public transport network is based on mid 2022 infrastructure and service provision.

6.2 Highways

The highway network

6.2.1 The Project would have a direct connection on the following principal roads:

a. The M25 between junction 27 (M11) and junction 2 (A2).

b. The A13 between its junctions with the M25 (junction 30) and the A132 (Pitsea).

c. The A1089 between Tilbury Docks and A13.

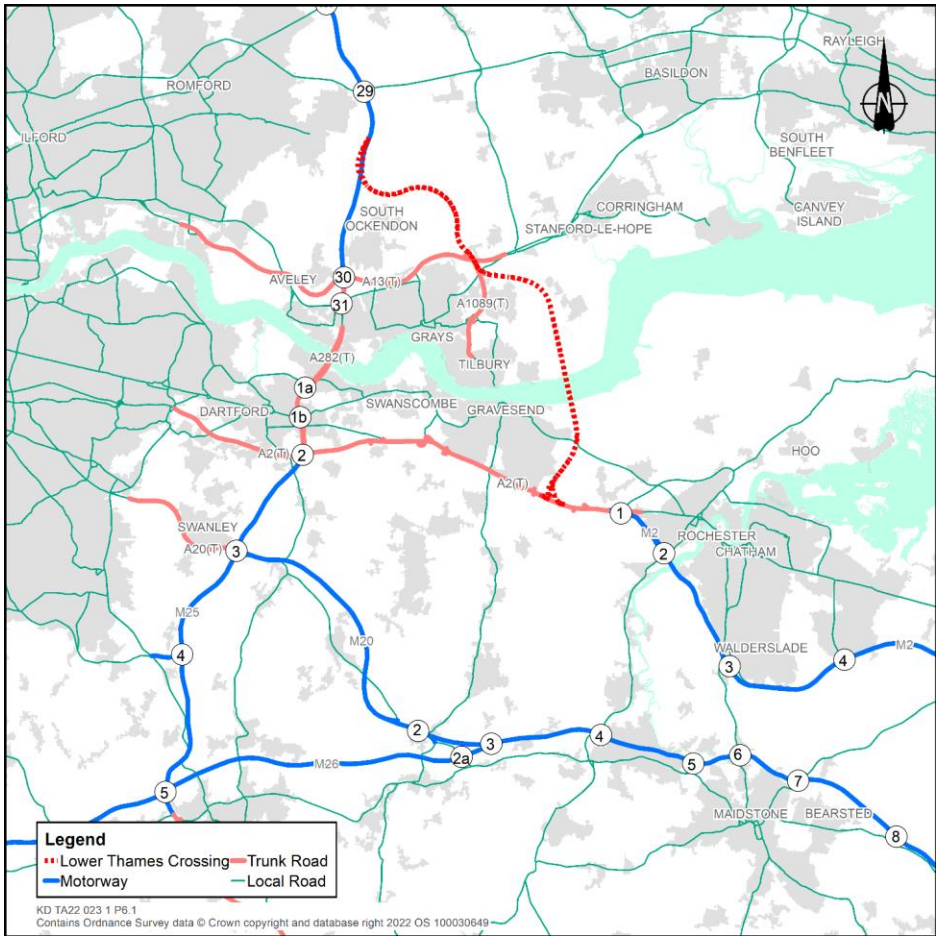
d. The A2 between its junction with the M25 (junction 2) and M2 (junction 1).

6.2.2 Plate 6.1 and Table 6.1 set out the principal roads near the Project.

Table 6.1 Principal roads near the Project

Road	Relevant section
M25	Between junctions 27 and 2
A12	Between the North Circular and Chelmsford
A127	Between Gallows Corner and Basildon
A13	Between the North Circular and Basildon
A1089	Between Tilbury Docks and the A13
A2	Between the South Circular and M2 junction 1
M2	Between junctions 1 and 7
A228	Between M20 junction 4 and M2 junction 2
A229	Between M20 junction 6 and M2 junction 3
A20	Between the South Circular and M25 junction 3
M20	Between junctions 1 and 7
M26	Between M25 junction 5 and M20 junction 3

Plate 6.1 The highway network near the Project



6.3 Road descriptions

A282 Dartford Crossing

6.3.1 The Dartford Crossing provides four lanes for traffic in each direction. The four lanes northbound are provided in two tunnels, each with two lanes. The four lanes southbound are provided over a bridge.

6.3.2 There is a charge for using the Dartford Crossing which is collected remotely.

6.3.3 The Dartford Crossing is the only road crossing of the River Thames east of the Blackwall Tunnel, which lies 15 miles to its west in inner London (other than the Woolwich Ferry, which operates limited hours and with vehicle restrictions). The Silvertown Tunnel, currently under construction, will lie adjacent to the Blackwall Tunnel.

M25 junction 27 to the Dartford Crossing

6.3.4 At the point that the Project's route would join the M25, the motorway is a dual four-lane carriageway, having been widened from dual-three lanes in a scheme completed in 2012 that widened the M25 between junctions 27 and 30. Between the northern extent of the Dartford Crossing and junction 27 the M25 (including the A282 between the northern extent of the Dartford Crossing and M25 junction 30) is dual four lanes, with dual three lanes through the junctions. Most of this section has hard shoulders but there are some discontinuities at structures.

Dartford Crossing to M25/A282 junction 2 (A2)

6.3.5 To the south of the Dartford Crossing, the A282 is dual four lanes to junction 2 with the A2.

A2 from M25 to A2/M2 junction 1

6.3.6 The A2 is dual four lanes from the A282 to M2 junction 1, except for a dual three lane section through the Bean junction.

6.4 Traffic flows

6.4.1 Plate 6.2 to Plate 6.4 show the hourly traffic flows across the area of the proposed Lower Thames Crossing in the AM peak hour, average inter-peak hour and PM peak hour in 2016.

6.4.2 The Dartford Crossing has some of the highest flows in the vicinity, with over 6,500 PCUs one way in the 2016 AM and PM peaks. The A2 sees similarly high flows, in particular in the westbound direction in the AM peak and the eastbound direction in the PM peak, mainly due to traffic heading towards and coming from London.

Plate 6.2 Baseline flows 2016 AM peak (07:00–08:00)

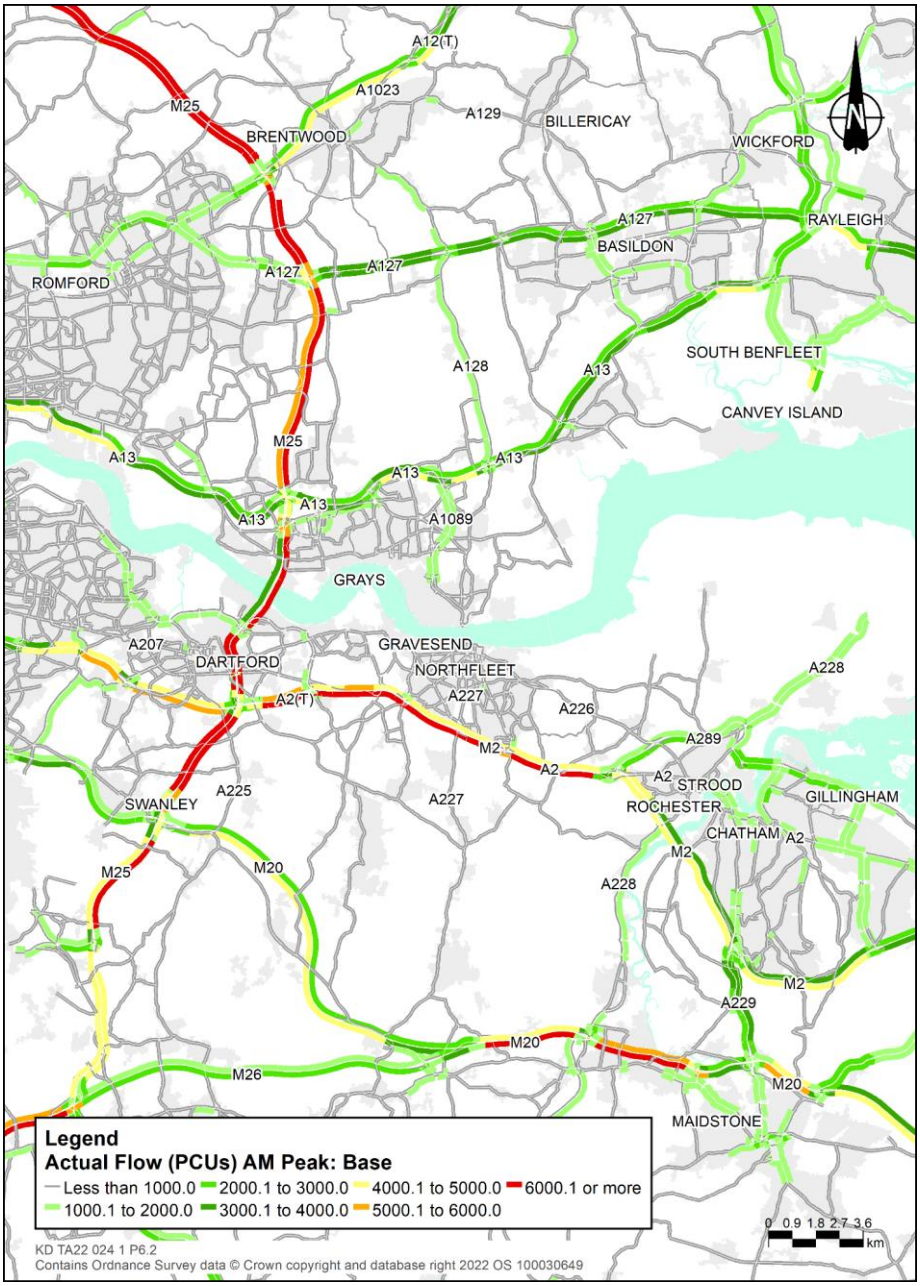


Plate 6.3 Baseline flows 2016 inter-peak

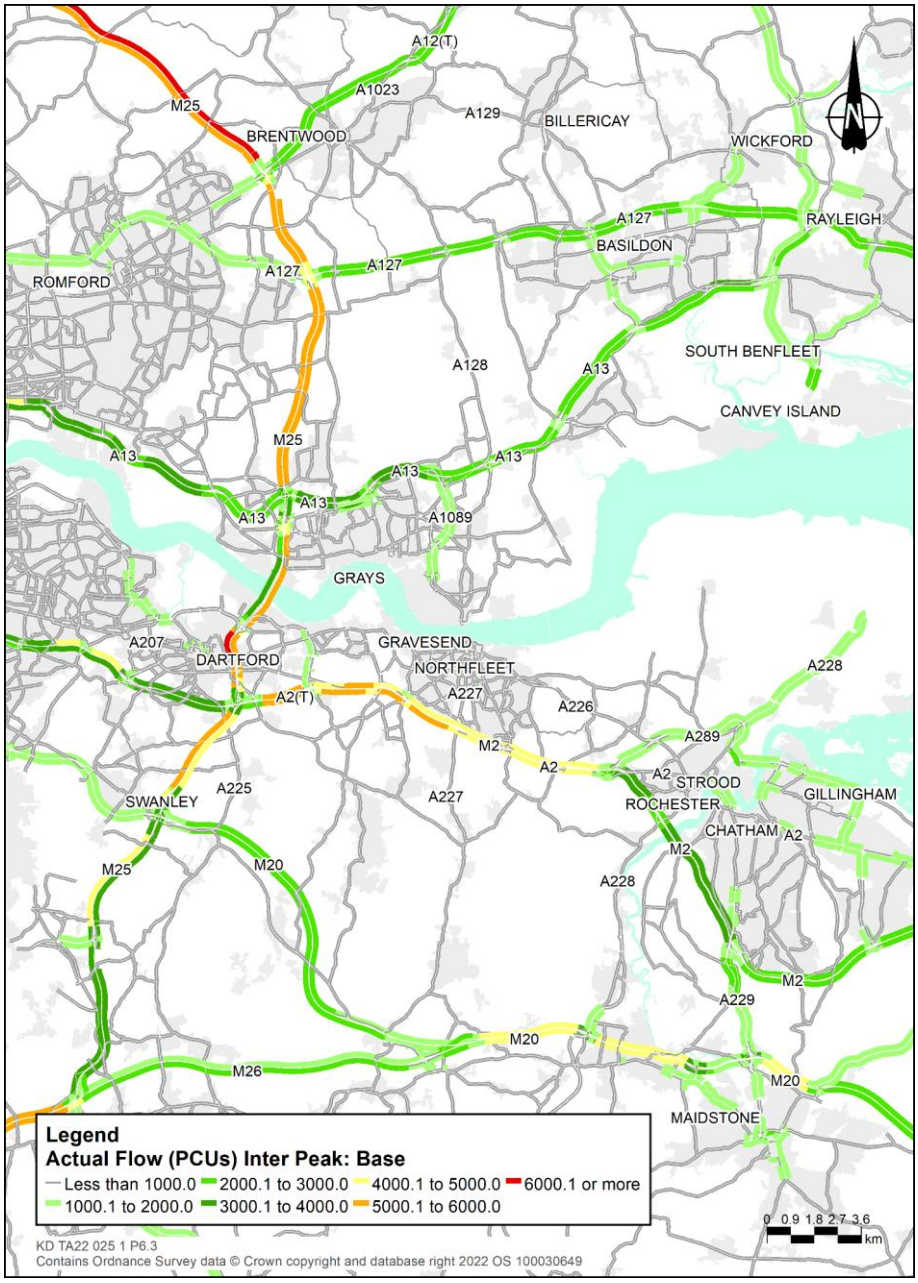
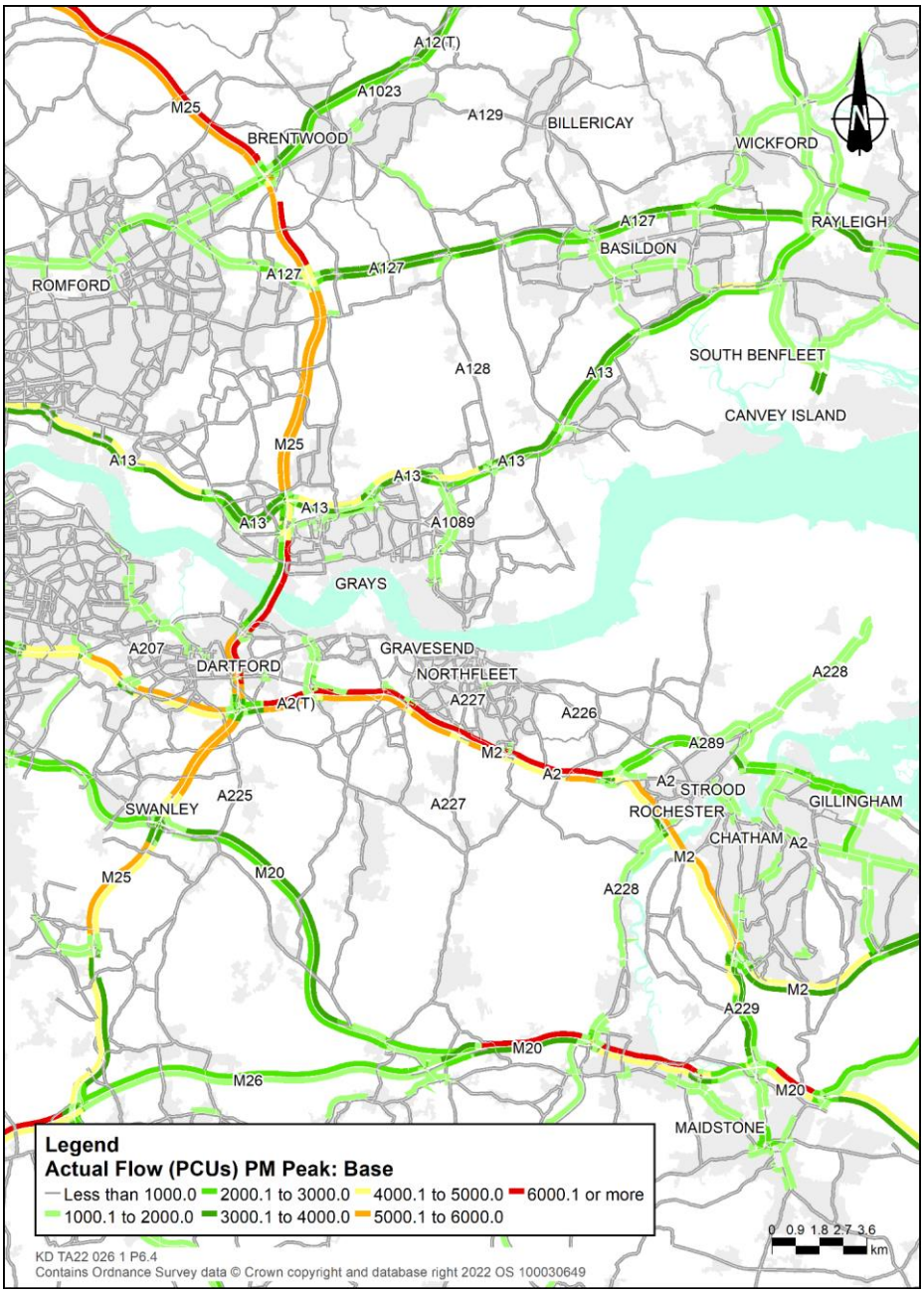


Plate 6.4 Baseline flows 2016 PM peak



6.5 Volume/Capacity

6.5.1 The relationship between the volume of traffic on a road and the capacity of the road is often expressed as a percentage, where the numbers typically lie between 0% and 100%.

6.5.2 When the number of vehicles using a road (volume) becomes closer to the number of vehicles that the road can carry (capacity), then the average speed falls and journey times become more unreliable. This begins to happen when the volume of traffic (in PCUs) is over 85% of the capacity of the road, queuing or slow-moving traffic is often observed which is likely to increase in frequency as the percentage increases.

6.5.3 Plate 6.5 to Plate 6.7 shows the volume to capacity for links near the Project during the 2016 AM peak hour, inter-peak and PM peak hour.

6.5.4 The Dartford Crossing is above 95% during the 2016 AM peak and PM peak northbound. The A2 is also above 95% westbound in the AM peak and eastbound in the PM peak.

6.5.5 Other areas where the volume to capacity is above 95% include the westbound A13 and A1306 during the AM peak. During the PM peak, this is reversed with sections along the eastbound A13 close to the junction with the M25 above 95%.

6.5.6 M25 junction 29 with the A127 is also above 95% approaching the junction from all directions, except the M25 southbound off-slip in the AM peak.

Plate 6.5 Volume to capacity 2016 AM peak (07:00–08:00)

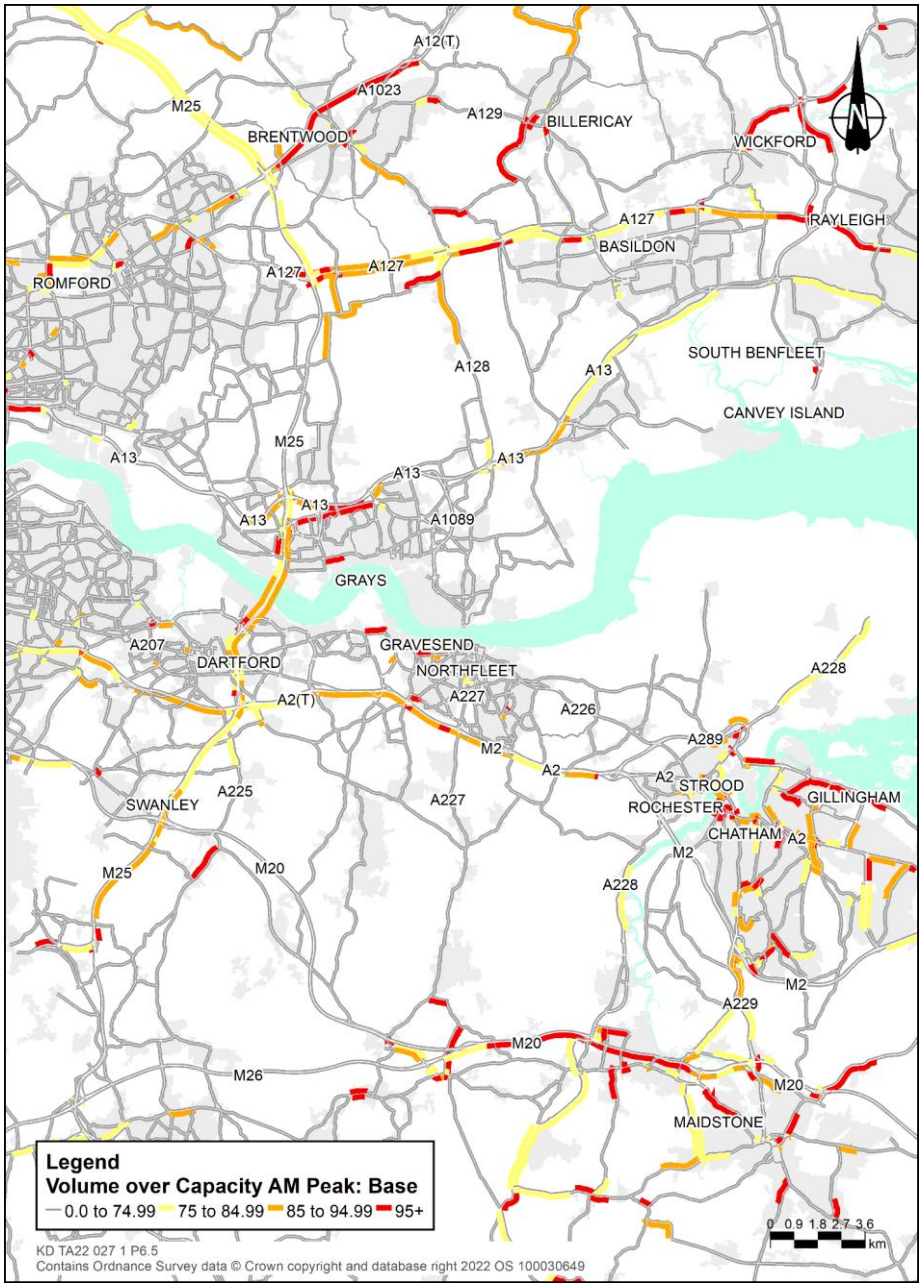


Plate 6.6 Volume to capacity 2016 inter-peak

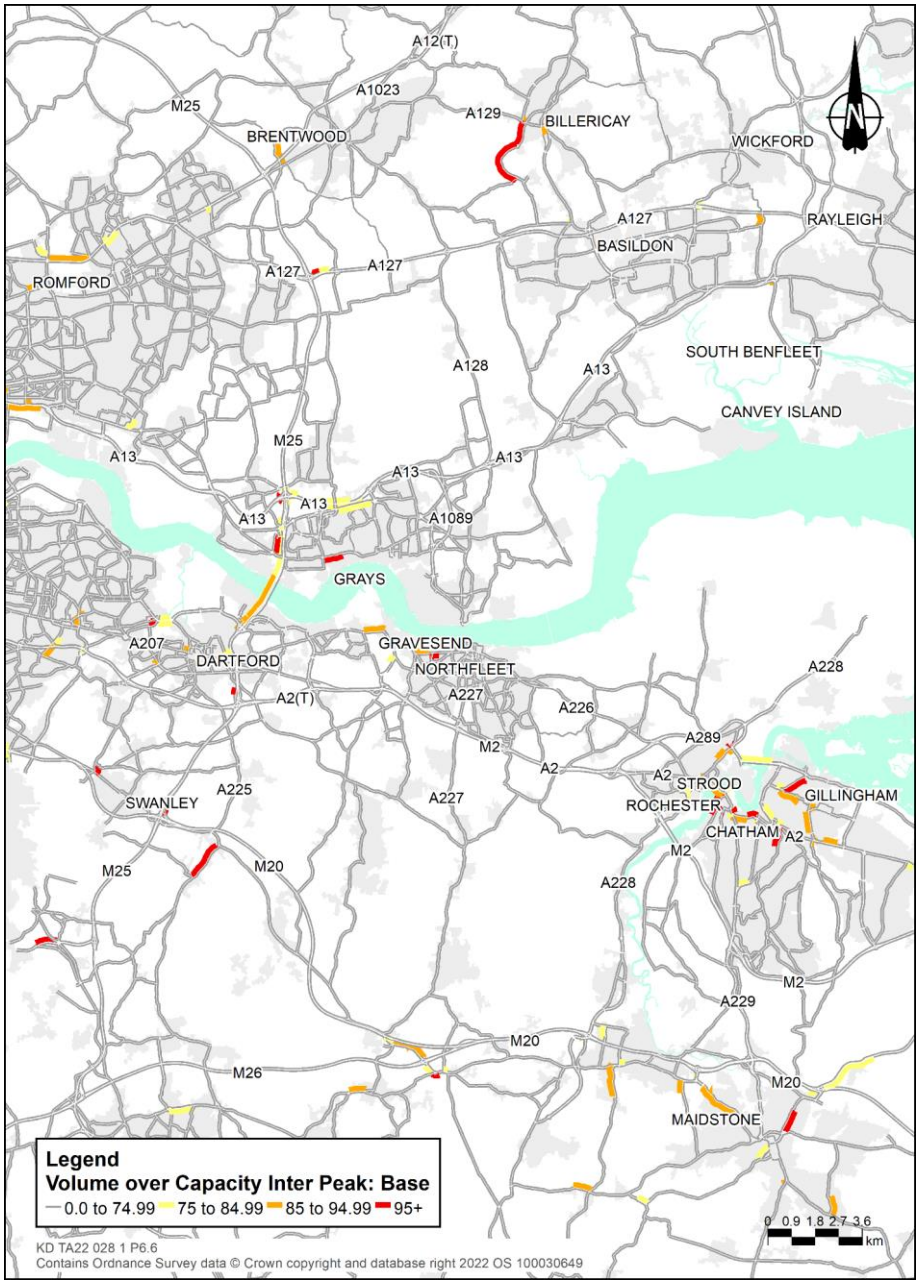
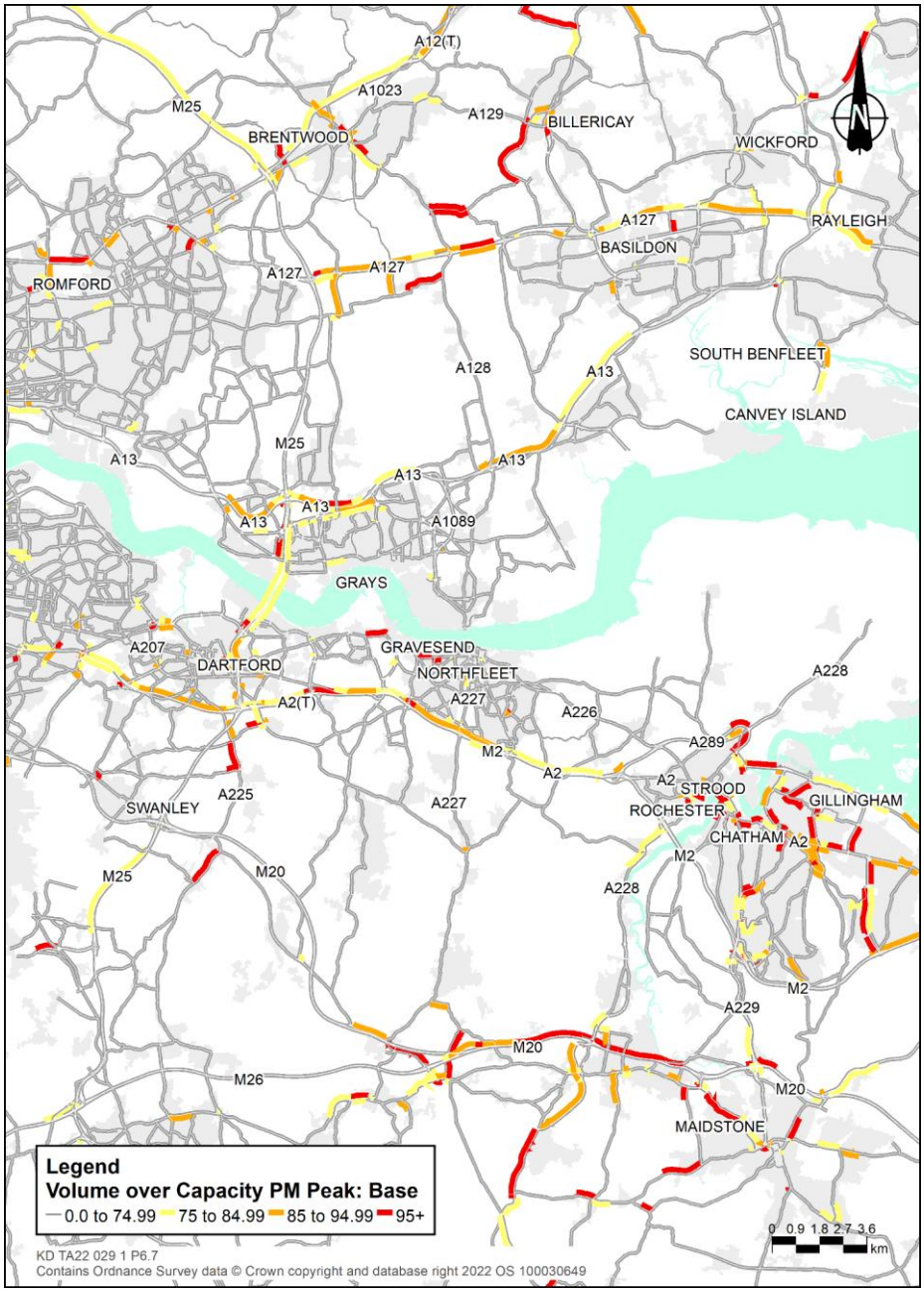


Plate 6.7 Volume to capacity 2016 PM peak (17:00-18:00)



6.6 Highway conditions near junctions with the Project

A2/M2

6.6.1 The A2 is a four-lane dual carriageway from the A282/M25 junction 2 to M2 junction 1 with six grade separated interchanges along this length at Bean (B255), Ebbsfleet (B259) and Northfleet (B262) including three junctions for Gravesend with the middle junction connecting with the A227. The A2 becomes the M2 at its junction with the A289. The M2 then continues south-east with four lanes in each direction, except through junctions (reduction to three lanes), to its junction with the A229 (junction 3). The M2 then continues south-east towards Canterbury, becoming the A2 again before Dover.

6.6.2 Plate 6.8 to Plate 6.10 display the flows near the M2/A2/A122 Lower Thames Crossing junction. In the 2016 AM peak there are flows in excess of 6,500 PCUs westbound along sections of the A2.

6.6.3 Plate 6.11 to Plate 6.13 display volume to capacity near the M2/A2/A122 Lower Thames Crossing junction. These show problems in the westbound direction along the A2 towards the M25 in the AM peak, with the volume to capacity from 85% to over 95%, depending on the section. This is also the case at the westbound slip of the junction between the A289 and the A2.

6.6.4 In the PM peak the volume to capacity is above 95% eastbound near the M25 and at the eastbound slip of the A2/A289 junction.

Plate 6.8 Baseline flows 2016 AM peak (07:00–08:00) at the M2/A2/A122 Lower Thames Crossing junction

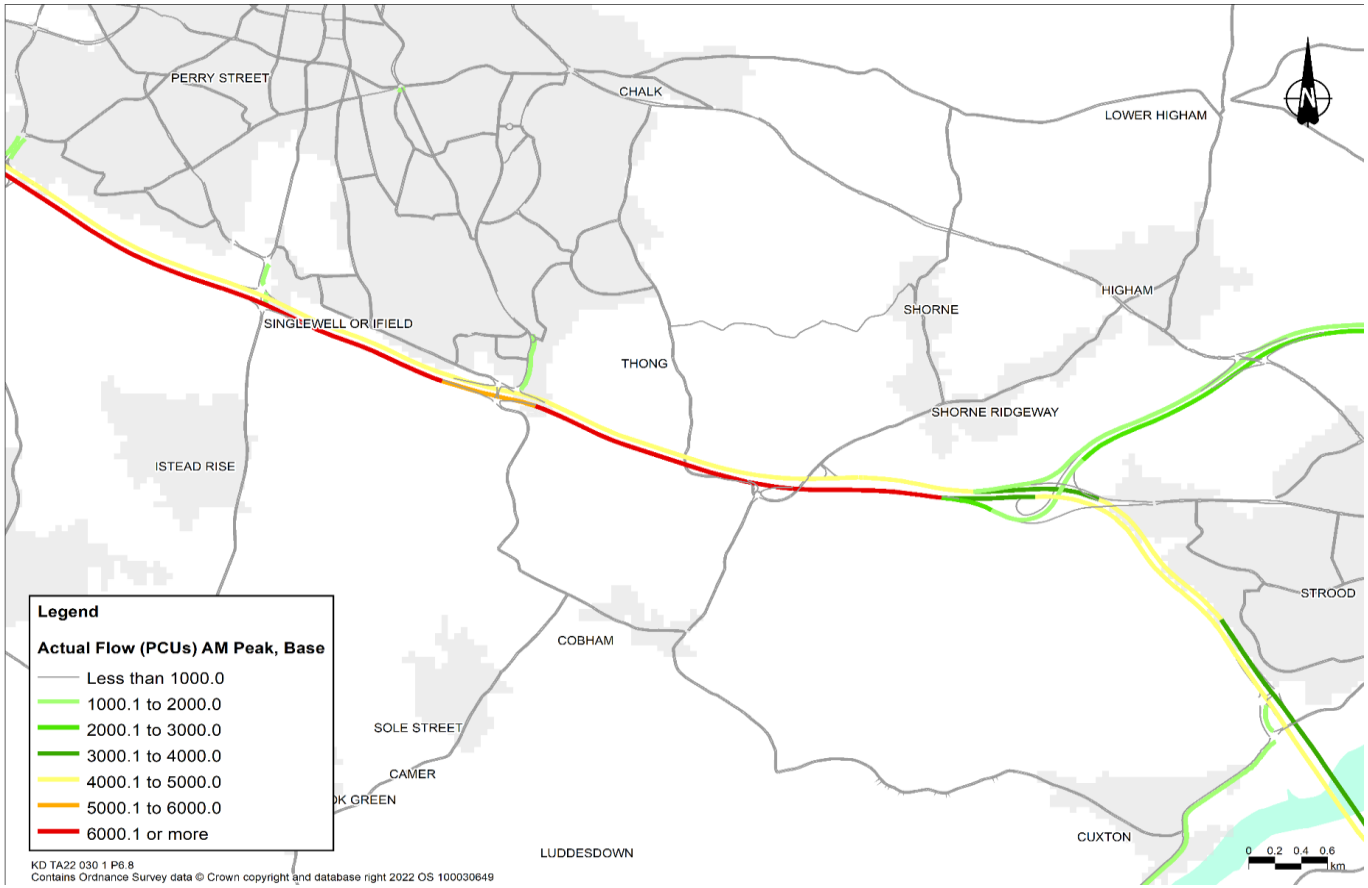


Plate 6.9 Baseline flows 2016 inter-peak at the M2/A2/A122 Lower Thames Crossing junction

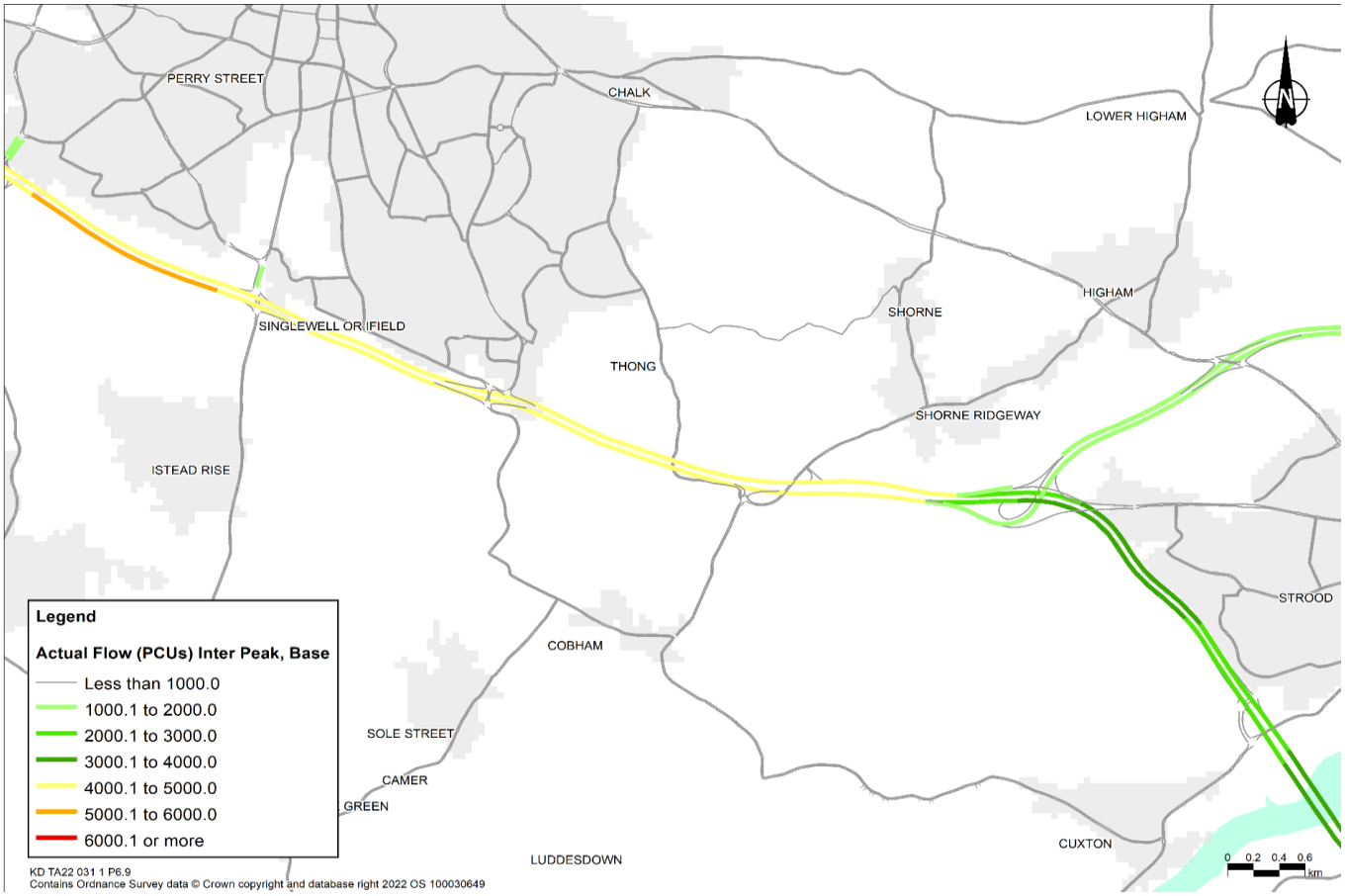


Plate 6.10 Baseline flows 2016 PM peak (17:00-18:00) at the M2/A2/A122 Lower Thames Crossing junction

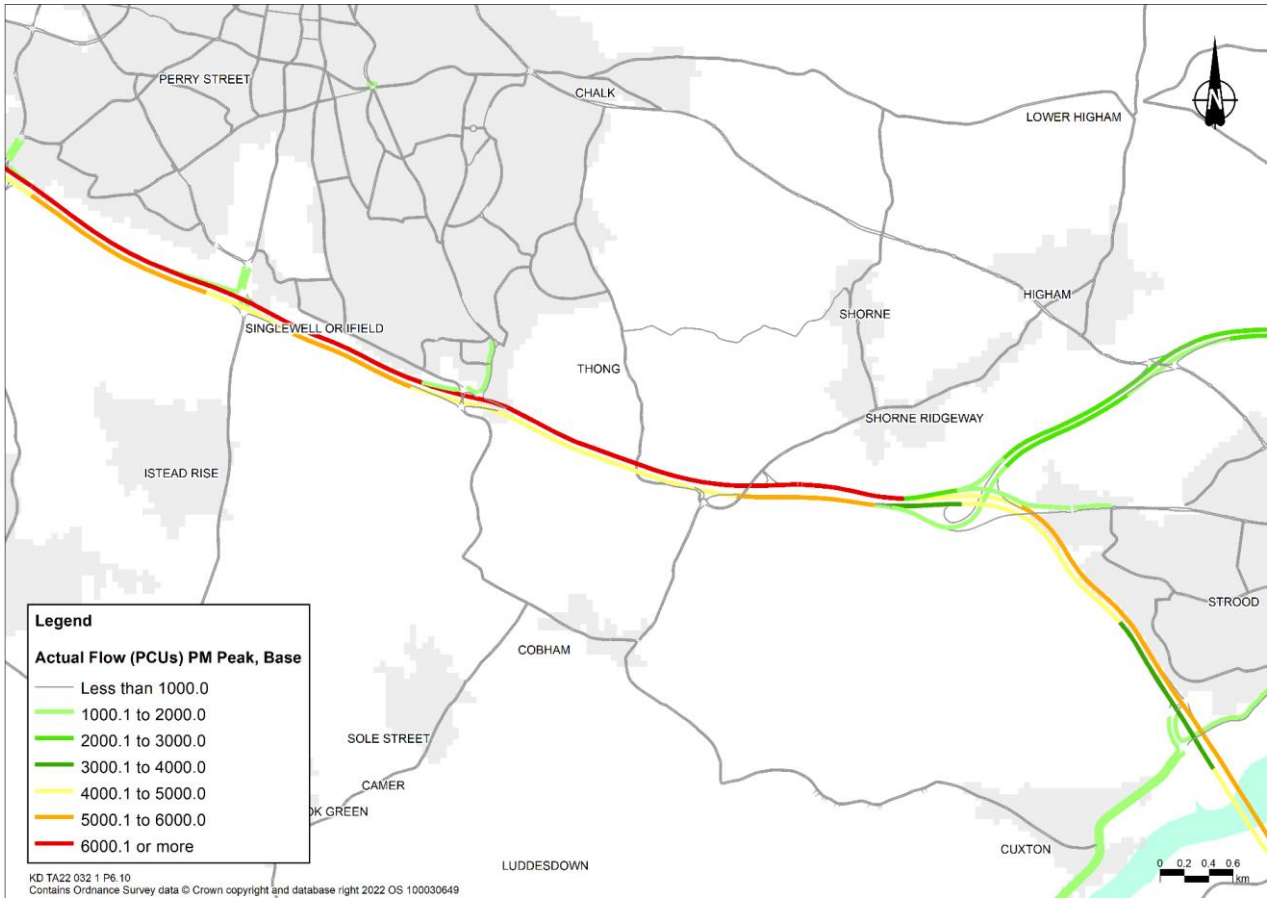


Plate 6.11 Volume to capacity 2016 AM peak (07:00–08:00) at the M2/A2/A122 Lower Thames Crossing junction

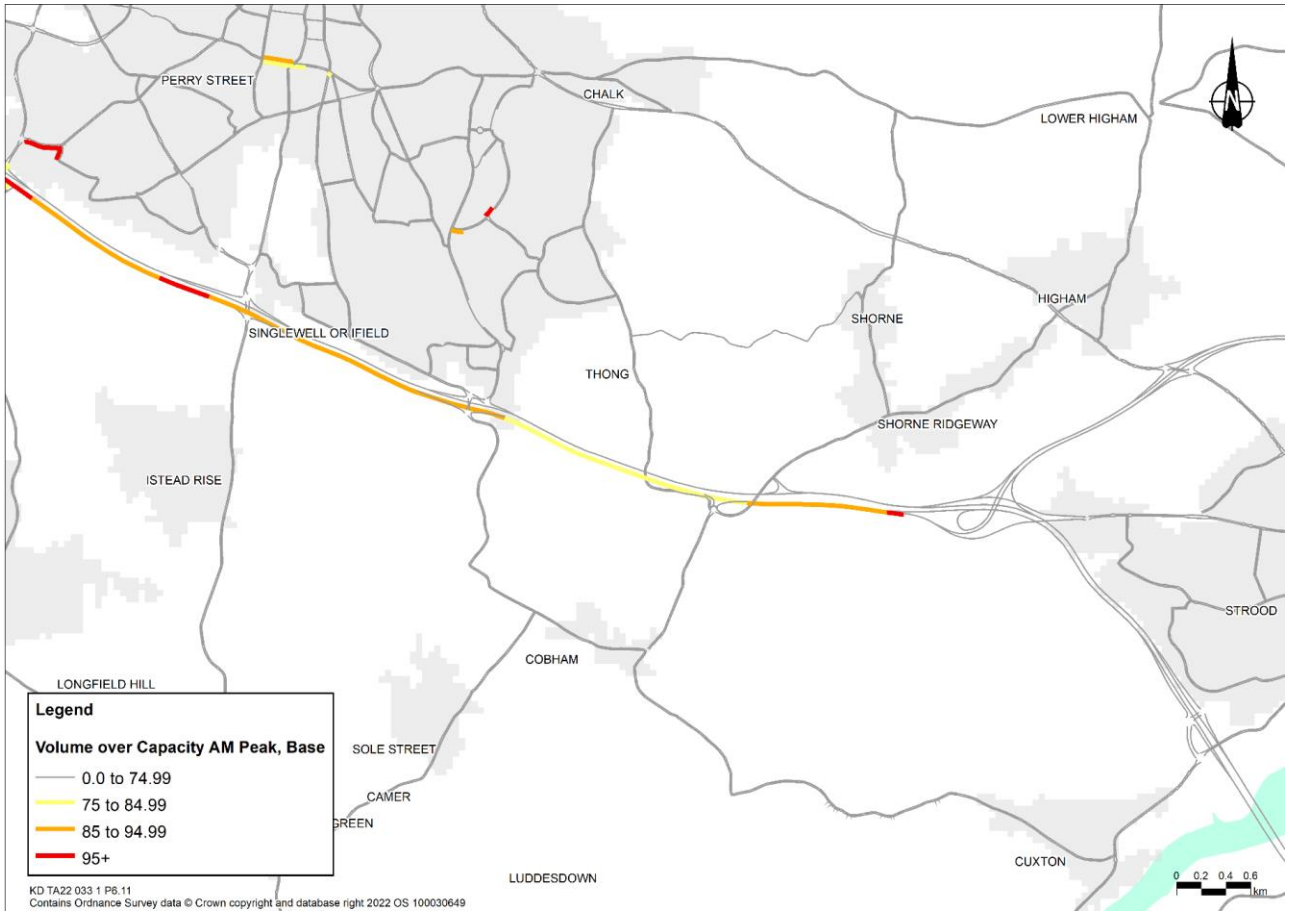


Plate 6.12 Volume to capacity 2016 inter-peak at the M2/A2/A122 Lower Thames Crossing junction

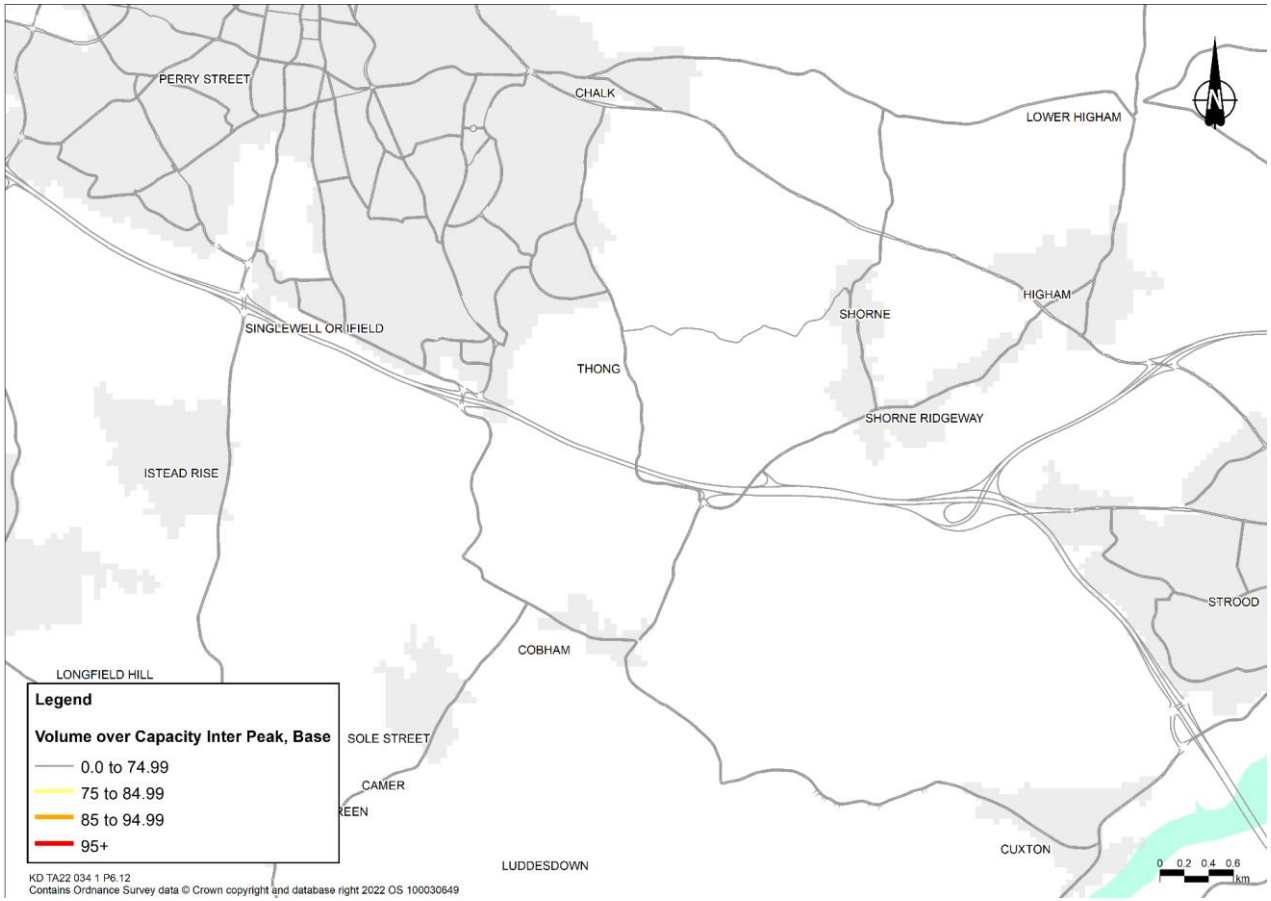
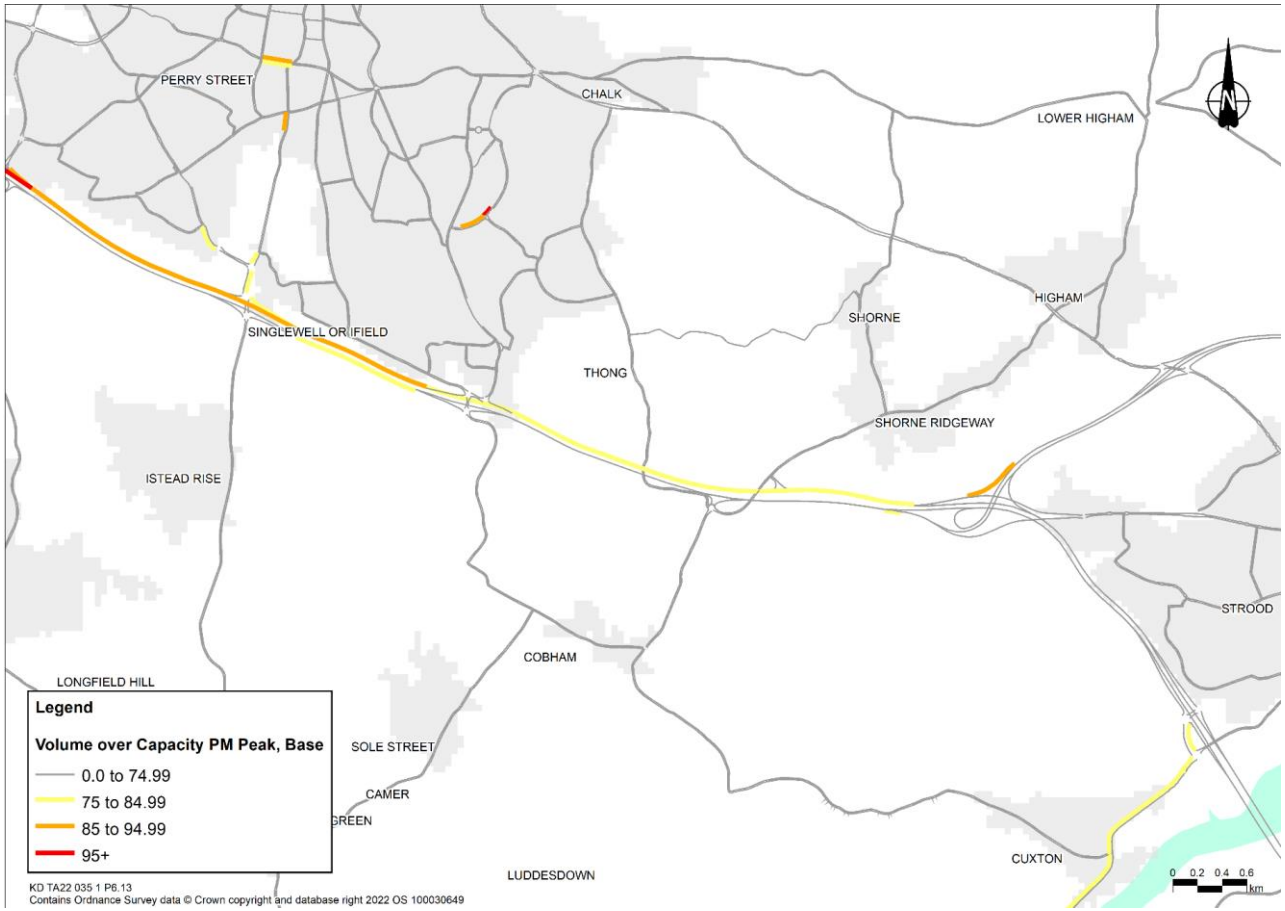


Plate 6.13 Volume to capacity 2016 PM peak (17:00-18:00) at the M2/A2/A122 Lower Thames Crossing junction



A13/A1089/A127

6.6.5 North of the River Thames there are three main A roads, the A13, A1089 and A127, near the Project. These roads form strategic commercial connections from the M25 to Tilbury Port and the London Gateway Port (DP World) and connections to towns including Basildon, Tilbury, Grays, Corringham, Southend-on-Sea and Canvey Island.

6.6.6 East of the M25 the A13 runs east-west with five grade separated interchanges along this length at the A126, A1012, A1089, A128 and A1014. The carriageway is predominantly dual three-lanes between the M25 junction 30 and the A128 junction. The section between the A128 and the A1014 is currently a two-lane dual carriageway, but Thurrock Council are in the process of widening this section to dual three-lanes. The A13 also runs west from M25 junction 30 to London. An improvement scheme on the A13 at M25 junction 30 was completed in early 2017.

6.6.7 The A1089 is a link between the A13 and Tilbury Port. The majority is two-lane dual carriageway with the southern end a single carriageway.

6.6.8 Plate 6.14 to Plate 6.16 show the baseline flows near the A13/A1089/A122 Lower Thames Crossing junction.

6.6.9 Plate 6.17 to Plate 6.19 show the volume to capacity near the A13/A1089/A122 Lower Thames Crossing junction and the A13/A128 junction.

6.6.10 In the 2016 AM peak the volume to capacity is between 85-95% in the westbound direction along the A13 before the junction with the A128. In the PM peak this is reversed, with 85-95% along the eastbound A13 near the junction with the A128.

Plate 6.14 Baseline flows 2016 AM peak (07:00–08:00) at the A13/A1089/A122 Lower Thames Crossing junction

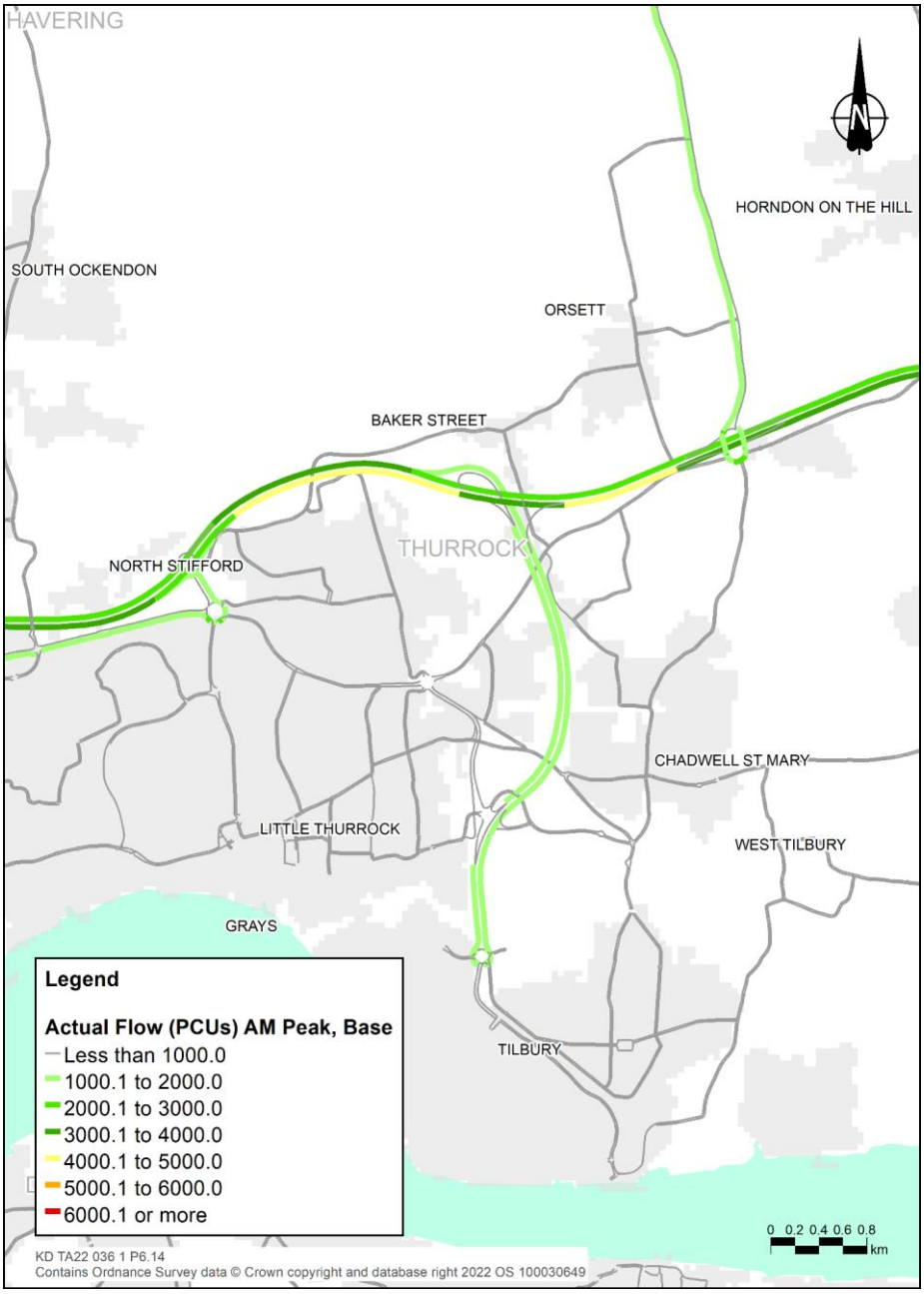


Plate 6.15 Baseline flows 2016 inter-peak at the A13/A1089/A122 Lower Thames Crossing junction

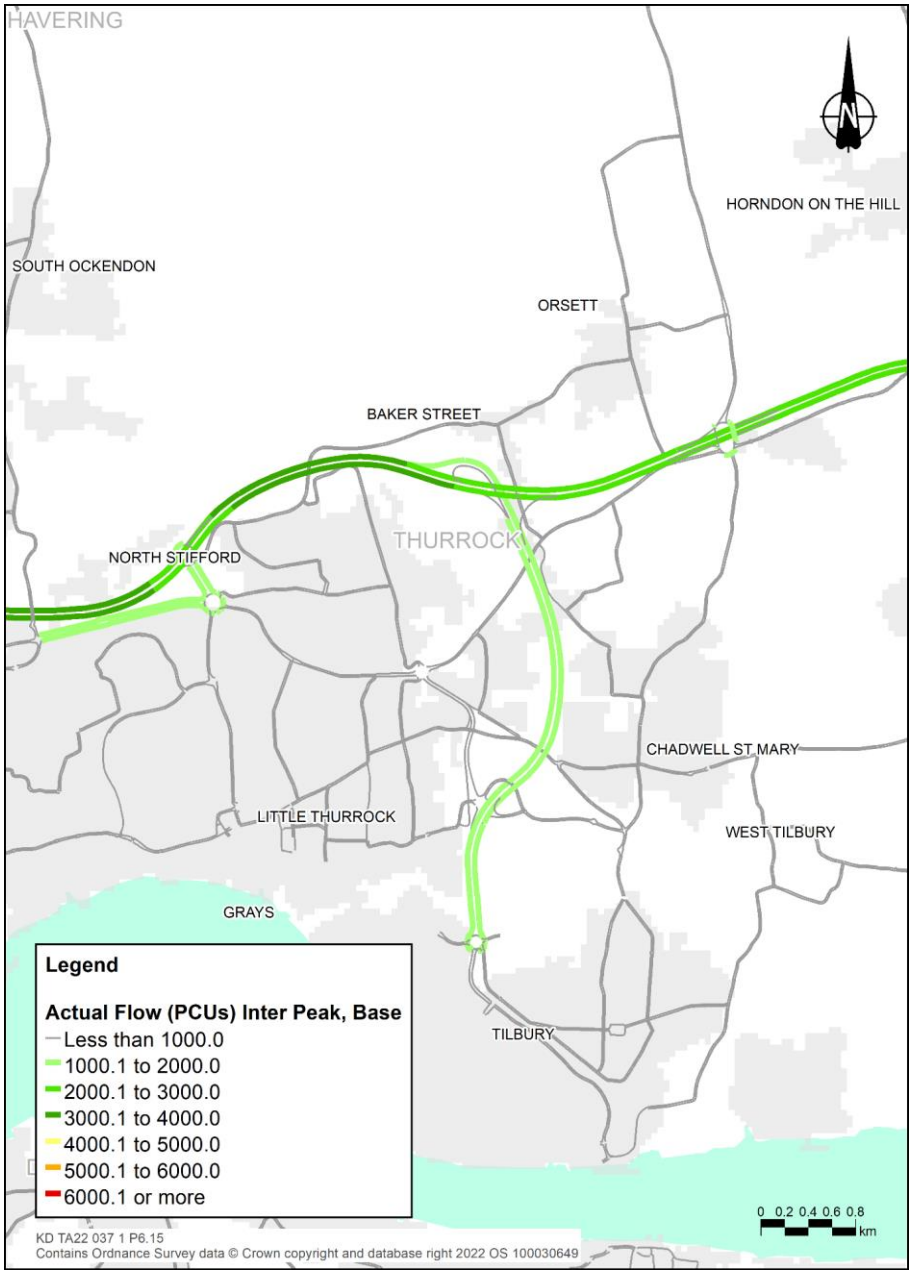


Plate 6.16 Baseline flows 2016 PM peak (17:00-18:00) at the A13/A1089/A122 Lower Thames Crossing junction

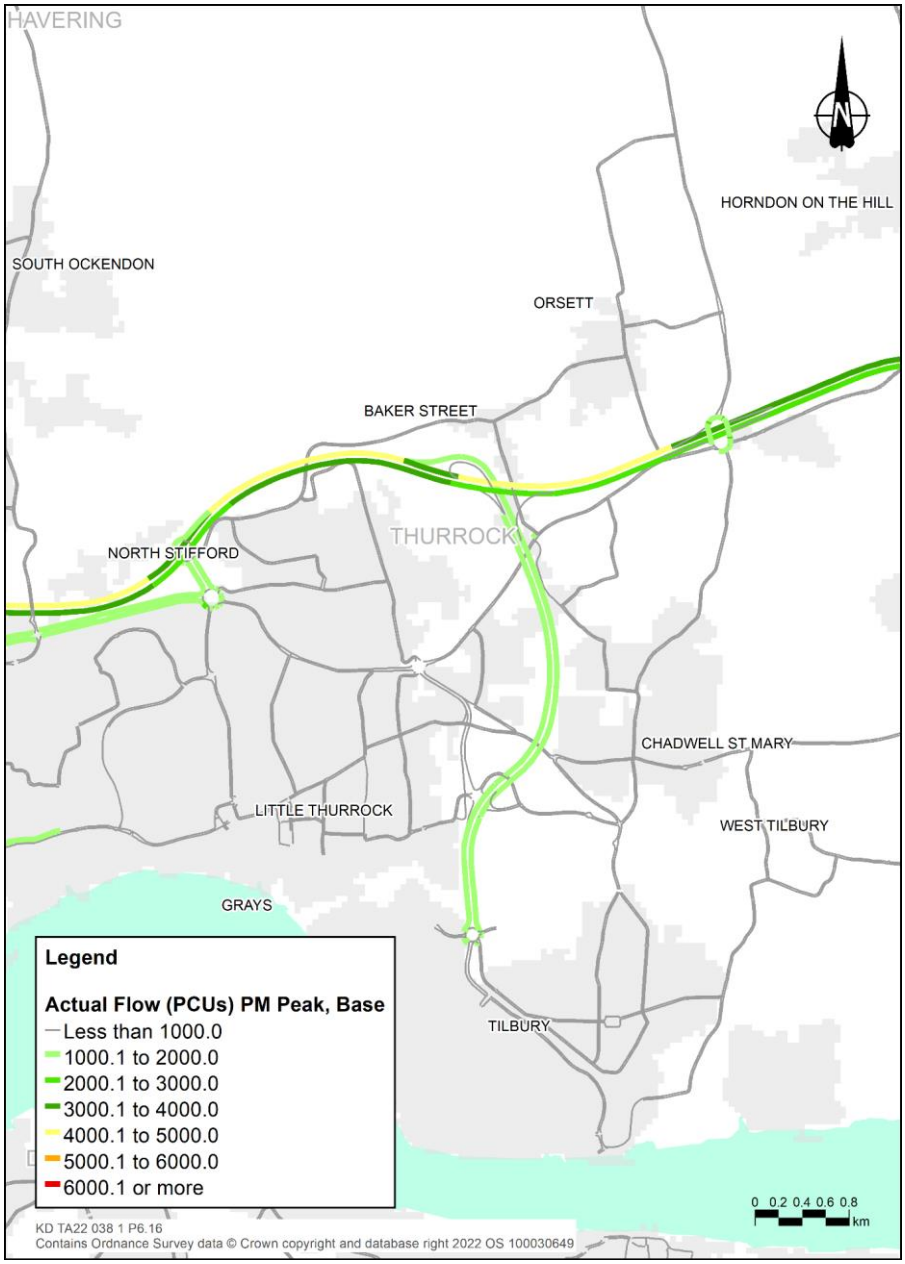


Plate 6.17 Volume to capacity 2016 AM peak (07:00–08:00) at the A13/A1089/A122 Lower Thames Crossing junction

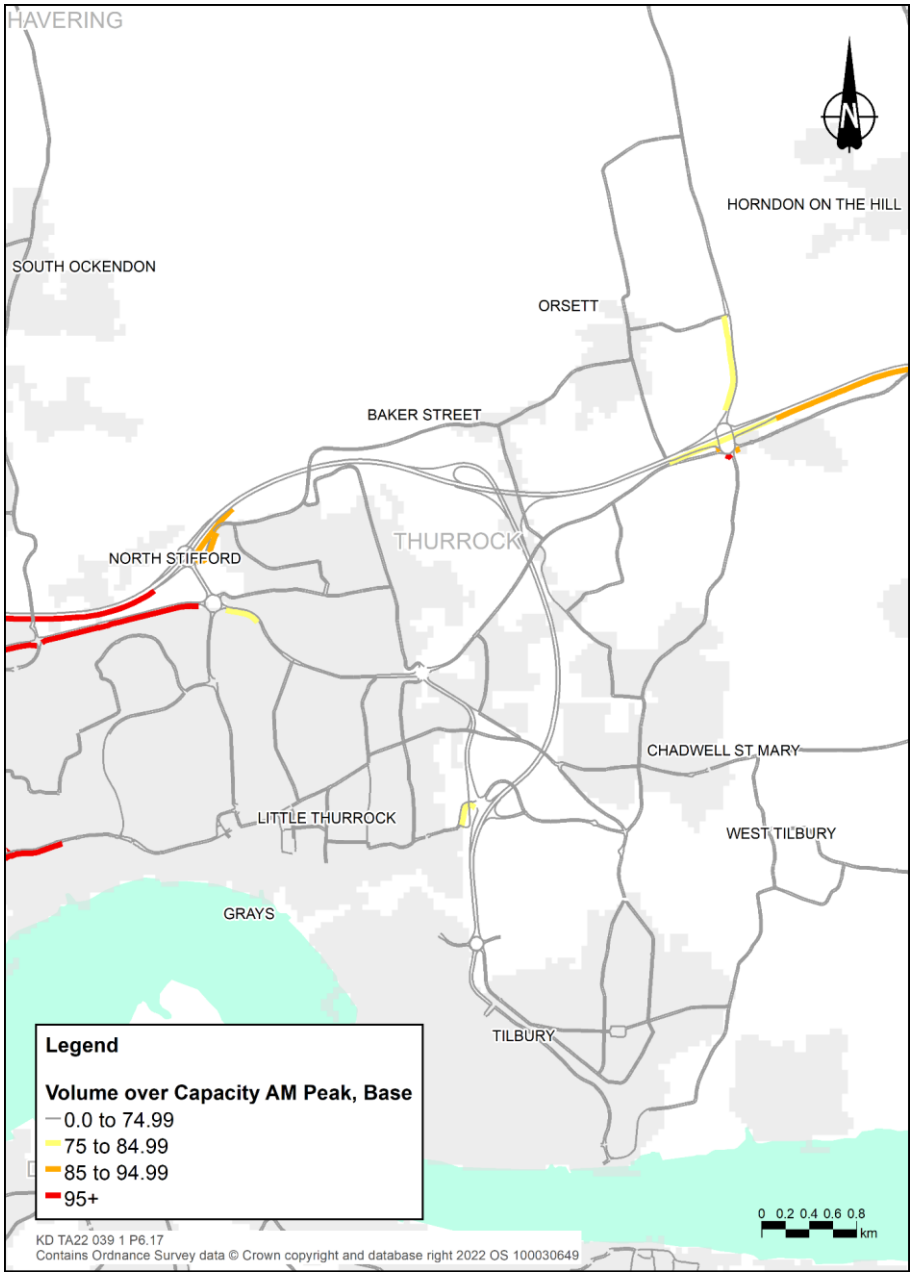


Plate 6.18 Volume to capacity 2016 inter-peak at the A13/A1089/A122 Lower Thames Crossing junction

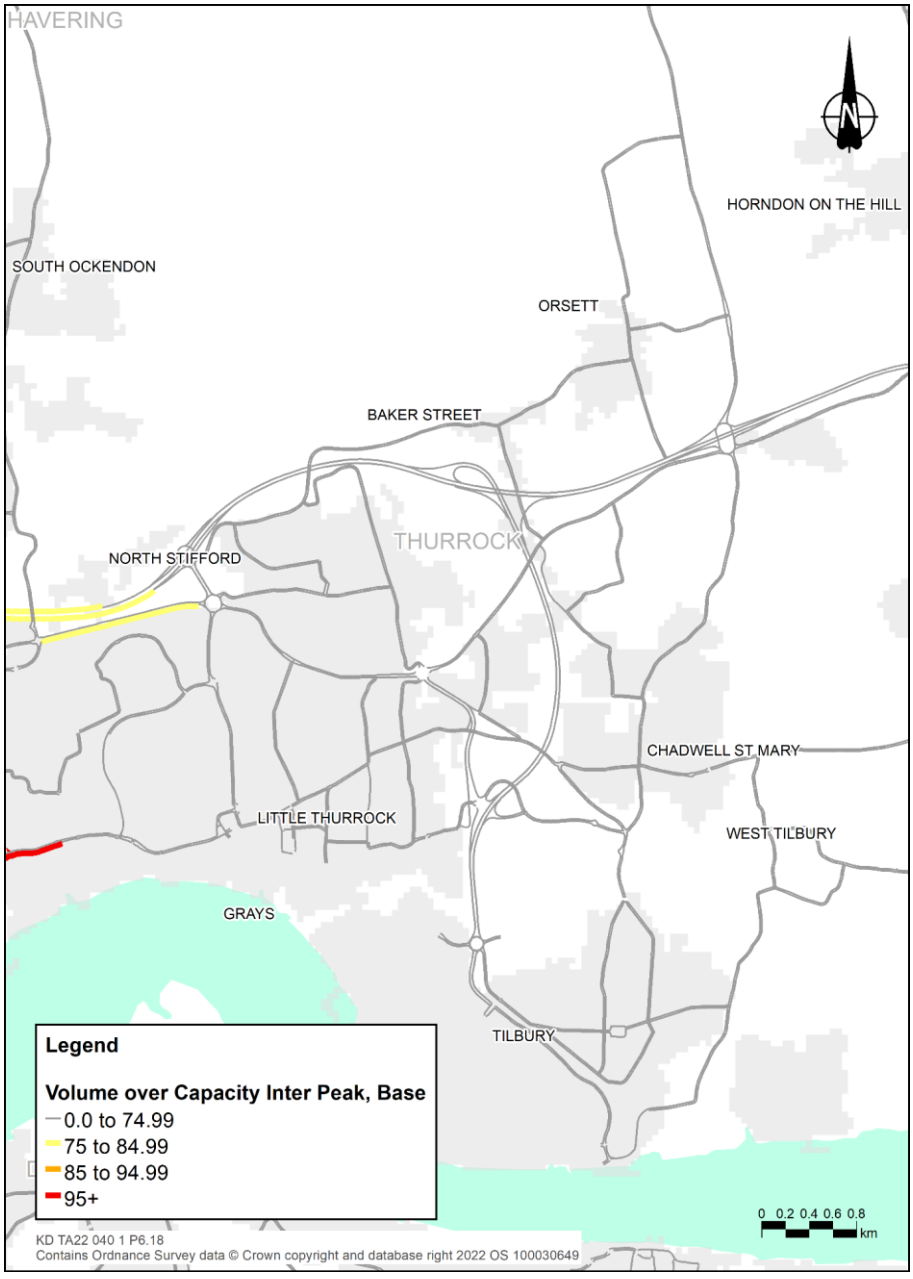
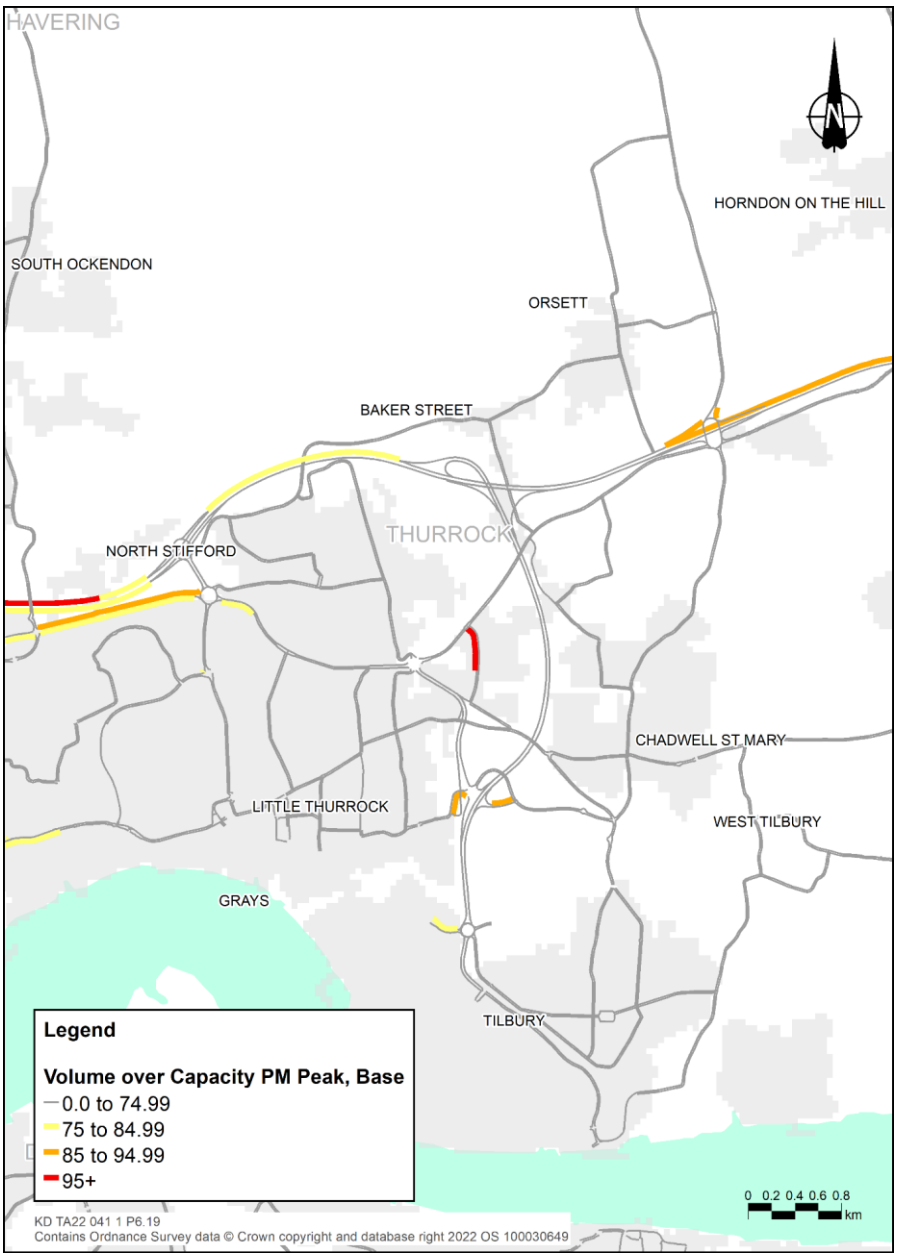


Plate 6.19 Volume to capacity 2016 PM peak (17:00-18:00) at the A13/A1089/A122 Lower Thames Crossing junction



M25

6.6.11 The M25 is, as expected, the route with the highest recorded baseline flows near the Project. Plate 6.20 to Plate 6.22 display these baseline flows.

6.6.12 There are link flows in excess of 6,500 PCUs/hour in each direction along the M25 in the 2016 AM peak hour between junctions 27, 28 and 29, which are the junctions with the M11, A12 and A127 respectively. To the south of junction 29 there are recorded flows of between 5,500-6,500 PCUs/hour in each direction during the AM peak.

6.6.13 In the 2016 PM peak, flows of over 6,500 PCUs/hour are recorded in the clockwise direction between junction 29 to junction 27, whilst in the anti-clockwise direction, the flows are between 5,500-6,500 PCUs/hour.

6.6.14 Volume to capacity in excess of 95% are recorded for the approaches to junction 28 in the AM peak, with the exception of the northbound off-slip from the M25. The slips from and to the A127 at M25 junction 29 are also in excess of 95%, with the exception of the southbound off-slip. The eastbound slip onto the A127 is also over 95%.

6.6.15 In the PM peak the situation is improved, however the slip road to the A127 eastbound from junction 29 is shown as above 95%. At junction 28 with the A12 the approaches from the M25 southbound and A12 westbound are between 85% to 95%. The volume to capacity for the network are shown in Plate 6.23 to Plate 6.25.

Plate 6.20 Baseline flows 2016 AM peak (07:00–08:00) at the A122 Lower Thames Crossing/M25 junction

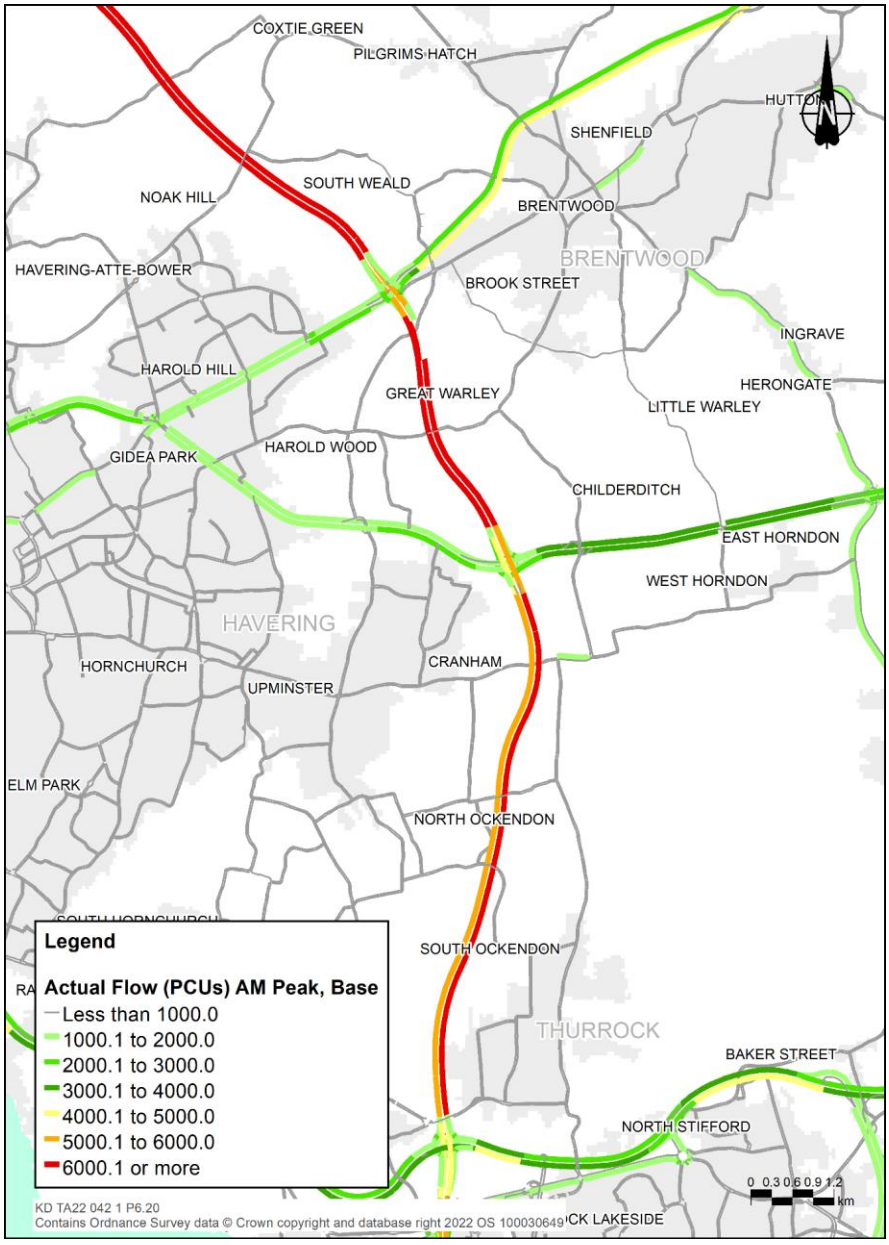


Plate 6.21 Baseline flows 2016 inter-peak at the A122 Lower Thames Crossing/M25 junction

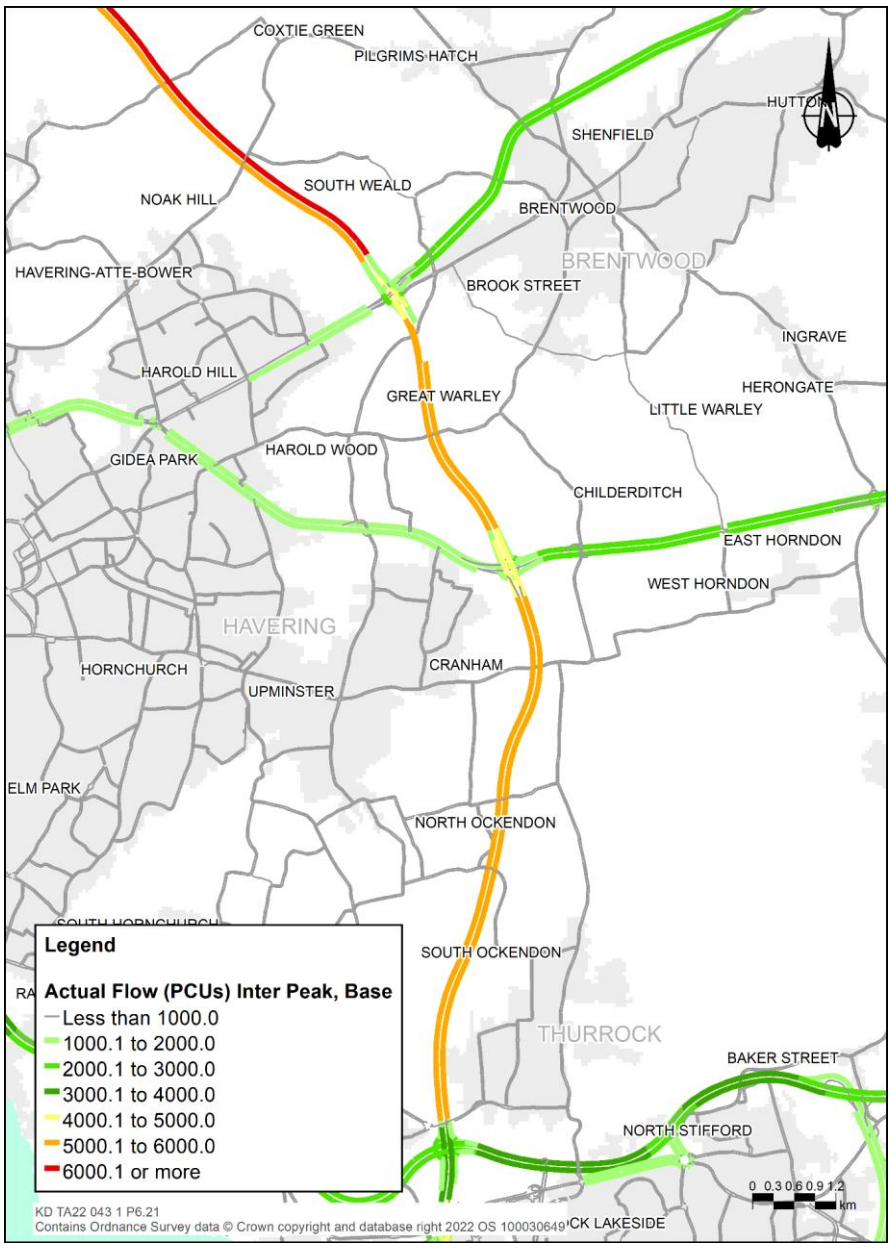


Plate 6.22 Baseline flows 2016 PM peak (17:00-18:00) at the A122 Lower Thames Crossing/M25 junction

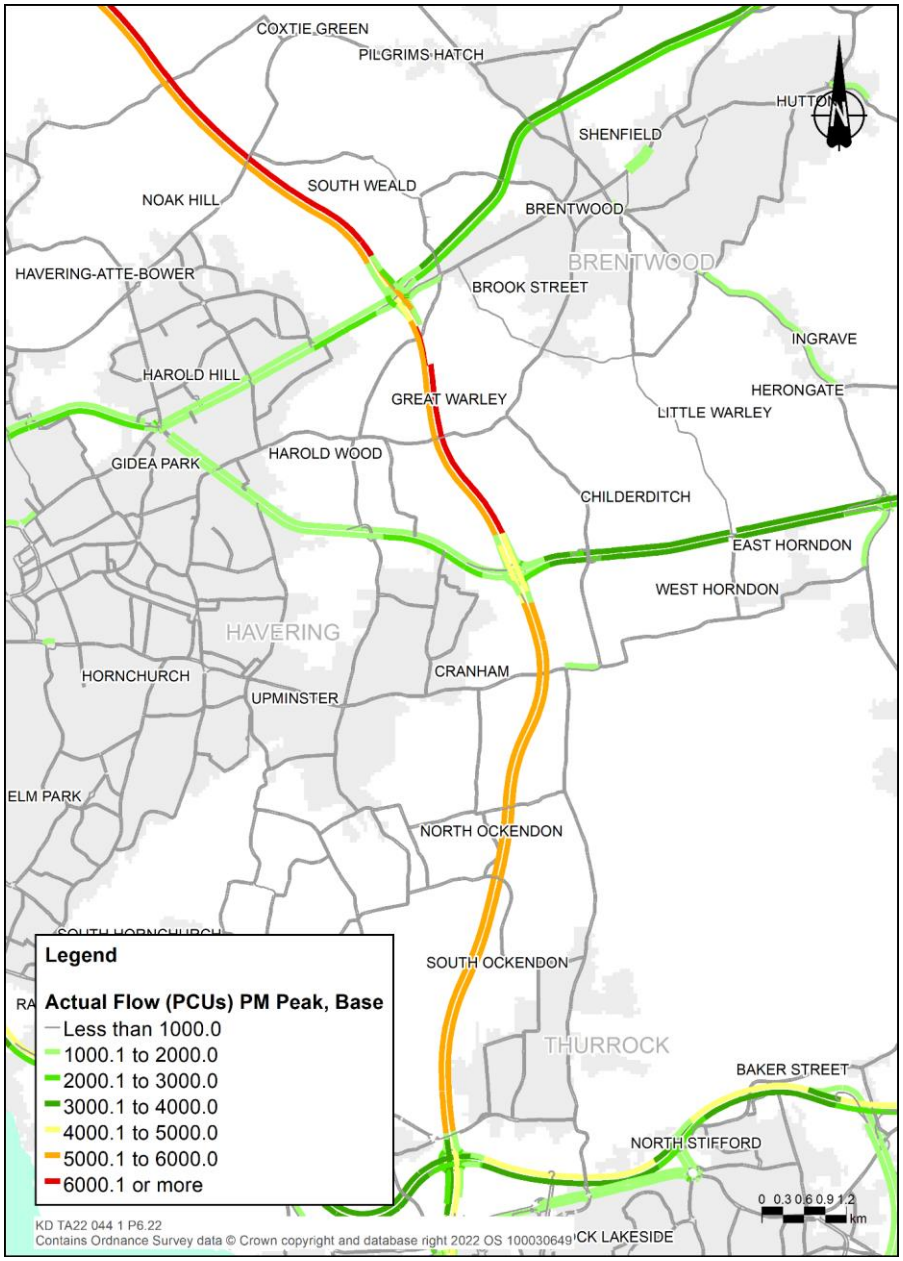


Plate 6.23 Volume to capacity 2016 AM peak (07:00–08:00) at the A122 Lower Thames Crossing/M25 junction

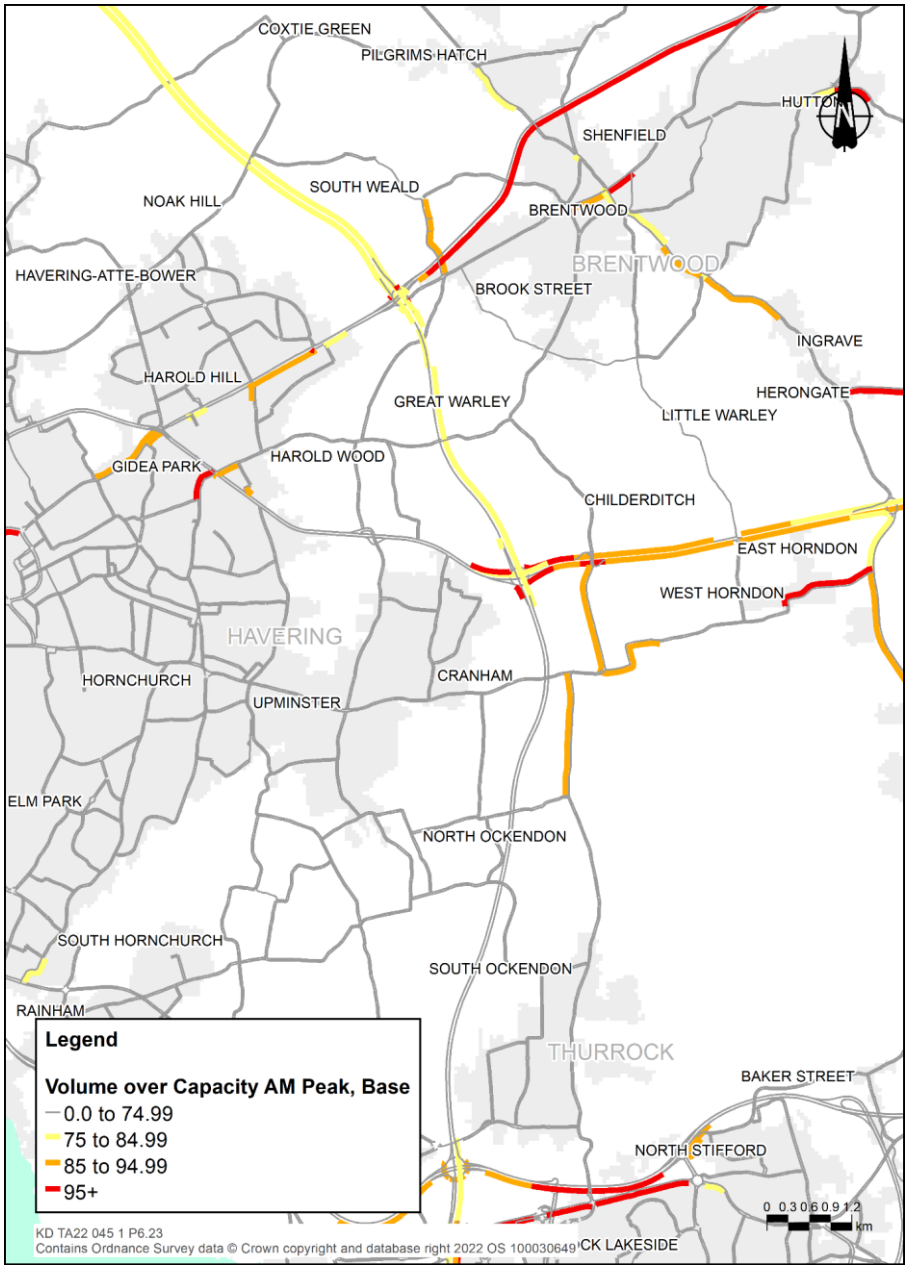


Plate 6.24 Volume to capacity 2016 inter-peak at the A122 Lower Thames Crossing/M25 junction

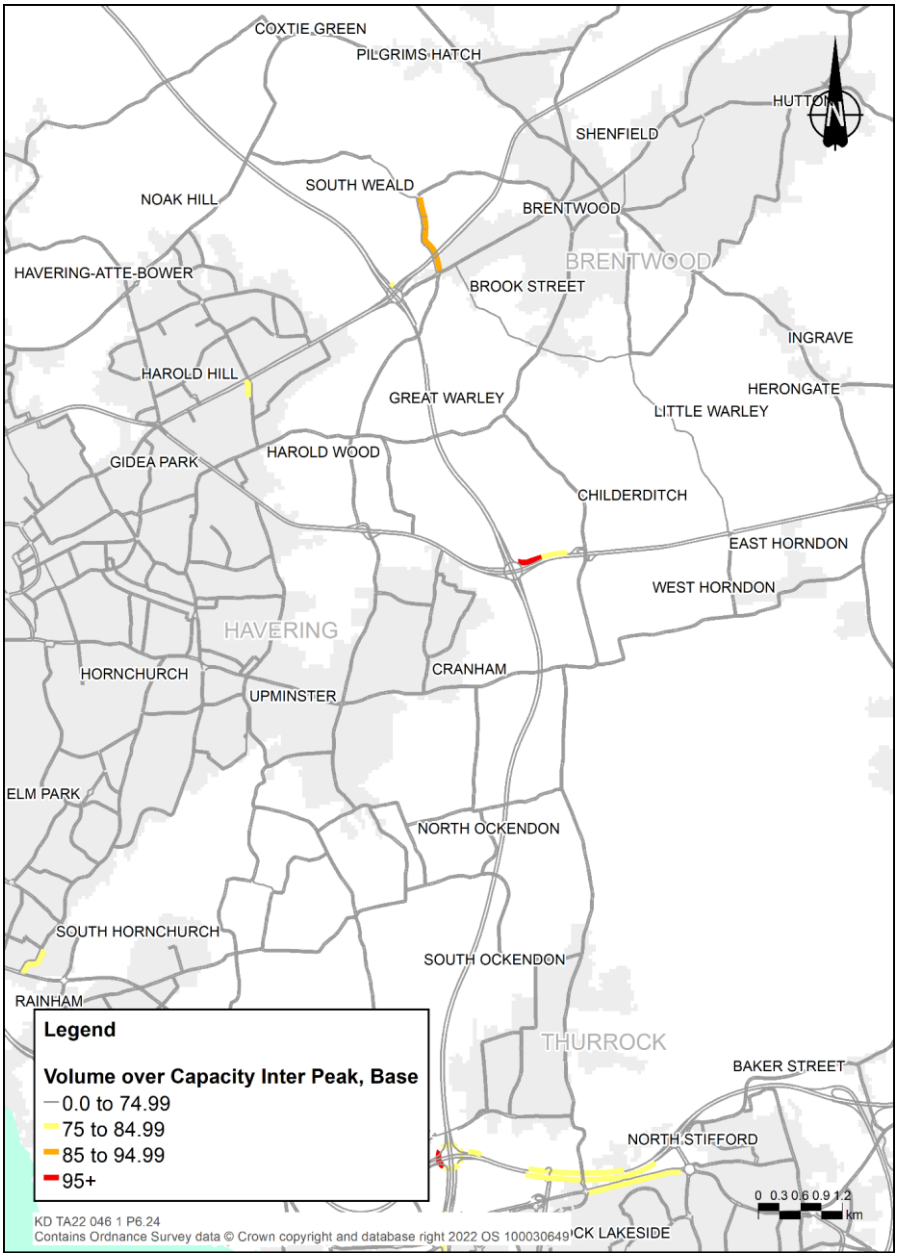
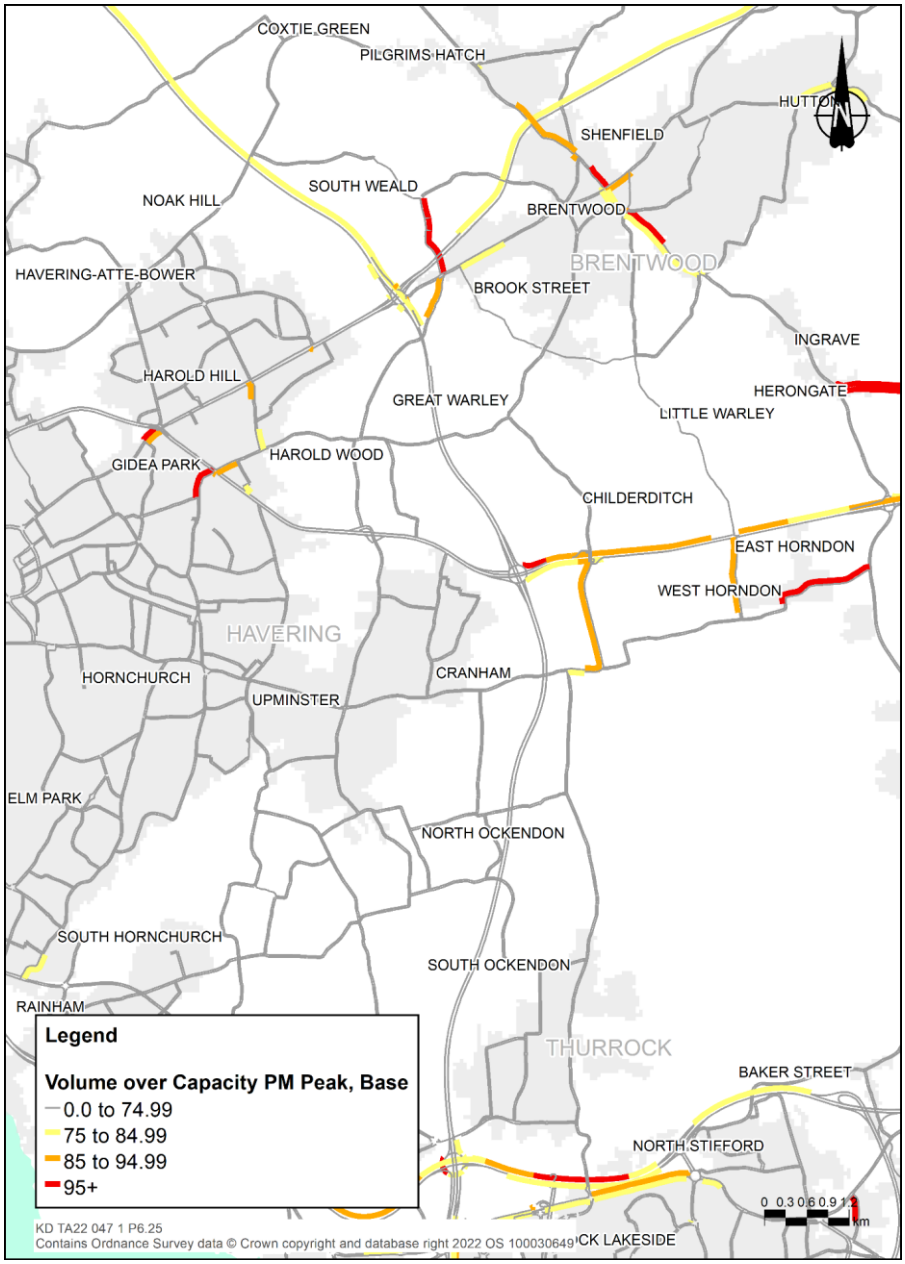


Plate 6.25 Volume to capacity 2016 PM peak (17:00-18:00) at the A122 Lower Thames Crossing/M25 junction



Abnormal routes

High load routes

6.6.16 There are no national high load routes near the Project.

6.6.17 The current headroom clearances at existing structures on the M25 are not sufficient to accommodate 'high' loads.

6.6.18 There are three local high load routes near the Project:

a. Dartford to Higham (along A226 between Chalk and A289).

b. M25 junction 30 to London Gateway Port via A13 and A1014.

c. M25 junction 30 to Tilbury Docks via the A13 and A1089.

6.6.19 The maintained headroom to all structures along these routes is 5.5m.

Heavy load routes

6.6.20 The heavy load routes near the Project are shown in Plate 6.26. There are currently two national heavy load routes carried by the Dartford Crossing: the HR93 Tilbury (Docks) to Bexley (Substation) and the HR156 M25 (a complete circuit from junction 1a to junction 1a).

6.6.21 These routes can accommodate abnormal heavy load vehicles. These are vehicles either exceeding 44,000kg or with an axle load of more than 10,000kg for a single non-driving axle and 11,500kg for a single driving axle.

6.6.22 There are four national heavy load routes near the proposed route of the Project:

a. HR80a M25 junction 29 Cranham to Rayleigh (Substation A).

b. HR80b M25 junction 29 Cranham to Rayleigh (Substation B).

c. HR210 Tilbury Docks to Tilbury Power Station.

d. HR212 Dartford Crossing to Littlebrook Power Station via A206 and B2228.

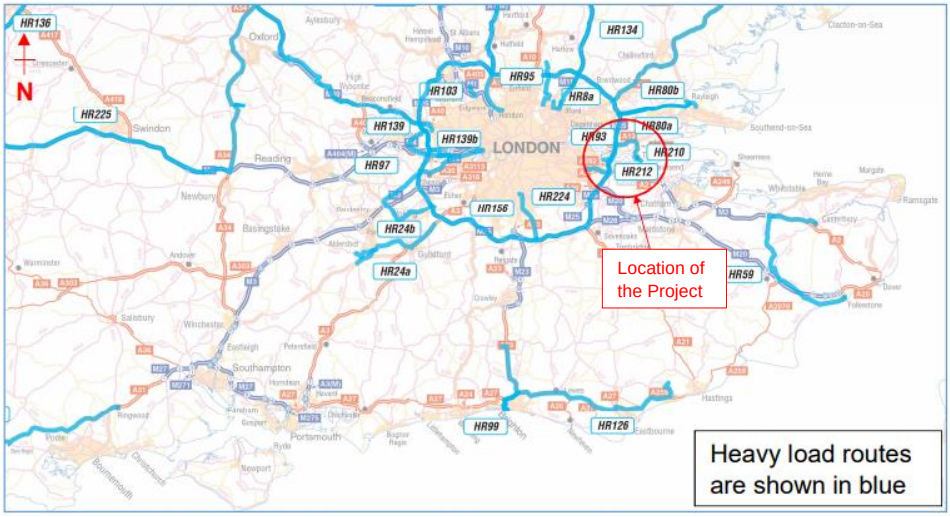
6.6.23 In addition, there are three local heavy load routes in Thurrock near the proposed route of the Project:

a. M25 junction 30 to London Gateway Port via the A13 and A1014.

b. South of Ockendon to the M25 via B186 Fen Lane, A128 and A127.

c. M25 junction 30 to Basildon via the A13.

Plate 6.26 Heavy load routes near the Project



6.7 Railways

6.7.1 The assessment considers all railway lines that are either crossed by the proposed alignment or within close proximity of the Project. These are the following:

a. The North Kent railway line from London Charing Cross to Strood which is used by Southeastern services from Kent into London and Thameslink services which run from Kent and cross London to Bedford.

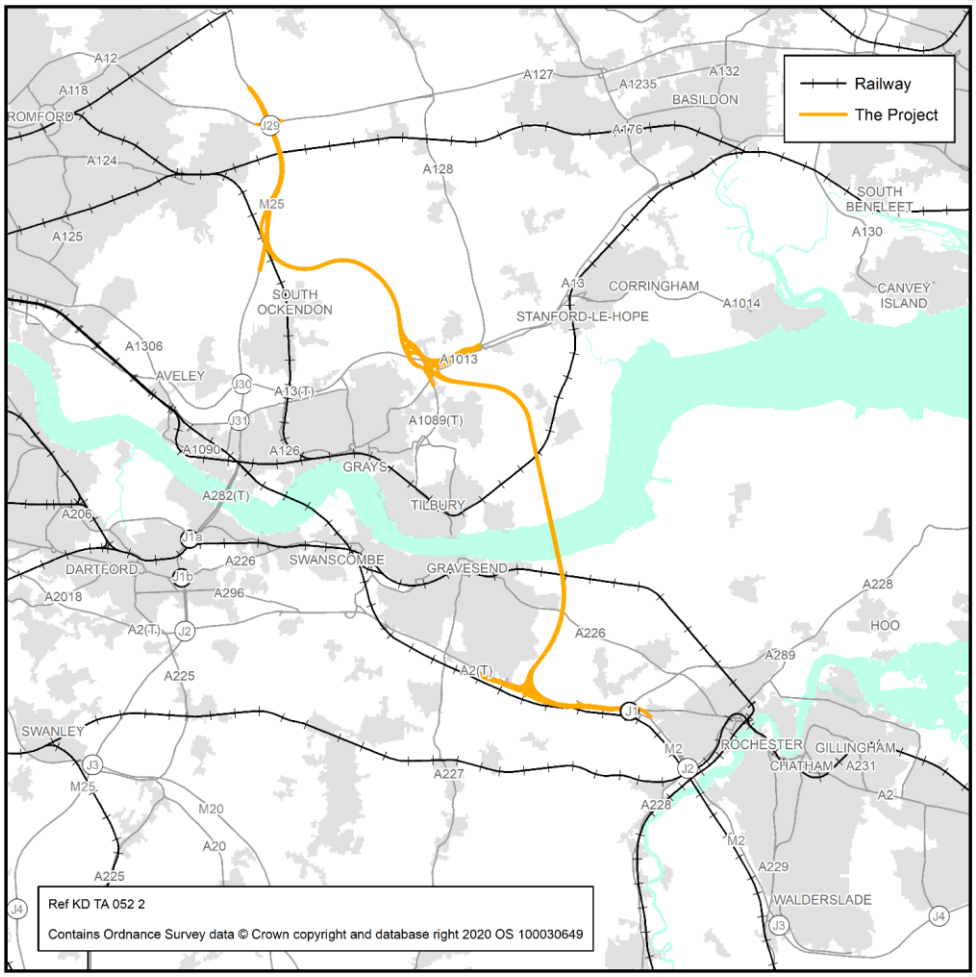
b. The HS1 railway line from London St Pancras to destinations in Kent (Southeastern highspeed) and Europe (Eurostar).

c. The Upminster and Grays Branch/Tilbury Loop railway line from Fenchurch Street to Southend Central which is used by C2C railway services from Essex into London via Grays.

d. The Shoeburyness railway line from Fenchurch Street to Shoeburyness which is used by C2C railway services from Essex into London via Basildon.

6.7.2 The existing railway lines are illustrated in Plate 6.27.

Plate 6.27 Existing railway lines



6.7.3 The frequency of rail services for these three railway lines and other nearby railway services are tabulated in Table 6.2.

Table 6.2 Frequency of rail services (August 2022)

Station	Route	Frequency
Upminster	London Underground District Line	6 trains per hour (tph) to Richmond 6tph to Ealing Broadway
	London Overground Romford-Upminster	2tph to Romford
	C2C London-Tilbury-Southend/Shoeburyness	4tph London Fenchurch Street 2tph Shoeburyness via Basildon 4tph Southend Central (2tph via Ockendon)
Ockendon	C2C London-Tilbury-Southend	2tph London Fenchurch Street 2tph Southend Central
Chafford Hundred Lakeside	C2C London-Tilbury-Southend	2tph London Fenchurch Street 2tph Southend Central
Purfleet	C2C London-Tilbury-Southend	2tph London Fenchurch Street 2tph Grays
Grays	C2C London-Tilbury-Southend	4tph London Fenchurch Street of which: • 2tph via Rainham (Essex) • 2tph via Ockendon • 2tph Southend Central
Tilbury Town	C2C London-Tilbury-Southend	2tph London Fenchurch Street via Ockendon 2tph Southend Central
East Tilbury	C2C London-Tilbury-Southend	2tph London Fenchurch Street via Ockendon 2tph Southend Central
Gravesend	Southeastern Highspeed	2tph High Speed to London St Pancras 2tph High Speed to Faversham (1tph extended to Margate, Ramsgate)
	Southeastern Charing Cross-Gravesend	2tph London Charing Cross via Sidcup
	Thameslink Luton-Rainham (Kent)	2tph Luton 2tph Rainham (Kent)
Ebbsfleet International	Southeastern Highspeed	3tph London St Pancras 1tph Dover Priory or Sandwich via Ashford International 1tph Margate via Ashford International and Canterbury West 1tph Faversham or Ramsgate via Gravesend

6.7.4 The equivalent total off-peak and peak services are as identified in Table 6.3 on the three railway lines.

Table 6.3 Frequency of train services on lines bisected by the Project (August 2022)

Route	Services	Off-peak (tph) (includes both directions)	Total off-peak (tph)	Peak (tph) (includes both directions)	Total Peak (tph)
North Kent Line	Thameslink Luton-Rainham	4	6	4	8
	Southeastern Highspeed London St Pancras - Faversham	2		4	
Upminster and Grays Branch Railway	C2C London-Tilbury-Southend	4	4	4	4
Tilbury Loop	C2C London-Tilbury-Southend	4	4	6	6
Shoeburyness Railway	C2C London-Shoeburyness	8	8	13	13

6.7.5 The Project would cross the existing railway lines at the following locations:

a. Tunnel near Gravesend (under the North Kent railway line).

b. Overpass near West Tilbury (over the Tilbury Loop railway line).

c. Footpath near North Ockendon (over the Upminster and Grays branch railway line).

d. M25 upgrade near North Ockendon (over the Upminster and Grays branch railway line).

6.7.6 There are other locations where the Project is in close proximity to railway lines. These are:

a. Henhurst Road and Park Pale overpasses (over HS1).

b. Thong Lane/Brewers Road/A2 junction bridge (over HS1).

c. Brewers Road bridge (over HS1).

6.8 Waterways and canals

6.8.1 The Project crosses the following waterways and canals:

a. The River Thames.

b. The Thames and Medway Canal.

c. The Mardyke.

6.8.2 The Thames and Medway Canal is a disused remnant of a canal that previously connected the River Thames with the River Medway. It is now only used for fishing, informal boating and other water activities. Therefore, the canal is excluded from this TA.

6.8.3 The Mardyke is a river that flows through Thurrock into the River Thames at Purfleet. It is no longer used as a waterway and therefore is also excluded from this TA.

6.9 Bus and coach networks

6.9.1 The existing bus and coach networks are summarised in this section. It is assumed that these services would still be operational in 2030. This includes:

a. coach routes including commuter services

b. local bus routes in Thurrock

c. local bus routes in Gravesend

6.9.2 Coach routes include long distance coach routes which operate on the M25, Dartford Crossing, A127, A13 and the A2, including commuter coaches.

6.9.3 Local bus routes in Thurrock include services along routes that would bisect the Project alignment, and along the SRN that would be connected to the Project. These routes are illustrated in Plate 6.28.

6.9.4 Local bus routes in Gravesend which service local destinations (Chalk, Riverview Park) to the east of Gravesend, and Medway Towns and Maidstone via A226 and A2. These routes are illustrated in Plate 6.29.

Plate 6.28 Thurrock bus routes

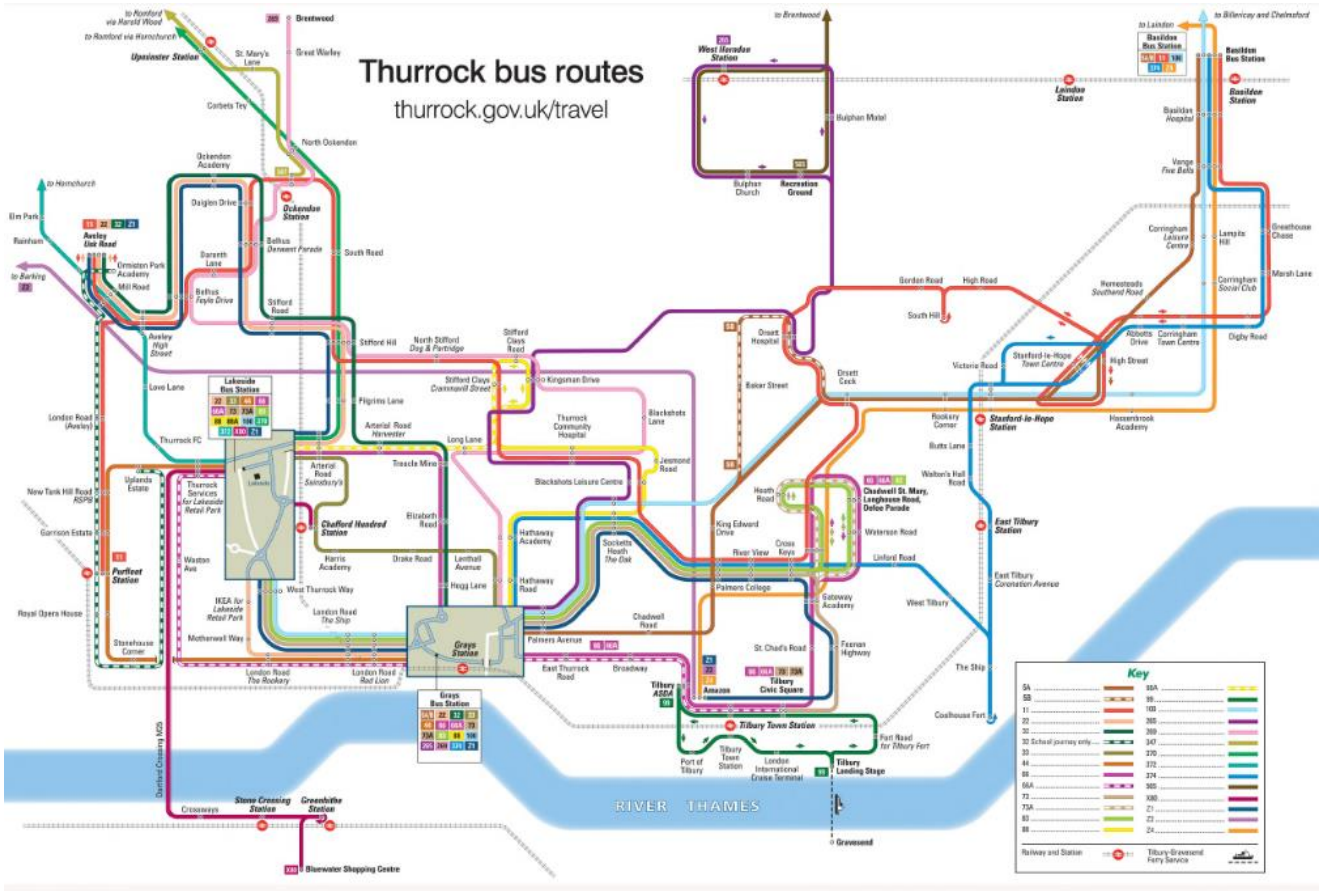
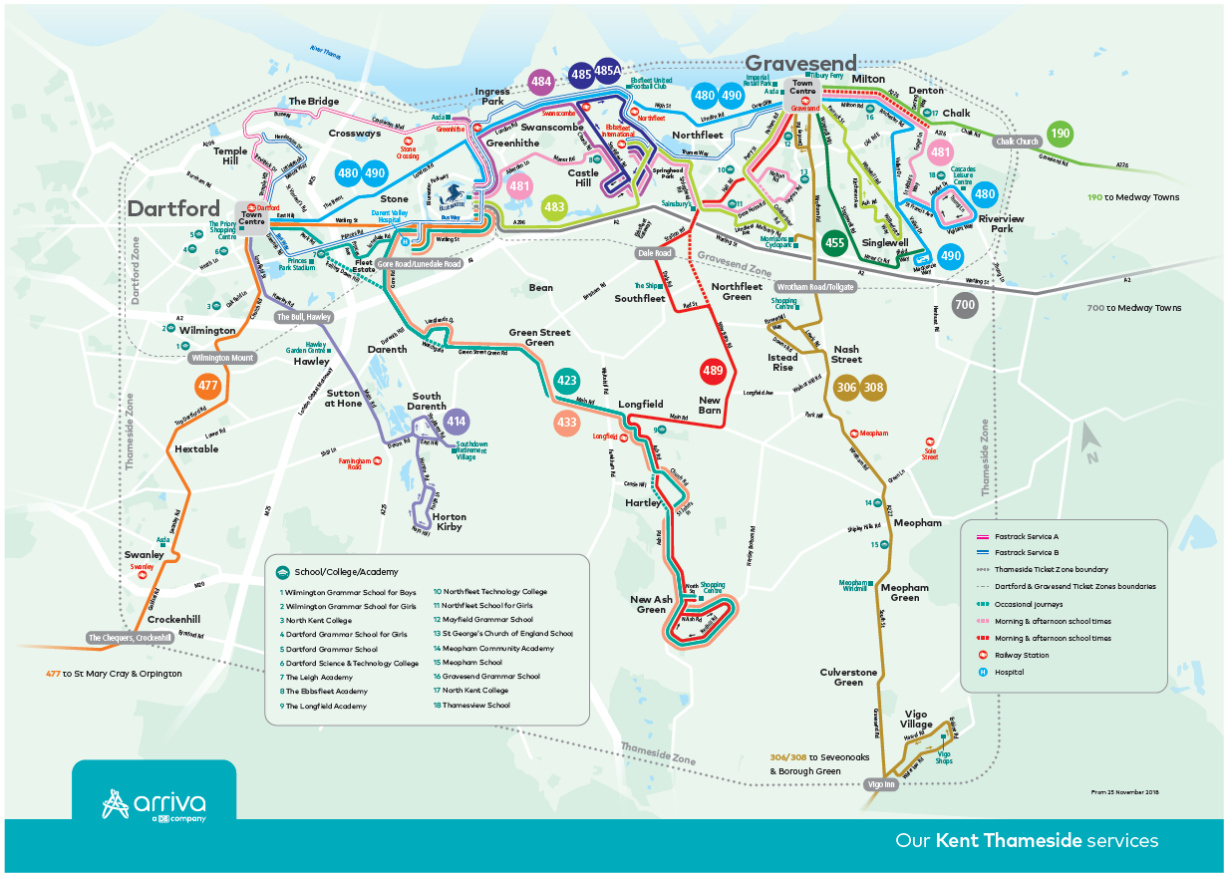


Plate 6.29 Gravesend bus routes



6.9.5 The routes and service frequencies for all coach and bus services that are affected by the proposed alignment of the Project are tabulated in Table 6.4, Table 6.5, Table 6.6 and Table 6.7. These are correct as of August 2022.

Table 6.4 National Express coaches.

Route number	Route description	Frequency
7	London Victoria Coach Station - Canterbury - Dover	3 per day
22	London Victoria Coach Station - Ramsgate	3 per day

Table 6.5 Commuter coaches

Route number	Route description	Frequency
Redwing	London - Gravesend	Various

Table 6.6 Thurrock buses

Route number	Route description	Frequency
5A/B	Grays - Pitsea	Every 10 minutes
11	Purfleet - Basildon	Every four hours
33	Lakeside - Grays	Every 15-30 minutes
100	Lakeside - Chelmsford	Every 15 minutes
200/201	Grays – Basildon	Hourly
265	West Horndon - Grays	Three services daily
269	Grays - St Helen's School, Brentwood	Every two hours
347	Ockendon - Romford	Every two hours
370	Lakeside - Romford Mercury Gardens	Every 10-15 minutes
374	Grays - Basildon	Every three hours
X80	Chafford Hundred - Bluewater	Hourly
Z1	Tilbury (Amazon) – Aveley	Four services daily
Z4	Amazon Tilbury - Laindon	Four services daily

Table 6.7 Gravesend buses

Route number	Route description	Frequency
190	Chatham - Gravesend	Every 45 minutes
306	Bluewater Bus Station – Sevenoaks	Five evening services
308	Sevenoaks Bus Station – Gravesend Station	Nine services daily
416	Gravesend - Meopham	Four services daily
417	Gravesend - Cliffe	Two services daily
480/490	Dartford/Bluewater - Valley Drive	Every 15 minutes
481	Bluewater - Riverview Park	Every 30 minutes
483	Gravesend – Bluewater Bus Station	Every 30 minutes
700	Chatham - Bluewater	Hourly
Fastrack AZ	Dartford – Gravesend	Six services daily
Fastrack B	Temple Hill - Gravesend	Every 10-15 minutes

6.9.6 Bus services in the area may be affected by changes in travel speeds on the highway network. Buses may be affected if they are on a road that crosses the alignment of the Project or are on other roads where the traffic flows and speeds vary as a result of the Project.

6.9.7 The frequency of services that may be affected during the construction of the Project or once it is operational are set out in Table 6.8.

Table 6.8 Buses along affected routes

Route	Services	Peak buses per hour (includes both directions)
M25	X80	2
A2	National Express Victoria - Canterbury - Dover, 7, 22 Redwing Coaches of London: • 700 London-Gravesend	Varies
A128 Brentwood Road (S of A13)	11 Z4	4
A1013	5A 100 200/201 374 Z4	24
Baker Street/Stifford Clays Road	265/5B	14
Rowley Road, Orsett	11/200/201/265/5B	18
Rectory Road, Orsett	11/5B/200/201	16
A226 Gravesend Road	190, 416, 417	2
Linford Road	374	2
B186 North Road	269, 347, 370	16
Ockendon Road	370	12

6.10 Network for walkers, cyclists and horse riders

6.10.1 There is an extensive WCH network that would be affected by the Project, either temporarily during construction or permanently, once the Project is open.

6.10.2 There are pedestrian footways adjacent to many of the roads in the proximity of the Project. There are also roads without footpaths used by pedestrians. There is a network of advisory cycle routes and traffic free routes, particularly around Thurrock, including two National Cycle Network (NCN) routes and two Regional Cycle Routes.

6.10.3 In addition to the pedestrian facilities on the public roads, there are a number of PRoW linking local communities.

6.10.4 Many of these existing PRoW have been severed by the construction of major roads, including the M25, A13, A2, as well as the HS1, adjacent to the A2. There are also numerous bridleways near the Project.

6.10.5 This section summarises the existing cycleways, footpaths and bridleways near the Project. For the purposes of this report, the WCH network is described separately for the south of the River Thames and two areas north of the River Thames.

South of the River Thames

Cycle routes

6.10.6 There are a number of cycle routes south of the River Thames near the Project:

a. National Cycle Route 1 (NCR1) runs along the disused Thames and Medway Canal, bordering a number of marshes near the River Thames. It connects Lower Higham and Gravesend, along the A2260 through Ebbsfleet to Bluewater.

b. National Cycle Route 177 (NCR177) runs parallel north of the A2 from the A2260 Northfleet into Strood, Rochester. NCR177 crosses the A2 at Park Pale bridge. The route is mixed on-road and partially traffic-free along Watling Street. It is connected to National Cycle Route 1 (NCR1) at A2260 Northfleet.

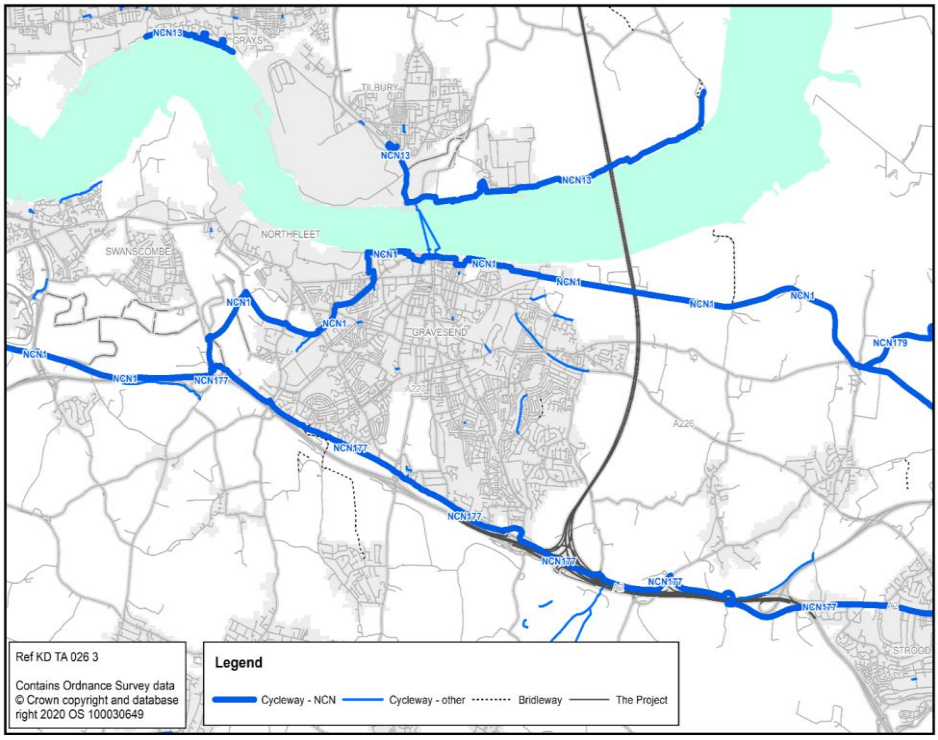
c. To the south of the A2 there are a number of permissive routes available for cyclists which includes the Darnley Trail and permissive use for WCH through Ashenbank Woods.

d. NS195 to the south of the A2.

e. Gravesend Road (A226) accommodates an on-road cycle lane from Strood via Higham to Gravesend.

6.10.7 Plate 6.30 shows National Cycle Routes south of the River Thames near the Project.

Plate 6.30 Cycle routes south of River Thames



Bridleways

6.10.8 Bridleways near the Project south of the River Thames include the following:

a. NU48 crosses the A2 at the Hog Lane over bridge. Located to the west of Cyclopark, it connects to NU27 from Istead Rise to the Painters Ash housing estate via Downs Road/Northfleet Green Road.

b. NS174 is a bridleway originating from NG17 by the Gravesend East junction and finishing halfway up footpath NS167. It looks to have been previously connected to NS367 before the A2 construction.

c. NS318 begins at NG2 (the disused Thames and Medway Canal) and ends at NG1 by the Shornemead Fort.

6.10.9 The bridleways south of the River Thames are illustrated in Plate 6.31.

Local roads

6.10.10 Local roads (without dedicated pedestrian facilities) which may be used by WCH south of the River Thames include the following:

a. Station Road connects Betsham to southern Gravesend, crossing over the A2 at Gravesend west junction.

b. New Barn Road connects New Barn, Southfleet and Northfleet Green to southern Gravesend, crossing the A2 at Gravesend west junction.

c. Wrotham Road (A227) connects Hook Green and Istead Rise to southern Gravesend, crossing the A2 at Gravesend central junction.

d. Jeskyns Road leads to Sole Street and Cobham, then crosses over the A2 at Gravesend east junction via Henhurst Road, to link to southern Gravesend.

e. Batts Road links Henley Street to Cobham and then continues over the A2 at the Cobham junction via Halfpence Lane and Brewers Road. The route then heads east towards Strood.

f. Thong Lane links Chalk and Riverview Park to the A2, in a north/south direction.

g. Lower Higham Road links Chalk and Lower Higham in an east/west direction.

h. Green Farm Lane links Gravesend Road and Lower Higham Road.

i. Brewers Road, The Ridgeway and Peartree Lane link Higham to the A2.

6.10.11 These routes are likely to be temporarily affected by the construction traffic.

Footpaths

6.10.12 The PRoW footpaths that are in close proximity to the Project south of the River Thames are summarised below:

a. NG22 crosses the A2 east of Gravesend Central junction, via a footbridge from Roman Road to Wrotham Road.

b. NS359 crosses the A2 west of Gravesend East junction via a footbridge from Hever Court Road and Church Road.

c. NS183 passes under the M2 at Albatross Avenue, connecting RR28 and NS183.

d. NS167 links Thong and the A2 via Thong Lane and Valley Drive.

e. NS170 and NS355 both stem from NS167 north, joining onto Shorne Ifield Road.

f. NS169 connects FP NS167 and Riverview Park housing estate.

g. NG17 originates from Valley Drive/Franklin Road, passes through a small group of houses just off the Gravesend east junction and ends when it joins the path along the A2.

h. NS367 originates from Henhurst Road and looks to have been previously connected to NG17, but has been severed by the A2 construction.

i. NS177 is located south of the A2 connecting Cobham and Henhurst Road, just south of the Gravesend east junction of the A2.

j. NS177A joins NS177 to Henhurst Road, but further south of where NS177 meets Henhurst Road.

k. NS311 and NS195 both originate from Cobham. They merge into one another within Ashenbank Wood and utilise the Thong Lane structure to cross the A2.

l. NS178 originates in Cobham, travels through Ashenbank Wood and joins the roundabout connecting Halfpence Lane, Darnley Lodge Lane and Brewers Road.

m. NS179 starts at Halfpence Lane in Cobham, travels north to the A2 then runs parallel to the A2 before joining Park Pale. NS179, NS180, NS161 all converge at this point.

n. NS180 originates at Lodge Lane in Cobham, travels through Rochester & Cobham Park Golf Club and joins NS179 and NS161 at Park Pale.

o. NS161 originates at Knights Farm Equestrian Centre, travels through Rochester and Cobham Park Golf Club and then joins the roundabout connecting Halfpence Lane, Thong Lane and Brewers Road. It looks to have been connected to NS161 north of the A2; heading towards Shorne Ridgeway, before the A2 was constructed.

p. NS183 passes under the M2 at Albatross Avenue and joins onto RR28.

q. NS1563 links NS182; via Knights Farm Equestrian Centre and crossing over a rail track, to a service road connecting to an A2 slip road heading westbound.

r. Footpaths NG8, NG9, NG7, NS165, NS164, NS163 and NS163A are footpaths that form part of a network of PRoW that cross fields between Shorne and Gravesend. NG7 goes across several fields from Thong Lane/A226 Gravesend Road to Shorne at Crown Lane. NG8 goes across the Southern Valley Golf Course from Riverview Park and ends at the A226 Gravesend Road.

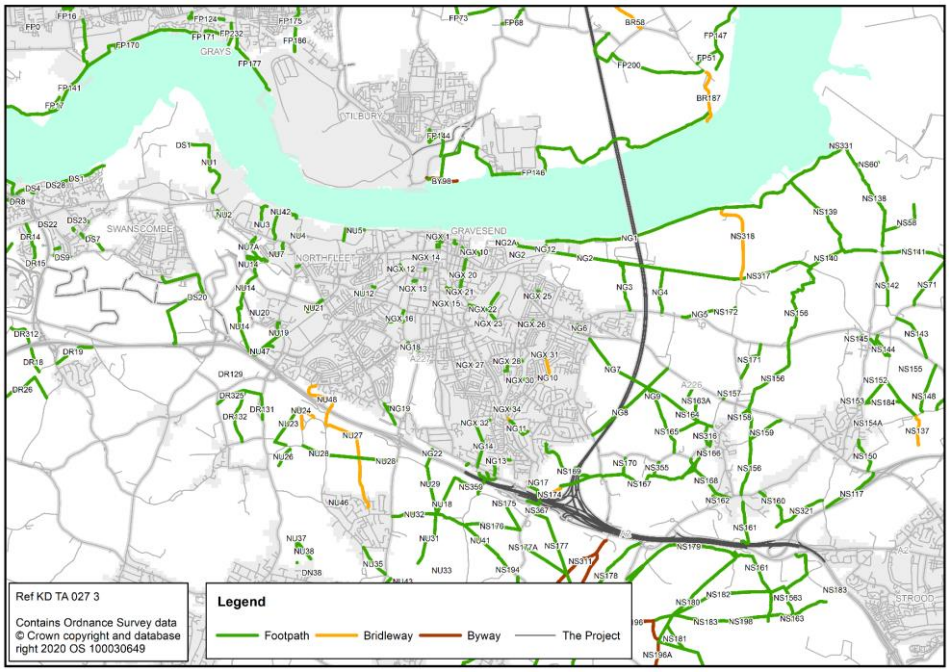
s. NG3 and NG4 are footpaths that run parallel to one another in a north to south direction, starting at Lower Higham Road and finishing at the Thames and Medway Canal.

t. NG1 runs right along the edge of the River Thames from Cliffe to Gravesend.

u. NG2 runs parallel to the north of the disused Thames and Medway canal.

6.10.13 These PRoW footpaths are illustrated in Plate 6.31.

Plate 6.31 PRoW south of the River Thames



North of the River Thames

6.10.14 The area north of the River Thames is divided into two areas for the purposes of this assessment. The first is the southern area around Tilbury and includes the area around the A13. The second is the area north of the A13 which includes Ockendon.

Southern area and around the A13 (Tilbury area)

Cycle routes

6.10.15 There are a number of cycle routes north of the River Thames in the Tilbury area:

a. National Cycle Route 13 (NCR13) is a national cycle route on the north side of the River Thames within Tilbury, although it is currently fragmented.

The eastern section connects Tilbury town via the A1089 via Tilbury docks, East Tilbury towards Coalhouse Fort. This route is also partly footpath (FP146). The western section connects Wouldham Road to the Tilbury power station site. National Route 13 is in development and will connect Tower Bridge in London with Fakenham in Norwich.

b. National Cycle Route 137 (NCR137) is part of an entirely traffic-free path that follows the route of the Mardyke River from the south of Aveley to North Stifford. The route starts just off Ship Lane and under the M25 and the A13. It travels through Davy Down Riverside Park before finishing at the B186 just outside North Stifford. Here the route connects to local cycle routes that continue on into Chafford Hundred and skirt the Grays Chalk Quarry Nature Reserve.

c. There is a cycle path along Stifford Road near the M25 providing a connection to NCR137 and the Mardyke Bridleway.

d. There is a cycle route from NCR137 B186 Pilgrims Lane, B186 Burghley Road, B186 Fenner Road to the junction of the A126 and Lakeside Shopping Centre. The route crosses under the A13.

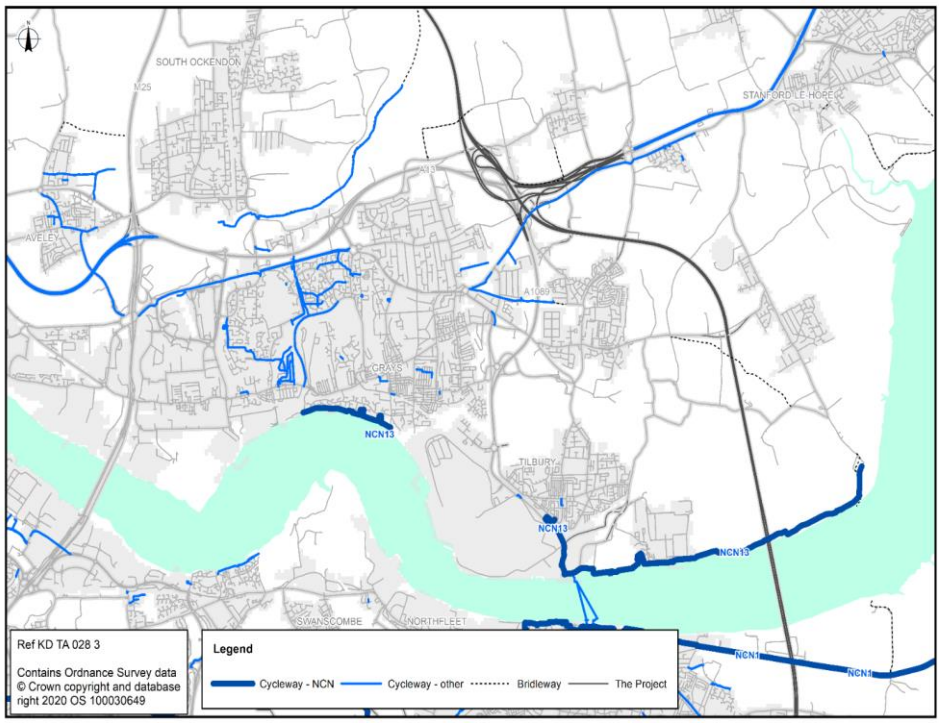
e. There is a cycle route from London Road, south of Lakeside, parallel to the A282, along the A1306 Arterial Road West Thurrock, A1306 Arterial Road North Stifford, Lodge Lane, A1013 Stanford Road to Stanford-le-Hope, where it meets London Road. The cycle route has connections from Lodge Lane along Hogg Lane to Grays Chalk Quarry Nature Reserve and also Hathaway Road to Little Thurrock.

f. There is a cycle route connecting Little Thurrock and Horndon-on-the-Hill, via Blackshots Lane and Stifford Clays Road, passing under the A13, through Orsett. The route splits north and south at Rectory Road providing a link to the on-road cycle lane on the A1013 Stanford Road. The route also provides a wider loop between Little Thurrock and Horndon-on-the-Hill, via Stanford-le-Hope, connecting via the A1013 Stanford Road cycle route.

g. There is a cycle route linking Ferry Road, Dock Road, across the A1089 Asda roundabout, adjacent to A1089, A126 Marshfoot Road, passing over the A1089, connecting into Tilbury via A126 St Chad's Road, Chadwell Hill. There is also a connection between B149 Chadwell Bypass along Wood View Road and Chadwell Road, linking Chadwell St Mary and Little Thurrock, crossing over the A1089.

6.10.16 Plate 6.32 illustrates the National Cycle Routes and other cycle routes north of the River Thames near the Project.

Plate 6.32 Cycle routes north of the River Thames (Tilbury area)



Bridleways

6.10.17 Bridleways near the Project in the Tilbury area are listed below:

a. BR187 runs along the edge of the River Thames from Coalhouse Fort to NCR146.

b. BR161 Green Lane bridleway and farm track.

c. BR58 (also referred to as Coal Road) begins at the point where Station Road meets Love Lane, then crosses over the rail line; via a level crossing, crosses Low Street Lane, joins onto BR66 and ties into Muckingford Road.

d. BR63 connects to BR58 and provides access onto Muckingford Road.

e. BR233 connects the A1013 and Long Lane, passing through a travellers' site.

f. BR206 and BR94 link a private track owned by the Foxhounds Riding School and Baker Street (B188) running parallel to the edge of the A13.

g. A permissive bridleway that starts at Heath Road, runs parallel to the edge of the A1089 and connects to a footpath.

h. BR112 that connects Orsett Heath Crescent (Orsett) and King Edward Drive (Little Thurrock), via a footbridge over the A1089.

6.10.18 These bridleways are illustrated in Plate 6.33.

Local roads

6.10.19 Local roads likely to be used by WCH in the Tilbury area include:

a. Fort Road connects Tilbury Docks (at the ferry port), with West Tilbury.

b. Station Road connects north of the rail line to East Tilbury.

c. Coopers Shaw Road, Church Road, Station Road and Love Lane form a route from Fort Road to Princess Margaret Road in an east to west direction.

d. Princess Margaret Road connects Coalhouse Fort and Linford via East Tilbury.

e. Buckingham Hill Road connects Linford to the A1013 by Stanford-le-Hope.

f. Hornsby Lane connects Orsett to Orsett Heath.

g. Muckingford Road and Linford Road link Chadwell St Mary and East Tilbury.

h. Low Street Lane connects Church Road to Muckingford Road.

i. Turnpike Lane connects Fort Road and Linford Road.

j. The A1089 originates at the Tilbury ferry dock, passes through Tilbury, Chadwell St Mary, Orsett Heath and links to the A13.

k. Hoford Road links Muckingford Road to Buckingham Hill Road (vehicle access is restricted by a traffic regulation order).

l. High House Lane is a private access road that links Linford Road and Brentwood Road.

m. Brentwood Road connects Chadwell St Mary to Southfields.

n. Heath Road links Chadwell St Mary and Orsett Heath.

o. Long Lane links north Thurrock to the A1013, running partly parallel along the edge of the A1089 via a travellers' site.

p. Baker Street links the A1013 to Orsett, passing under the A13.

q. Rectory Road connects to the A1013; via an overbridge over the A13 to Orsett.

r. Stifford Clays Road connects north Thurrock to Orsett, passing under the A13.

Footpaths

6.10.20 The PRoW footpaths that are in close proximity to the Project in the Tilbury area, north of the River Thames are summarised below:

a. FP193 and FP98 connect Tilbury Fort with Fort Road.

b. FP144 connects Fort Road and Brunel Close, running along the edge of the Port of Tilbury VHC.

c. FP200 originates at Coalhouse Fort, travels through the East Tilbury Marshes and connects into Station Road.

d. FP68 links Gun Hill and Church Road.

e. FP72 links Biggin Lane and Turnpike Lane.

f. FP71, FP69 and FP70 are a small network of footpaths that occupy a field between Turnpike Lane and Blue Anchor Lane.

g. FP74 links Turnpike Lane and Linford Road.

h. FP66 link Blue Anchor Lane and Muckingford Road, crossing over BR58 (Coal Road).

i. FP61 starts at Princess Margaret Road and connects to Low Street Lane and BR58 (Coal Road) at the point where they intersect.

j. FP60 connects FP61 and Muckingford Road.

k. FP65 and FP64 both link High House Lane to Hoford Road at different points. FP65 to the south and FP64 to the north.

l. FP75 links Linford Road to Cole Avenue (housing estate).

m. FP78 starts at High House Lane, crosses Brentwood Road and joins onto FP79 at the most northern point of Chadwell St Mary.

n. FP79 starts in northern Chadwell St Mary, crosses FP78 and joins the A1013 at Rectory Road bridge.

o. FP95 starts at the end of FP78 and ends at the start of FP107.

p. FP108 links Heath Road and an unknown footpath (Orsett Heath Crescent; Orsett, and King Edward Drive; Little Thurrock), via a footbridge over the A1089.

q. FP107 starts at the end of FP95 and ties into Hornsby Lane.

r. FP43, FP45, FP46, FP106 and FP105 connect to one another to create a route from Buckingham Hill Road, around the edge of Orsett Golf Centre, to the A1013 where the Rectory Road bridge is located.

s. FP105 links the A1013 at Rectory Road bridge to Brentwood Road.

t. FP97 starts at Long Lane, heading in a north direction but has no final destination, ending where it is intersected by the A13.

u. FP104 connects the A13 Brentwood junction to Rectory Road as it enters Orsett.

v. FP93 links Mill Lane to Rectory Road at the point where it crosses the A13.

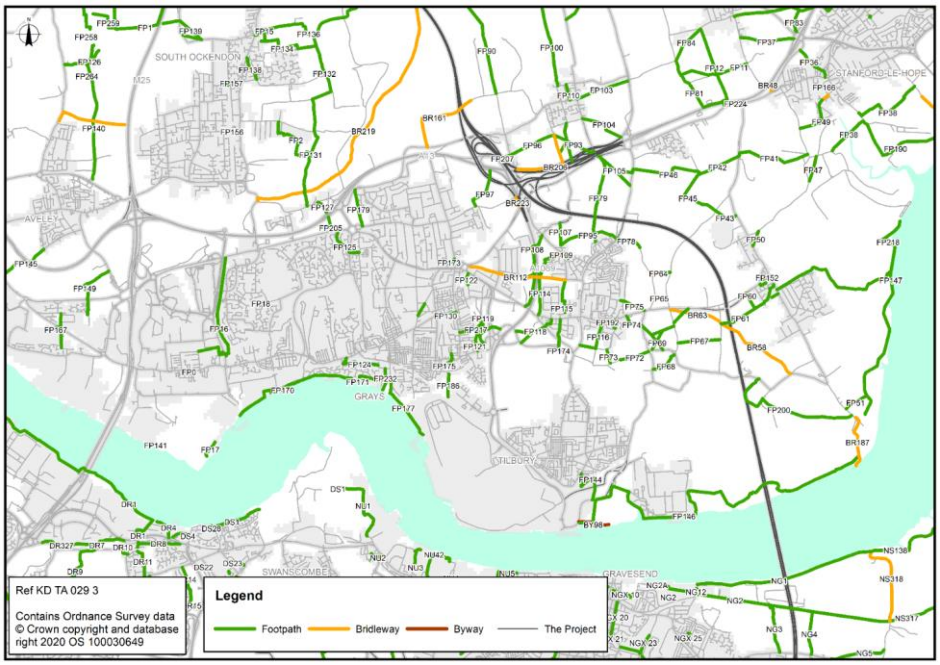
w. FP82 starts at School Lane but has no final destination, ending where it is intersected by the A13.

x. FP96 connects Mill Lane and Baker Street (B188).

y. FP207 starts at Baker Street (B188) but ends where the A13 link road onto the A1089 intersects it.

6.10.21 The PRoW footpaths are illustrated in Plate 6.33.

Plate 6.33 PRoW north of the River Thames (Tilbury area)

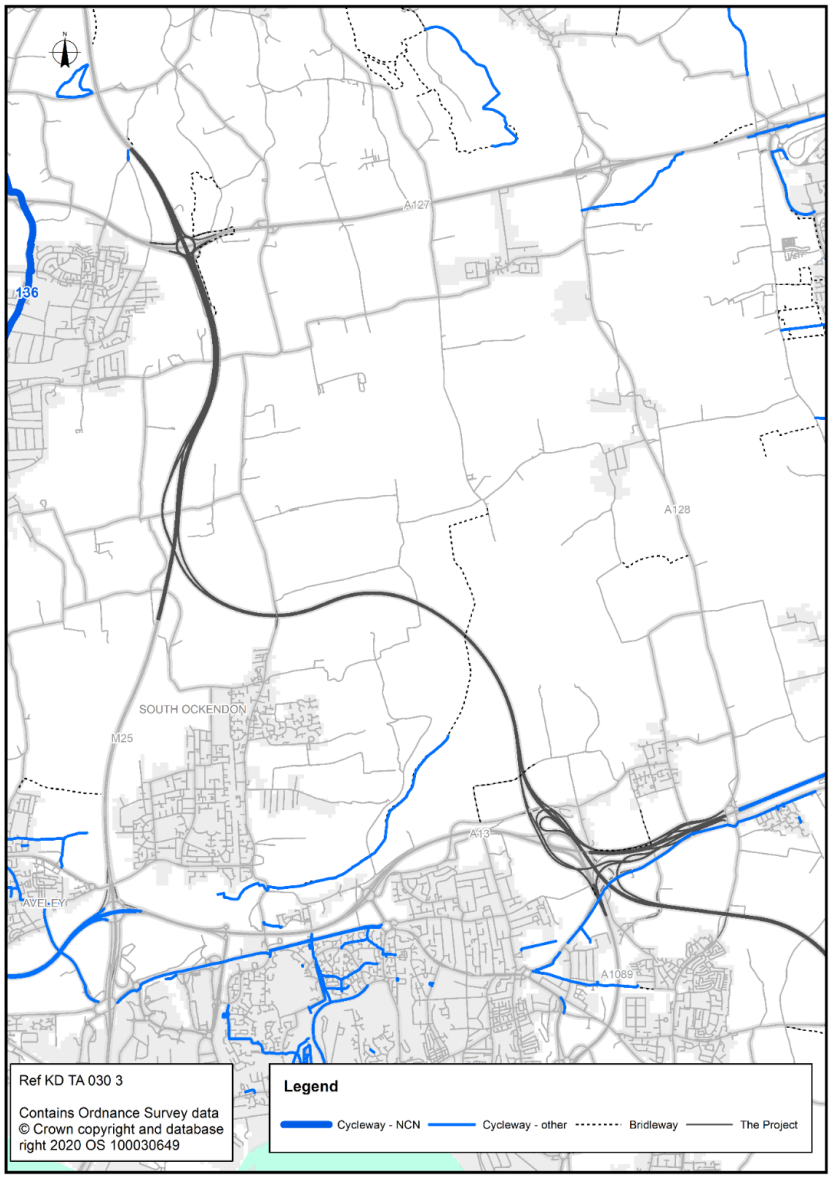


North of the A13 (Ockendon area)

Cycle routes

6.10.22 The cycle routes in the Ockendon area are illustrated in Plate 6.34.

Plate 6.34 Cycle routes north of River Thames (Ockendon area)



Equestrian facilities

6.10.23 Bridleways near the Project in the Ockendon area include the following:

a. BR161 travels along the length of Green Lane. It starts at Stifford Clays Road and ends where Green Lane meets Fen Lane.

b. BR219 originates in North Stifford, passes close to the A13 and follows the edge of the Mardyke, before ending at the crossroads of Dunnings Lane, Fen Lane and Harrow Road.

c. BR183 originates at Cobham Hall Lane and provides a link over the A127 via a private access bridge. To the south of the A127, the bridleway runs parallel to the M25, down to a structure by a rail line. There it connects to FP176 originating from Fairholme Gardens in Cranham that has been redirected south to use an underpass under the M25.

d. BR119 originates at Tomkyns Lane and travels east towards the M25. It uses a footbridge over the M25 to connect to Beredens Lane.

6.10.24 These bridleways are illustrated in Plate 6.35.

Local roads

6.10.25 Local roads likely to be used by WCH in the Ockendon area include the following:

a. St Marys Lane (B187) connects Upminster/Cranham to east of the M25 (B186).

b. North Road (B186) connects South Ockendon to Great Warley, passing through North Ockendon and passing over the A127 on route.

c. Dennis Road and Dennises Lane connect South Ockendon to west of the M25.

d. Pea Lane connects Dennises Lane to Ockendon Road.

e. Stubbers Lane connects Dennises Lane to Ockendon Road.

f. Sunnings Lane connects Dennises Lane to Ockendon Road.

g. A private access track connects North Road (B186) to Fen Lane.

h. Fen Lane links Bulphan to North Road (B186).

i. Ockendon Road links North Ockendon to Corbets Tey.

j. Pike Lane connects Ockendon Road to St Marys Lane (B187).

k. Moor Lane provides a link from a large housing estate south-west of M25 junction 29 to Cranham and the Upminster London Underground depot.

l. Front Lane connects St Marys Lane and Folks Lane, passing through the centre of Cranham and crossing over the A127.

m. Hall Lane connects Shepherds Hill/Warley Road to Cranham, crossing over the A127.

n. Nags Head Lane links Ardleigh Green and Brentwood, crossing over the M25.

o. Warley Road (north) provides a link from Nags Head Lane to Great Warley, crossing over the M25.

Footpaths

6.10.26 The PRoW footpaths that are close to the Project in the Ockendon area, north of the River Thames, are summarised below:

a. FP90 starts where Green Lane meets Fen Lane, travels north, joins onto FP89 and ends at Harrow Road.

b. FP89 splits from FP158 at Parkers Farm Road, ties onto Harrow Road and ends at the crossroads of Dunnings Lane, Fen Lane and Harrow Road.

c. FP131, FP132 and FP136 form a route that links High Road in North Stifford to the crossroads of Dunnings Lane, Fen Lane and Harrow Road near Bulphan. It passes through South Ockendon on route.

d. FP134 and FP15 link FP132 to Hall Lane in Ockendon, also tying into FP136.

e. FP135 links North Road (B186) to Fen Lane by the Top Meadow Golf Course.

f. FP136 originates in South Ockendon, connects to FP16 and heads towards Bulphan.

g. FP151 links North Road to Church Lane.

h. FP254 starts at FP151 and ends at Church Lane.

i. FP1 and FP259 link Aveley Road and Dennises Lane.

j. FP250 links Dennises Lane and Stubbers Lane.

k. FP201, FP139 and FP153 join to form a route from Dennis Road heading in a westerly direction, ending where it is intersected by the M25.

l. FP252 and FP253 starts at Church Lane, ending where it is intersected by the M25.

m. FP251 to the west of the M25 starts at Pea Lane and ends where it is intersected by the M25, and the footpath to the west of the M25 starts at Church Lane, runs parallel to the M25 and ties into FP231 and Ockendon Road.

n. FP231 starts at Church Lane, runs parallel to the M25 and ties into Ockendon Road.

o. FP272 links Church Lane and Clay Tye Road (B186).

p. FP283 connects North Road (B186) and Fen Lane.

q. FP230 starts at Pike Lane but ends where it is intersected by the M25.

r. FP232 Links Clay Tye Road and a private access track off St Marys Lane.

s. FP228 links Ockendon Road and The Chase.

t. FP229 links Pike Lane and The Chase.

u. FP227 links Pike Lane and The Chase.

v. The Thames Chase Forest Centre has many footpaths that occupy the area immediately west of the M25 between Ockendon Road and St Marys Lane. A footpath passes under the M25 and joins onto a private access road, linked to Ockendon Road.

w. FP193 links St Marys Lane (B187) and Sunnycroft Gardens, crossing over the Shoeburyness railway line.

x. FP177 links St Marys Lane, FP176 and Warley Street (B186), crossing over the Shoeburyness railway line.

y. FP176 links Fairholmes Gardens in Cranham to Warley Street (B186); passing under the M25 via an underpass and using part of BR183 to the east of the M25.

z. FP148 links M25 junction 29 and Front Lane.

aa. FP179 links St Marys Lane and Little Warley Hall Lane.

bb. FP147 Links Front Lane and Bird Lane.

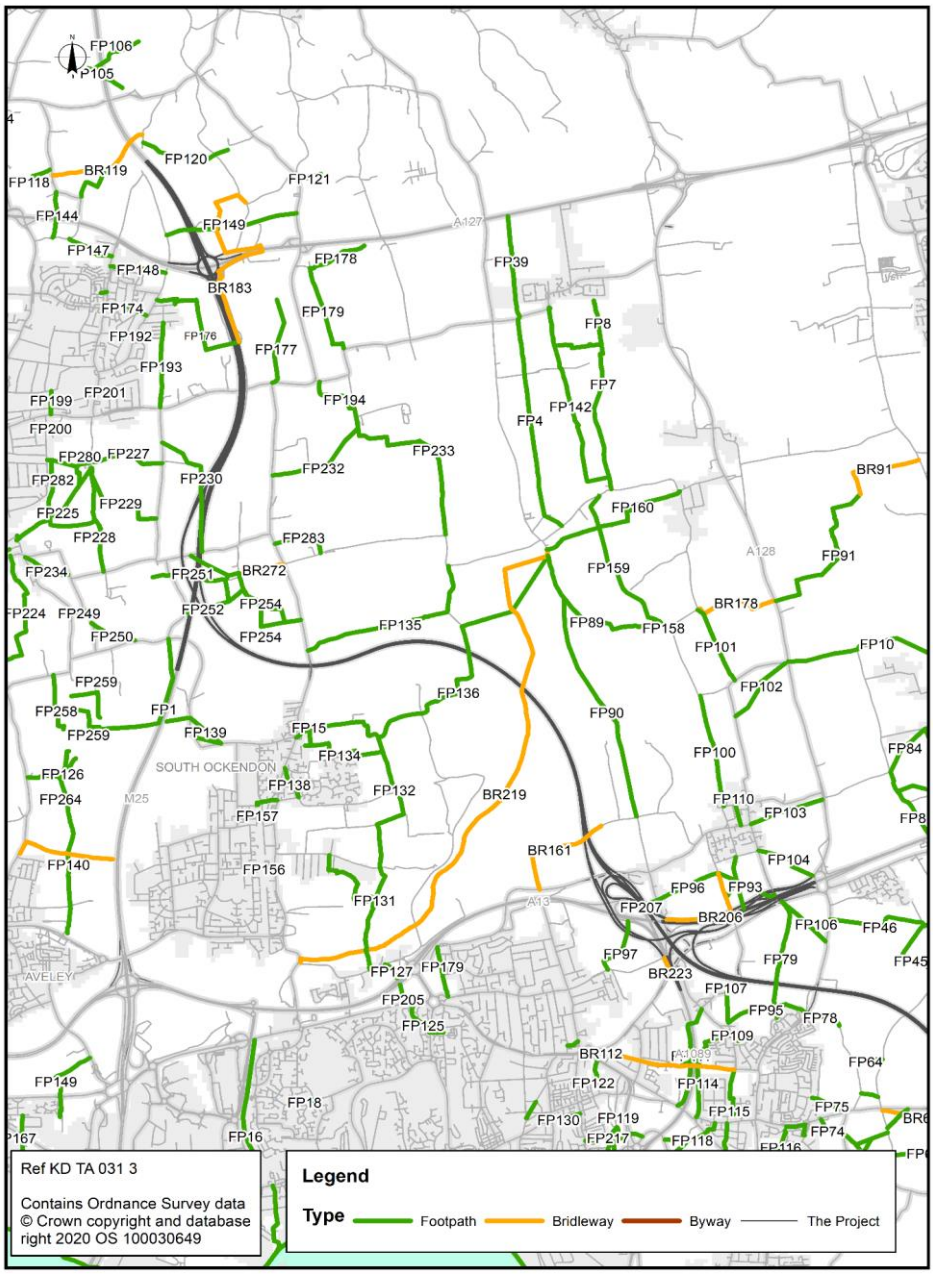
cc. FP149 starts at Warley Street but has no final destination and is intersected by the M25. It links into the BR183.

dd. FP120 links Beredens Lane to the B186.

ee. FP146, FP119 and several other unknown footpaths form a network from Folkes Lane to a footbridge over the M25, connecting to Beredens Lane.

6.10.27 The PRoW footpaths are illustrated in Plate 6.35.

Plate 6.35 PRoW north of River Thames (Ockendon area)



6.11 WCH surveys

6.11.1 Generally, the volume of trips across the WCH network is low, based on site observations of PRoW condition.

6.11.2 PRoW surveys were undertaken in August and September 2019 in key locations to establish the nature of the PRoW and their usage by WCH. The surveys included PRoW and roads that would cross the Project, and other PRoW likely to be affected by the Project. The majority of the PRoW surveys were undertaken during the weekend, at times when recreational use is expected to be highest; but where routes are likely to be used for non-leisure uses such as commuting, surveys were undertaken on a weekday. The surveys were carried out between 06:00 and 19:00 on days with good weather conditions, avoiding rain. The baseline survey results are shown in Table A1 in Appendix A.

6.11.3 As a result of the COVID-19 pandemic, data collection post 2019 has been affected by government restrictions and usage of WCH networks have not yet stabilised. Therefore, it is considered that the surveys collected in 2019 provide an appropriate baseline for this assessment.

6.11.4 The surveys indicated that the majority of the PRoW crossing the route are not used by many people. The PRoW surveys undertaken showed that there were fewer than 10 people a day recorded on 12 out of 35 of the PRoW surveyed.

6.11.5 South of the River Thames the PRoW with the greatest usage recorded were footpaths NS169 (75 walkers, six cyclists and zero horse riders) and NS174 (40 walkers, two cyclists and zero horse riders).

6.11.6 Local roads with the greatest usage recorded south of the River Thames were the A226 (65 walkers, 44 cyclists and zero horse riders) and Brewers Road (16 walkers, 99 cyclists and zero horse riders).

6.11.7 North of the River Thames the PRoW with the greatest usage recorded were footpaths FP230 (171 walkers, 42 cyclists and zero horse riders) and FP146/NCR13 (40 walkers, 36 cyclists and zero horse riders).

6.11.8 Local roads with the greatest usage recorded north of the River Thames were Baker Street (55 walkers, 47 cyclists and zero horse riders) and Rectory Road (39 walkers, 20 cyclists and zero horse riders).

6.11.9 There are no known proposals for changes to pedestrian footways, PRoW and bridleways that affect the future baseline, although cycle route NCR13 is under development. Therefore, no changes are assumed for the future baseline.

7 Operational assessment

7.1 Introduction

7.1.1 This section covers the impact of the Project once fully operational. This TA addresses the impacts on the strategic and local road network, public transport services and PRoW.

7.1.2 The anticipated opening date for the Project is in 2030. The construction programme for the Project is expected to last from 2025 to 2030. This assumes consent is granted in 2024.

7.1.3 The baseline for changes to conditions on the road network is the forecasts from the LTAM for the modelled opening year (2030) and design year (2045) without the Project. This is referred to as the 'Do Minimum' scenario.

7.1.4 The 'Do Minimum' is where the Project is not built, but where other changes to the road network, and planned development that is forecast to go ahead (whether the Project is built or not) are included.

7.1.5 This is compared with the traffic forecasts on the road network for the 'Do Something' scenario, which is where in addition to the changes included in the 'Do Minimum' the Project is also included, and road users have a choice to use the Project.

7.1.6 The operational assessment is based on the core scenario model runs from the LTAM. Further details of the methods used to develop these forecasts and the results for the low and high growth scenarios are reported in Appendix C: Transport Forecasting Package of the ComMA (Application Document 7.7).

7.1.7 This chapter reports on the forecast of the following:

a. Operation of the Project and its junctions.

b. Changes in traffic flows on the wider network.

c. Changes in volume/capacity (V/C) ratios on the wider network.

d. Changes in journey times on the wider network.

7.1.8 This chapter also sets out details of any permanent road closures and realignments and the impact of the Project on public transport services and PRoW.

7.2 Traffic on the Project mainline

7.2.1 The Project is described in Chapter 2 of this report. The A122 would have three lanes in both directions between the A13/A1089/A122 Lower Thames Crossing junction and the M2/A2/A122 Lower Thames Crossing junction. On the section between the A13 and the M25 there would be three lanes northbound and two lanes southbound.

7.2.2 There would be two lanes for the on-slip from the M25 southbound as only two lanes would be required to accommodate the forecast traffic flows on the Project southbound between the M25 and A13. When more traffic joins the Project southbound at the A13, an additional third lane is required which runs south to the junction with the M2/A2.

7.2.3 There would be three lanes northbound through the tunnel. Three lanes would be provided northbound after the A13 to accommodate the merge of the traffic joining from the A13, which contains a high proportion of HGVs, with the traffic already on the Project.

7.2.4 As a result of the Dartford Crossing having a lower capacity northbound than southbound (as less traffic is able to use the four lanes northbound through the tunnels than the four lanes southbound over the bridge), forecast traffic flows are higher northbound on the Project than they are southbound.

7.2.5 Forecast traffic levels on the A122 are shown in Table 7.1, for the two mainline sections. The table also shows the volume to capacity percentages for each of the two mainline sections.

Table 7.1 Forecast traffic flows on the A122

Scenario	Section	Direction	Flow (PCU)			Volume/Capacity		
			AM	IP	PM	AM	IP	PM
2030 Core	A122 (A2-A13)	SB	3,470	2,850	4,410	55	45	69
		NB	4,570	3,660	3,570	72	57	56
	A122 (A13-M25)	SB	2,270	2,280	3,210	49	49	69
		NB	4,160	2,980	2,790	60	43	40
2030 High	A122 (A2-A13)	SB	3,500	2,980	4,520	55	47	71
		NB	4,710	3,880	3,650	74	61	57
	A122 (A13-M25)	SB	2,300	2,370	3,310	49	51	71
		NB	4,400	3,180	2,910	63	46	42
2030 Low	A122 (A2-A13)	SB	3,370	2,710	4,280	53	43	67
		NB	4,350	3,410	3,430	68	54	54
	A122 (A13-M25)	SB	2,210	2,160	3,100	47	46	67
		NB	3,840	2,770	2,650	55	40	38
2045 Core	A122 (A2-A13)	SB	3,870	3,270	4,720	61	51	74
		NB	5,080	4,320	4,110	80	68	65
	A122 (A13-M25)	SB	2,540	2,530	3,380	55	54	73
		NB	4,640	3,420	3,180	66	49	45

Scenario	Section	Direction	Flow (PCU)			Volume/Capacity		
			AM	IP	PM	AM	IP	PM
2045 High	A122 (A2-A13)	SB	3,930	3,460	4,810	62	54	76
		NB	5,250	4,580	4,210	83	72	66
	A122 (A13-M25)	SB	2,640	2,640	3,490	57	57	75
		NB	4,930	3,640	3,350	70	52	48
2045 Low	A122 (A2-A13)	SB	3,800	3,110	4,590	60	49	72
		NB	4,840	3,970	3,990	76	62	63
	A122 (A13-M25)	SB	2,430	2,430	3,270	52	52	70
		NB	4,350	3,120	2,980	62	45	43

Note: Flows rounded to nearest 10.

Source: Lower Thames Area Model (CS72)

7.3 Traffic on the Project junctions

M2/A2/A122 Lower Thames Crossing junction

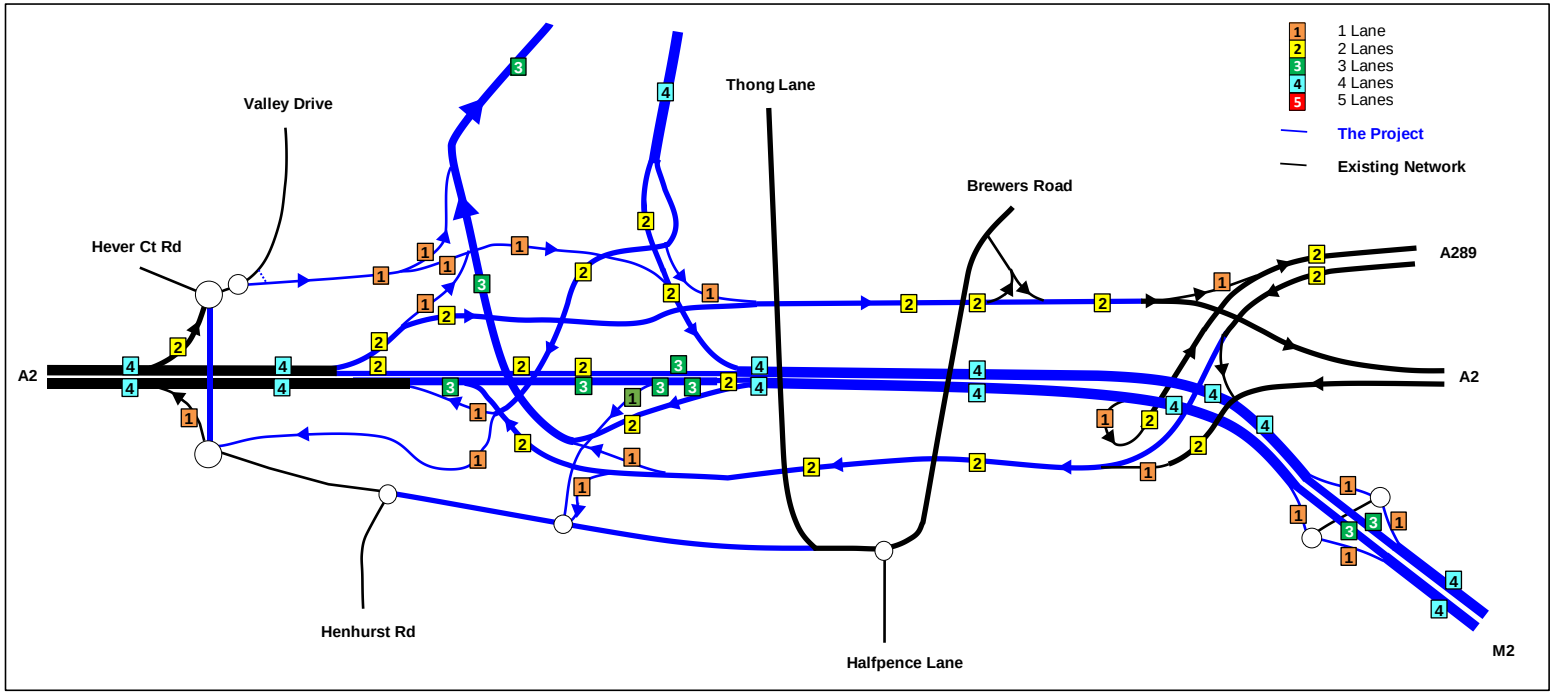
7.3.1 A plan of the way the junction is coded in the LTAM, showing the number of lanes on each section, is provided in Plate 7.1. It shows the number of lanes coded for each section of the junction and, for one-way links, the direction in which traffic is permitted to travel.

7.3.2 The permitted movements at the M2/A2/A122 Lower Thames Crossing junction are shown in Table 7.2.

Table 7.2 Permitted movements at the M2/A2/A122 Lower Thames Crossing junction

Starting location \ Your direct connections	LTC northbound	LTC southbound	M2 eastbound	M2 westbound	A2 eastbound	A2 westbound	Gravesend East eastbound	Gravesend East westbound	A289 eastbound	A289 westbound	Brewers Road eastbound	Brewers Road westbound
LTC northbound			✗	✗	✗	✗	✗	✗	✗	✗	✗	✗
LTC southbound			✓	✗	✓	✓	✗	✓	✓	✗	✗	✓
M2 eastbound	✗	✗			✗	✗	✗	✗	✗	✗	✗	✗
M2 westbound	✓	✗			✗	✓	✗	✓	✓	✗	✓	✗
A2 eastbound	✓	✗	✓	✗			✓	✗	✓	✗	✓	✗
A2 westbound	✓	✗	✗	✗			✗	✓	✗	✗	✓	✗
Gravesend East eastbound	✓	✗	✓	✗	✓	✗			✓	✗	✓	✗
Gravesend East westbound	✗	✗	✗	✗	✗	✓			✗	✗	✗	✗
A289 eastbound	✗	✗	✗	✗	✗	✗	✗	✗			✗	✗
A289 westbound	✓	✗	✓	✗	✗	✓	✗	✓			✗	✓
Brewers Road eastbound	✗	✗	✓	✗	✓	✗	✗	✗	✓	✗		
Brewers Road westbound	✓	✗	✗	✗	✗	✓	✗	✓	✗	✗		

Plate 7.1 M2/A2/A122 Lower Thames Crossing junction representation in the LTAM



7.3.3 The junction would maintain existing access to Brewers Road, Thong Lane, Halfpence Lane, Henhurst Road, Hever Court Road and Valley Drive.

7.3.4 In order to reduce conflicts between traffic, a new eastbound and westbound service road would be provided alongside the A2.

7.3.5 The east-facing on-slip at the Gravesend East junction would be removed and replaced by a connection to the A122 Lower Thames Crossing northbound and the M2 eastbound. This would mean that there is no longer a direct access eastbound to the A2 or A289 from this junction.

7.3.6 The traffic flows and volume to capacity percentages are presented below for the 2045 design year.

AM peak

Total vehicle flows

7.3.7 The number of vehicles joining the Project from the M2/A2 in the AM peak in 2045 is 4,566 PCUs in the core scenario. Of this traffic:

a. 83% would come from the east.

b. 10% would access from the Gravesend East junction.

c. 7% would come from the A2 to the west.

7.3.8 Similar proportions are seen for southbound traffic on the A122 Lower Thames Crossing:

a. 87% would travel east.

b. 8% would exit at the Gravesend East junction.

c. 5% would continue on the A2 to the west.

HGV flows

7.3.9 Similarly, for HGV flows there is a very high proportion of east-to-north and north-to-east HGV traffic using the Project. Very few HGVs west of the Gravesend East junction are forecast to use the Project. HGVs have a much higher operating cost per kilometre than other vehicles and favour using the shortest route possible even if the journey time is slightly longer.

7.3.10 For the HGV flows using the A122 northbound:

a. 91% of HGVs on the A122 Lower Thames Crossing northbound would come from the east.

b. 7% would access the A122 Lower Thames Crossing from the Gravesend East junction.

c. 2% would access from the A2 to the west.

7.3.11 Similar proportions are seen for southbound traffic on the A122 Lower Thames Crossing:

a. 89% would travel to the east.

b. 8% would exit at the Gravesend East junction.

c. 2% would continue on the A2 to the west.

Volume to capacity

7.3.12 The volume to capacity percentages for the junction in the 2045 AM peak are shown in Plate 7.2.

7.3.13 The plate shows the traffic flows as a percentage of capacity of the roads, coloured as follows:

a. Grey if traffic volumes would be below 75% capacity.

b. Yellow if traffic volumes would be between 75% and 85% capacity.

c. Orange if traffic volumes would be between 85% and 95% capacity.

d. Red if traffic volumes would be over 95% capacity.

7.3.14 In the AM peak in 2045, Plate 7.2 shows that the entire junction is forecast to operate with a volume to capacity of below 75%, with the exceptions of the southbound on-slip to the A2 eastbound and the A2 westbound approach to the new road which are forecast to be just over 76%.

Plate 7.2 Volume to capacity at the M2/A2/A122 Lower Thames Crossing junction – AM peak 2045

PM peak

Total vehicle flows

7.3.15 The traffic patterns would be similar in the PM peak to those in the AM peak discussed above. For the traffic on the A122 Lower Thames Crossing northbound:

a. 75% would come from the east.

b. 13% would come from the Gravesend East junction.

c. 12% would come from the A2 to the west.

7.3.16 Similar proportions would be seen for southbound traffic on the A122 Lower Thames Crossing:

a. 83% would travel east.

b. 13% would exit at the Gravesend East junction.

c. 4% would continue on the A2 to the west.

HGV flows

7.3.17 In the PM peak the traffic patterns for HGVs also show very few HGVs would come from the west. For HGV flows using the Project northbound:

a. 93% would come from the east.

b. 6% would come from the Gravesend East junction.

c. 1% of HGVs would come along the A2 from the west.

7.3.18 Similar proportions are seen for southbound traffic on the Project, where:

a. 95% would travel east.

b. 5% would exit at the Gravesend East junction.

c. Less than 1% would continue on the A2 to the west.

Volume to capacity

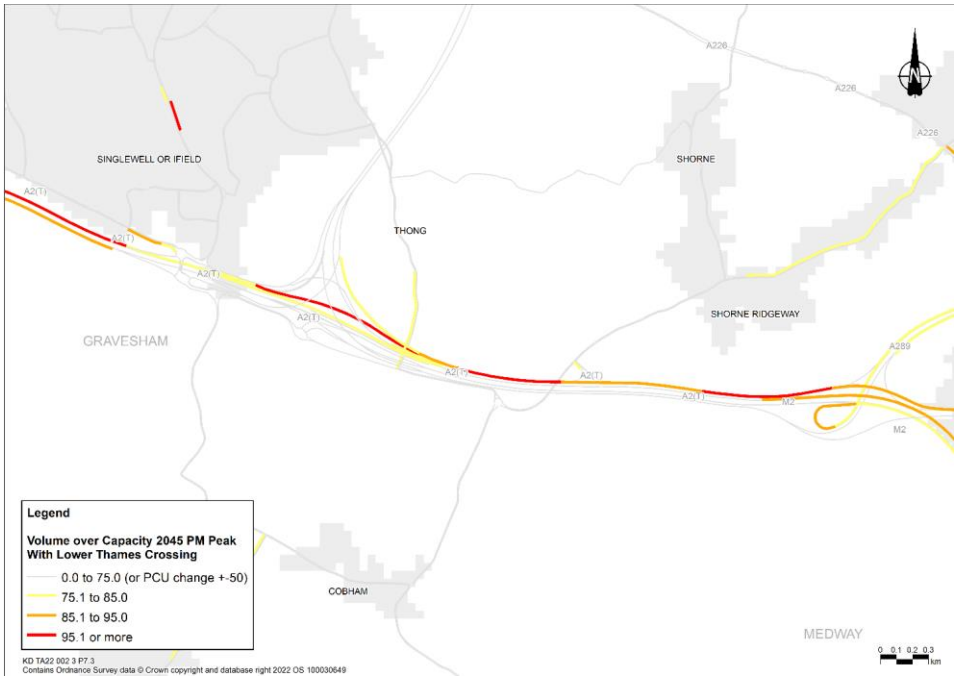
7.3.19 The volume to capacity percentages for the 2045 PM peak are shown in Plate 7.3.

7.3.20 This shows that in the 2045 PM peak there are a number of links at the M2/A2/A122 Lower Thames Crossing junction that are forecast to operate above 85%, including:

a. A2 eastbound distributor (98%)

b. A2 eastbound distributor approaching Brewers Road (95%)

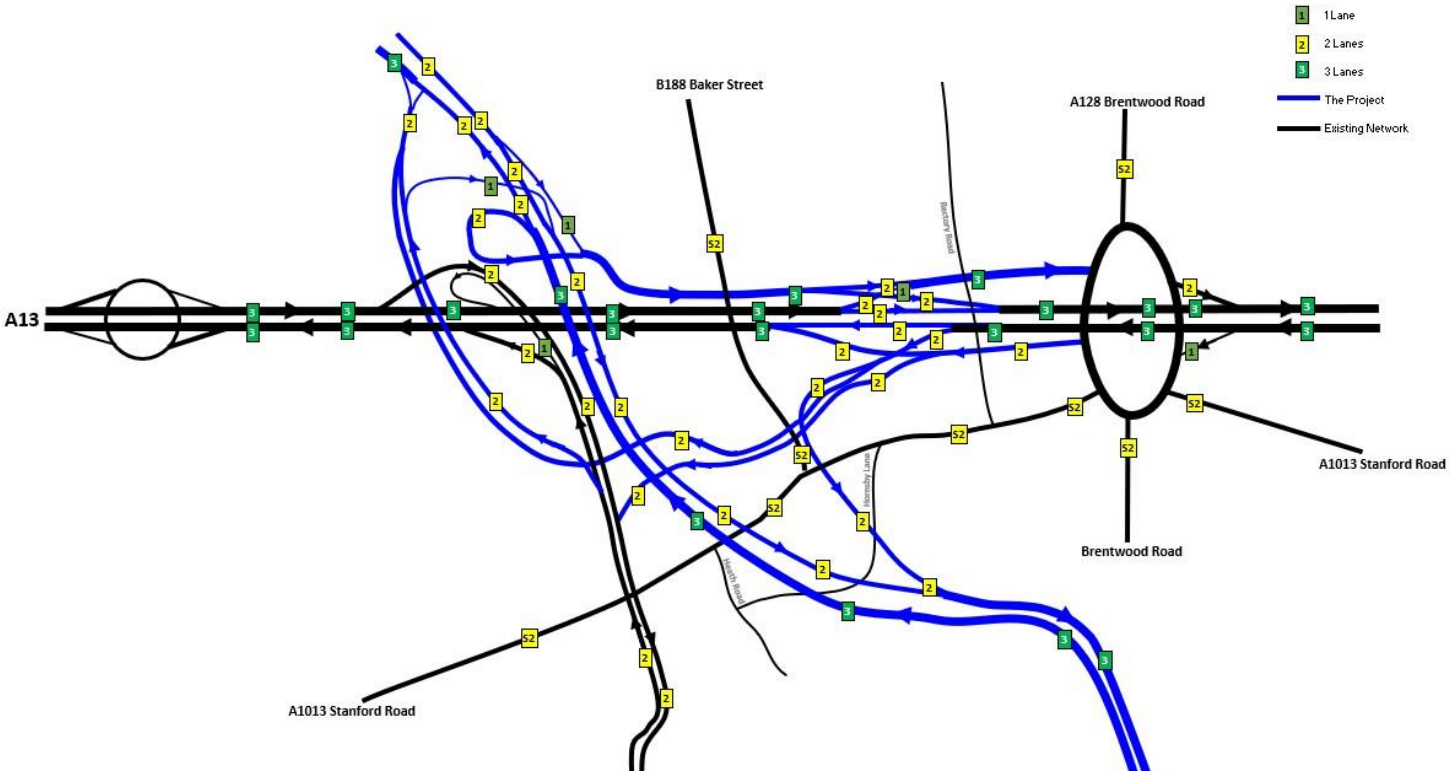
Plate 7.3 Volume to capacity at the M2/A2/A122 Lower Thames Crossing junction - PM peak 2045



A13/A1089/A122 Lower Thames Crossing junction

7.3.21 A plan of the way the junction is coded in the LTAM, showing the number of lanes on each section, is provided in Plate 7.4.

Plate 7.4 A13/A1089/A122 Lower Thames Crossing junction representation in the LTAM



Permitted movements

7.3.22 The A13/A1089/A122 Lower Thames Crossing junction has been designed to accommodate movements between the A13, A1089, A1013 Stanford Road and the Orsett Cock junction as detailed in Table 7.3.

Table 7.3 Permitted movements at the A13/A1089/A122 Lower Thames Crossing junction

Starting location \ Direct connections	LTC northbound	LTC southbound	A1089 southbound	A13 eastbound	A13 westbound
LTC northbound			✓†	✓	✗
LTC southbound			✓†	✓	✗
A1089 northbound	✓	✓		✓	✓
A13 eastbound	✗	✗	✓		
A13 westbound	✓*	✓*	✓†		

* Not from the Orsett Cock junction

† Via the Orsett Cock junction

7.3.23 The Project would not provide for all possible movements at the junction either due to lack of demand (for example A13 eastbound to the Project northbound) or because of physical constraints that prevent the cost-effective provision of the movement (for example the Project northbound to A13 westbound).

7.3.24 The A128 Brentwood Road, B188 Baker Street and Rectory Road would connect to the Project through the Orsett Cock junction.

7.3.25 Access to the A1089 from the A13 eastbound would remain unchanged, as would access from the A1089 to the A13 westbound. The current access from the A13 westbound to the A1089 would be rerouted via the Orsett Cock junction. Access from the A122 north and southbound, as well as to local roads, would also be via the Orsett Cock junction.

AM peak

Total vehicle flows

7.3.26 The traffic travelling north across the River Thames on the A122 is destined as follows:

a. 53% of total traffic would continue north towards the M25.

b. 47% of total traffic would turn east on to the A13.

7.3.27 Traffic travelling south across the River Thames on the A122 originates as follows:

a. 44% of total traffic would come from the M25.

b. 43% of total traffic would come from the A13 westbound.

c. 13% of total traffic would come from the A1089 northbound.

HGV flows

7.3.28 The traffic travelling north across the River Thames on the A122 is destined as follows:

a. 80% of HGVs would continue north towards the M25.

b. 20% of HGVs would turn east on to the A13.

7.3.29 The traffic travelling south across the River Thames on the A122 originates as follows:

a. 71% of HGVs would come from the M25.

b. 18% of HGVs would come from the A13 westbound

c. 13% of HGVs would come from the A1089 northbound.

Volume to capacity

7.3.30 The volume to capacity percentages for the 2045 AM peak are shown in Plate 7.5. The plate shows that in the 2045 AM peak, the vast majority of links at the A13/A1089/A122 Lower Thames Crossing junction are forecast to operate under 75%. A number of small sections are forecast to operate between 75% and 85%, with all of the junction operating below 85%.

Plate 7.5 Volume to capacity at the A13/A1089/A122 Lower Thames Crossing junction – AM peak 2045

PM peak

Total vehicle flows

7.3.31 The traffic travelling north across the River Thames on the A122 Lower Thames Crossing is destined as follows:

a. 44% of total traffic would continue north towards the M25.

b. 56% of total traffic would turn east on to the A13.

7.3.32 The traffic travelling south across the River Thames on the A122 Lower Thames Crossing originates as follows:

a. 45% of total traffic would come from the M25.

b. 43% of total traffic would come from the A13 westbound.

c. 12% of total traffic would come from the A1089 northbound.

HGV flows

7.3.33 The traffic travelling north across the River Thames on the A122 Lower Thames Crossing is destined as follows:

a. 81% of HGVs would continue north towards the M25.

b. 19% of HGVs would turn east on to the A13.

7.3.34 The traffic travelling south across the River Thames on the A122 Lower Thames Crossing would originate as follows:

a. 94% of HGVs from the M25.

b. 4% of HGVs from the A13 westbound.

c. 2% of HGVs from the A1089 northbound.

Volume to capacity

7.3.35 The volume to capacity percentages for the 2045 PM peak are shown in Plate 7.6.

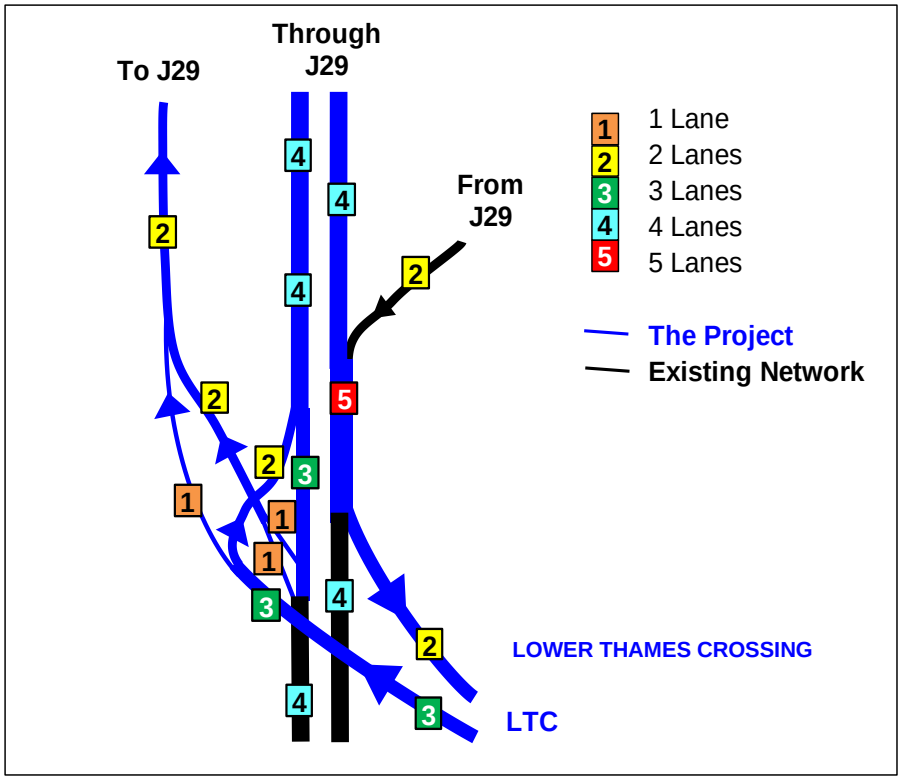
Plate 7.6 Volume to capacity at the A13/A1089/A122 Lower Thames Crossing junction – PM peak 2045

7.3.36 Plate 7.6 shows that in the 2045 PM peak, the vast majority of the A13/A1089/A122 Lower Thames Crossing junction would operate with a forecast volume to capacity of below 85%. However, a small part of the link road approaching the Orsett Cock junction from the west is forecast to operate at 88%, while the approach to the junction itself is forecast to operate at 93%.

A122 Lower Thames Crossing/M25 junction

7.3.37 A plan of the way the junction is coded in the LTAM, showing the number of lanes on each section, is provided in Plate 7.7.

Plate 7.7 A122 Lower Thames Crossing/M25 junction representation in the LTAM



Permitted movements

7.3.38 The A122 Lower Thames Crossing/M25 junction would be designed to accommodate the following movements between the M25, A127 and the A122:

a. A122 northbound to the M25 northbound.

b. A122 northbound to M25 junction 29.

c. M25 southbound to the A122 southbound.

d. M25 northbound to M25 junction 29.

AM peak

Total vehicle flows

7.3.39 The number of vehicles leaving the Project northbound in the AM peak in 2045 would be 4,693 PCUs in the core scenario. Of the traffic travelling north on the A122:

a. 79% of total traffic would continue north towards the M25.

b. 21% of total traffic would take the slip/link road to M25 junction 29.

7.3.40 For the traffic travelling south on the M25 towards the A122 Lower Thames Crossing:

a. 73% of total traffic would continue south on the M25.

b. 27% of total traffic would take the A122 Lower Thames Crossing towards the A13.

HGV flows

7.3.41 Of the HGV traffic travelling north on the A122 Lower Thames Crossing:

a. 91% of HGVs would continue north towards the M25.

b. 9% of HGVs would take the slip/link road to M25 junction 29.

7.3.42 For the HGV traffic travelling south on the M25 towards the A122 Lower Thames Crossing:

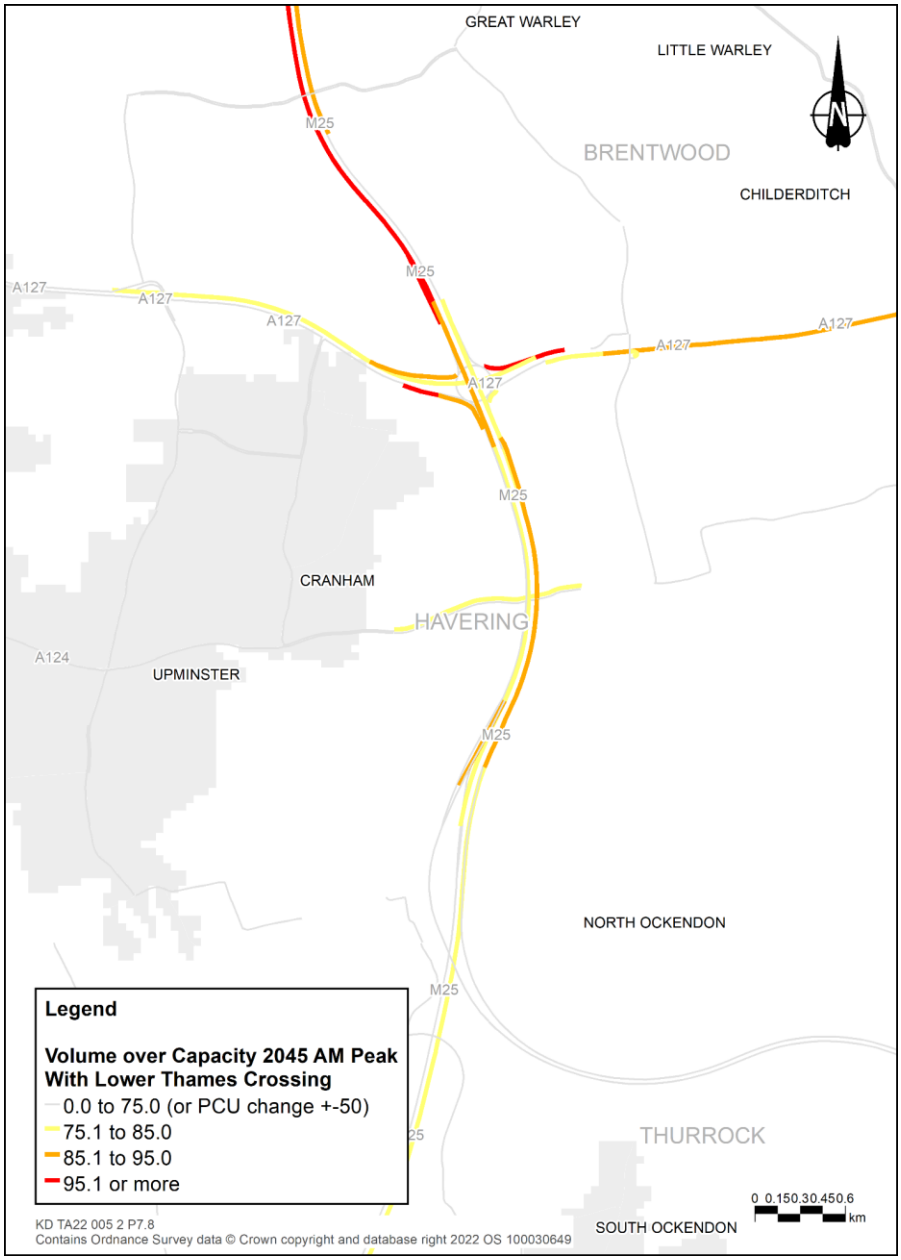
a. 71% of HGVs would continue south on the M25.

b. 29% of HGVs would take the A122 Lower Thames Crossing towards the A13.

Volume to capacity

7.3.43 The volume to capacity percentages for the 2045 AM peak are shown in Plate 7.8. The plate shows that in the 2045 AM peak all of the junction links are forecast to operate below 75%, except for the northbound lane merging with M25 northbound, where the volume to capacity percentage would be 88%.

Plate 7.8 Volume to capacity at the A122 Lower Thames Crossing/M25 junction – AM Peak 2045



PM peak

Total vehicle flows

7.3.44 The total vehicle traffic travelling north on the A122 would consist of:

a. 77% of total traffic continuing north towards the M25.

b. 23% of total traffic taking the slip/link road to M25 junction 29.

7.3.45 The total vehicle traffic travelling south on the M25 would consist of:

a. 62% of total traffic continuing south on the M25.

b. 38% of total traffic taking the A122 towards the A13.

HGV flows

7.3.46 The HGV traffic travelling north on the A122 would consist of:

a. 94% of HGVs continuing north towards the M25.

b. 6% of HGVs taking the slip/link road to M25 junction 29.

7.3.47 The HGV traffic travelling south on the M25 would consist of:

a. 64% of HGVs continuing south on the M25.

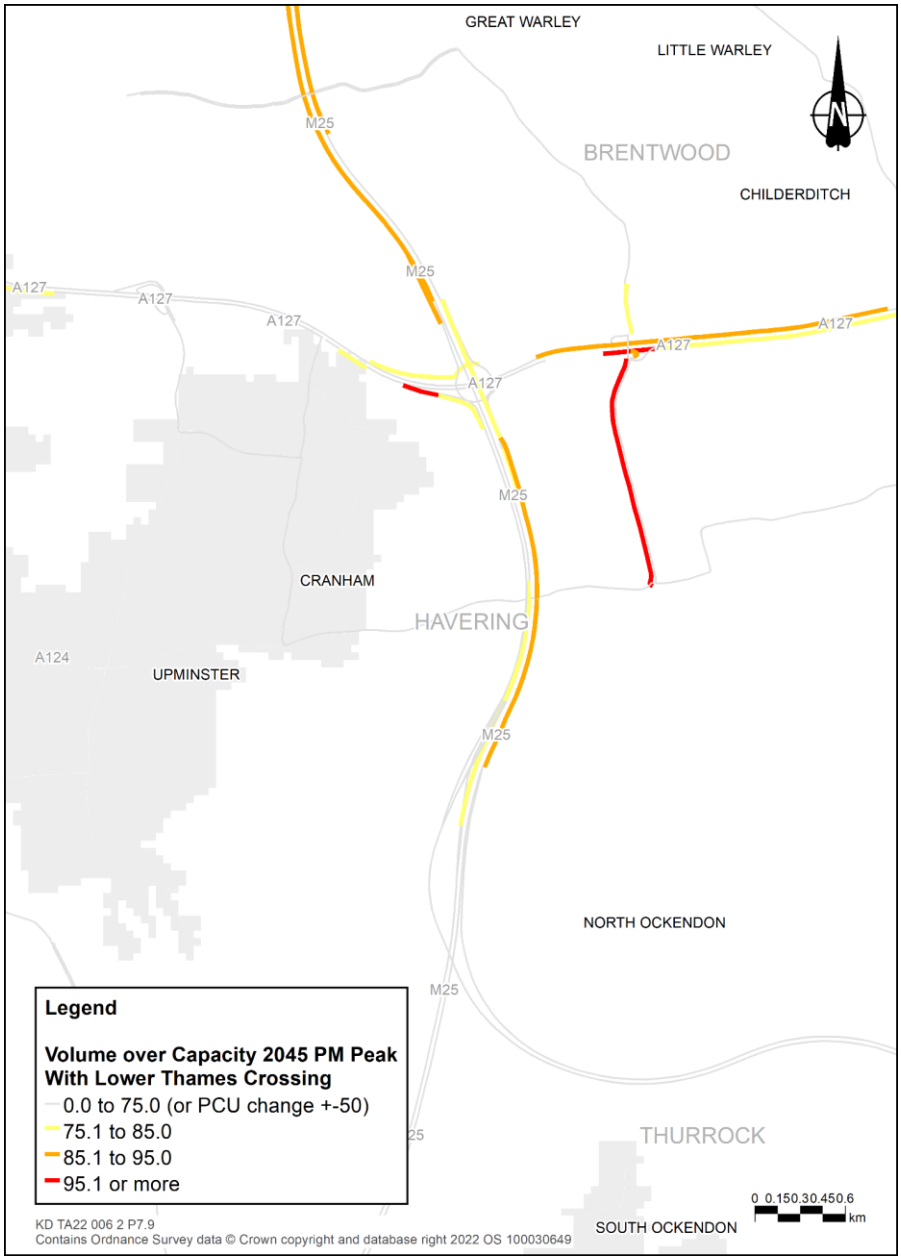
b. 36% of HGVs taking the A122 Lower Thames Crossing towards the A13.

Volume to capacity

7.3.48 The volume to capacity percentages for the 2045 PM peak are shown in Plate 7.9.

7.3.49 Plate 7.9 shows that in the 2045 PM peak, all the links associated with the A122 Lower Thames Crossing/M25 junction would have volume to capacity percentages that remain below 85%, with the exception of the M25 southbound link to the A122 which is forecast to be just over 87%.

Plate 7.9 Volume to capacity at the A122 Lower Thames Crossing/M25 junction – PM Peak 2045



7.4 Changes in flow on the river crossings

Total vehicle flows

7.4.1 Table 7.4 shows forecast traffic flows in both directions on the Dartford Crossing and at the A122 Lower Thames Crossing during the morning and evening peak hours, and an average inter-peak hour.

Table 7.4 Hourly forecast cross-river flows (PCUs/hr)

Period	Year	Without the Project (Do Minimum)	With the Project (Do Something)		
		Dartford Crossing*	Dartford Crossing*	Lower Thames Crossing	Total flows
AM peak hour	2016	14,430	-		
	2030	16,020	13,280	8,040	21,320
	2045	16,260	14,870	8,940	23,810
Inter-peak hour	2016	11,790	-		
	2030	14,410	10,780	6,510	17,290
	2045	15,660	12,770	7,590	20,360
PM peak hour	2016	12,830	-		
	2030	15,310	12,020	7,990	20,010
	2045	16,280	13,540	8,830	22,370

**Flows at the Dartford Crossing (northbound only) are approaching the Traffic Management Cell.*

Note: Flows rounded to nearest 10.

Source: Lower Thames Area Model (N108 (Run 1), CM49, CS72)

7.4.2 The number of vehicles using the Dartford Crossing is forecast to be lower with the A122 Lower Thames Crossing than without it in 2030 and 2045. The total number of trips using both crossings is higher than if only the Dartford Crossing is available. This is because more people in the catchment area of the new crossing would choose to cross the River Thames than they would without the new crossing, so the number of trips on the Project would be higher than the number of trips that would otherwise have used the Dartford Crossing from this area.

7.4.3 In addition, more trips in the catchment area for the Dartford Crossing would use that crossing once the Project is available as the congestion at the Dartford Crossing would fall and travelling to the other side of the River Thames becomes a more attractive option for people.

7.4.4 The model predicts that even with these additional journeys:

a. The overall level of traffic using the Dartford Crossing would fall on average by 19% in 2030 and up to 13% in 2045 in the peak hours when compared to the situation without the Project.

b. Average speeds on that part of the network would rise and journey times would become more reliable.

HGV flows

7.4.5 Furthermore, there would be a decrease in the number of HGVs using the Dartford Crossing. Together with lower overall flows on the Dartford Crossing, the percentage of HGVs would fall as shown in Table 7.5.

7.4.6 The levels of HGVs using the Project in 2030 and 2045 would be lower in percentage terms than the levels of HGVs currently using the Dartford Crossing. This is shown in Table 7.6.

7.4.7 However, when considering the combined flow for the Dartford Crossing and A122 Lower Thames Crossing in 2030 and 2045 in comparison to the Do Minimum flows, there would be an increase in the total HGV flows across all time periods:

a. 12% and 24% increase in the 2030 and 2045 AM peak.

b. 7% and 13% increase in the 2030 and 2045 inter-peak hour.

c. 7% and 11% increase in the 2030 and 2045 PM peak.

Table 7.5 Comparison of HGV vehicle numbers on Dartford Crossing and the A122 Lower Thames Crossing

Period	Year	Without the Project (Do Minimum)	With the Project (Do Something)		
		Dartford Crossing	Dartford Crossing	Lower Thames Crossing	Total flows
AM peak hour	**2016**	2,130	-		
	2030	2,210	1,640	840	2,480
	2045	2,120	1,770	850	2,620
Inter-peak hour	**2016**	2,220	-		
	2030	2,440	1,610	1,010	2,620
	2045	2,500	1,830	990	2,820
PM peak hour	**2016**	1,460	-		
	2030	1,550	1,040	620	1,660
	2045	1,570	1,140	600	1,740

Table 7.6 Percentage of HGVs at Dartford Crossing and the A122 Lower Thames Crossing

Period	Year	Without the Project (Do Minimum)	With the Project (Do Something)	
		Dartford Crossing (%)	Dartford Crossing (%)	Lower Thames Crossing (%)
AM peak hour	**2016**	18	-	
	2030	18	15	13
	2045	17	14	11
Inter-peak hour	**2016**	26	-	
	2030	24	19	20
	2045	23	18	16
PM peak hour	**2016**	14	-	
	2030	12	10	9
	2045	12	10	8

Volume to capacity

7.4.8 Table 7.7 shows the percentage of volume to capacity for the Dartford Crossing and the A122 Lower Thames Crossing tunnel. The data for the Dartford Crossing relates to the link just before the Traffic Management Cell northbound at the Dartford Crossing and the bridge itself southbound.

Table 7.7 Comparison of volume to capacity percentages on the Dartford Crossing and the A122 Lower Thames Crossing tunnel

Period	Year	Without the Project (Do Minimum)	With the Project (Do Something)	
		Dartford Crossing %	Dartford Crossing %	Lower Thames Crossing %
AM peak hour	**2016**	93	-	
	2030	104	86	65
	2045	105	95	73
Inter-peak hour	**2016**	78	-	
	2030	95	71	52
	2045	103	84	61
PM peak hour	**2016**	90	-	
	2030	101	79	63
	2045	107	89	70

7.4.9 More information on the traffic forecasts for the Dartford Crossing and the Project are contained in Appendix C: Transport Forecasting Package of the ComMA (Application Document 7.7).

7.5 Traffic forecasts for the wider road network

7.5.1 The transport model is used to predict the following:

a. How people would react to the changes in the time and cost of their journeys.

b. The routes they would use as a result of the Project.

7.5.2 The LTAM predicts that the biggest change as a result of the Project would be the number of people who choose to travel to the other side of the River Thames.

7.5.3 Information from the LTAM on the change in flows and percentage of volume to capacity is presented here to show these changes and their impact on the road network.

7.5.4 It is recommended that these are viewed together as a series to help understand what the transport model predicts. For example, a change in flow on a particular road does not necessarily result in an increase in congestion (which is shown by the change in volume to capacity).

Change in flow

7.5.5 Plate 7.10 to Plate 7.15 show the changes in the predicted amount of traffic in 2045, between the 'Do Minimum' and the 'Do Something' scenarios. A similar set of maps are shown in the Traffic Forecasts Non-Technical Summary (Application Document 7.8) for the opening year, 2030.

7.5.6 Roads contained within the LTAM are shown in varying shades of blue if traffic levels are forecast to decrease and in yellow to red if they are forecast to increase; the darker the colour, the greater the change. The A122 Lower Thames Crossing and other new links built as part of the Project are shown in green.

7.5.7 Overall, the impact on traffic flows as a result of the Project is similar during the AM, PM and inter-peak hours, with the changes more pronounced, and covering a wider area, during the AM and PM peaks.

7.5.8 On many roads to the west of the Project, such as the A2, the A13, the Dartford Crossing and the M25 in Thurrock, the number of vehicles would fall when the Lower Thames Crossing opens. However, roads on the approach to the Project, including the M2, A228, A229, and some roads to the east of the Project, such as the A13, the A2 and some sections of the M25, would experience an increase in traffic levels as travel across the River Thames becomes easier and more reliable.

Plate 7.10 Change in flows with the Project: AM peak (07:00–08:00), 2045

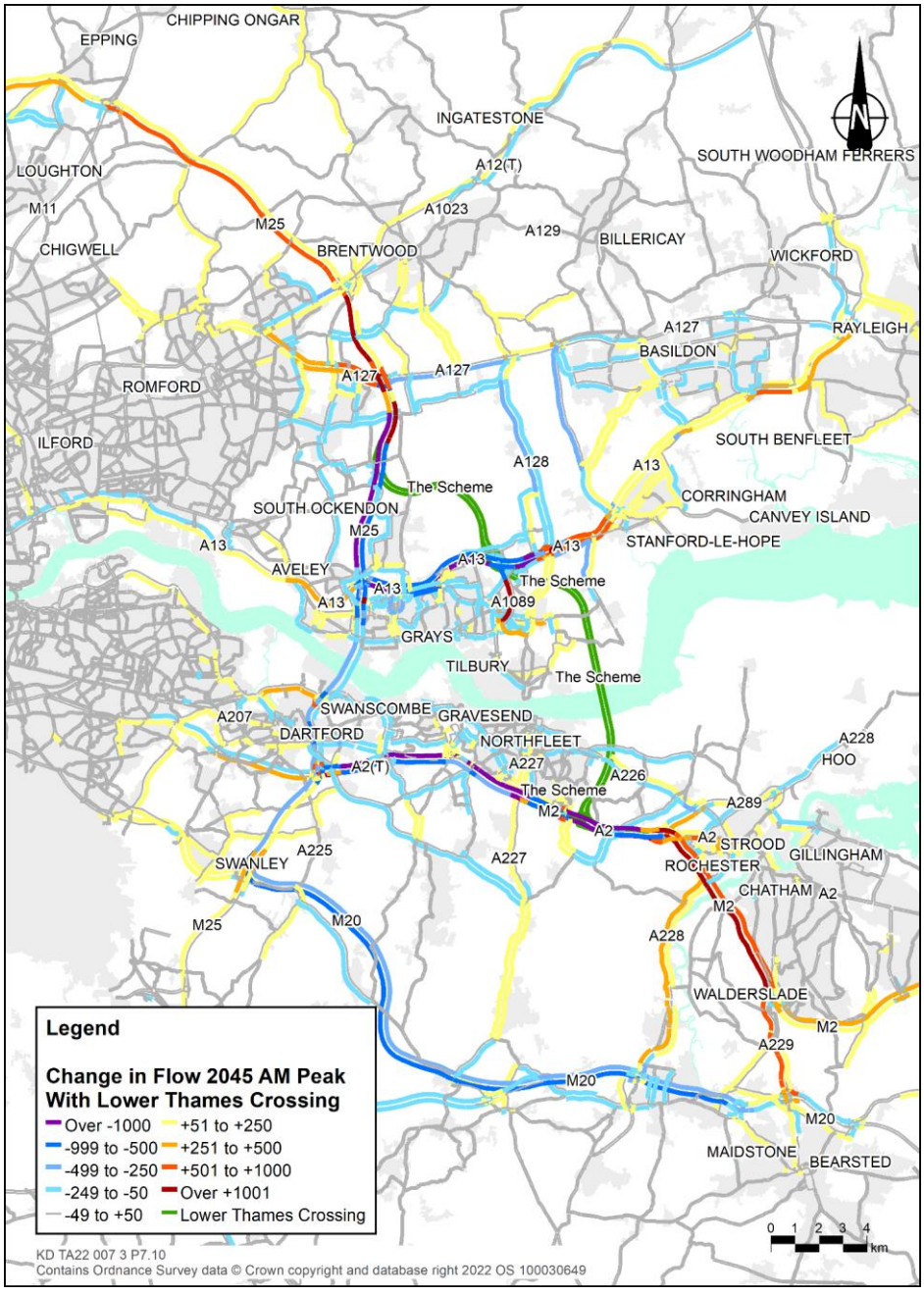


Plate 7.11 Change in flows with the Project: AM peak (07:00–08:00), 2045 at the junctions with the A2, A13 and M25

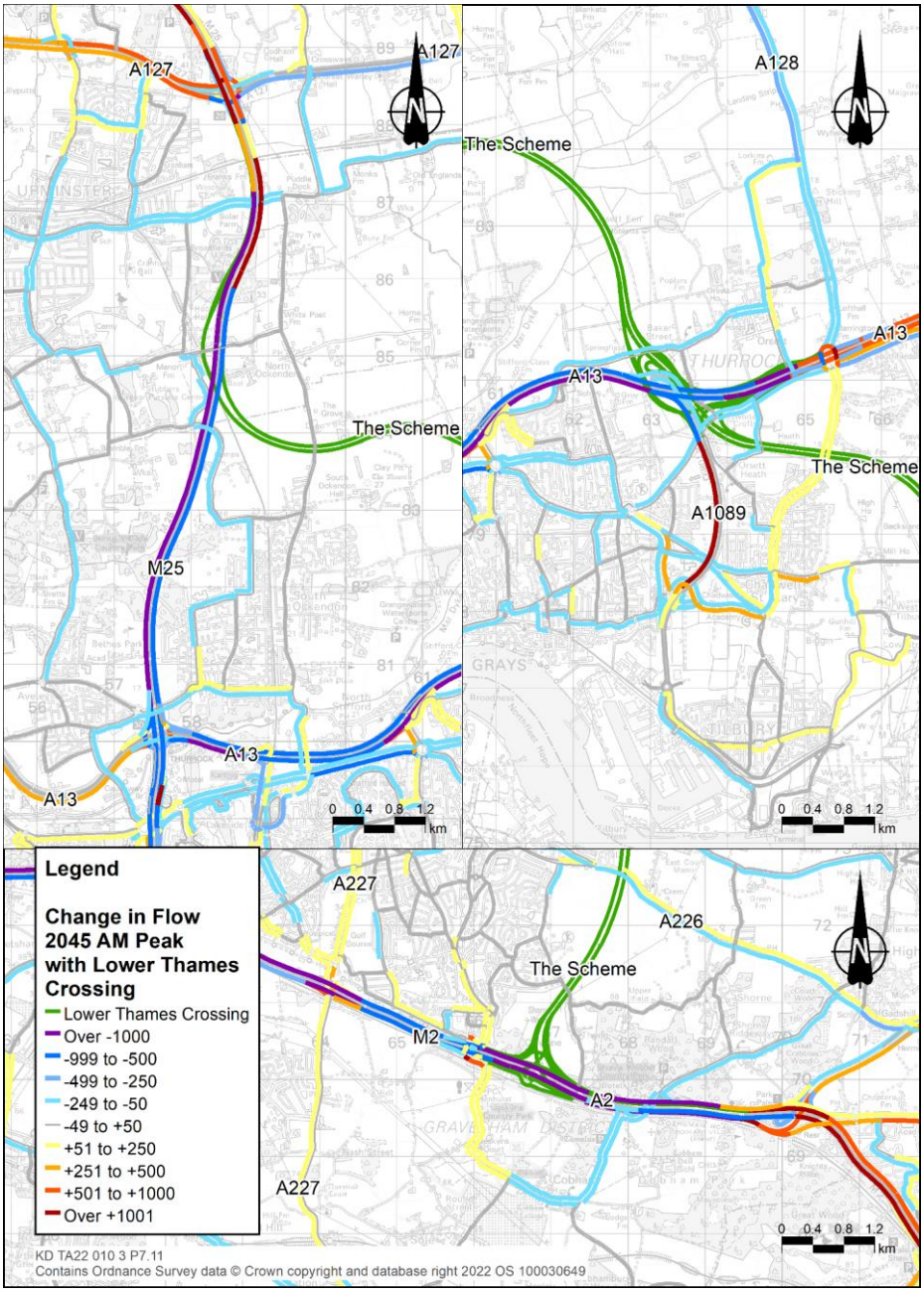


Plate 7.12 Change in flows with the Project: inter-peak, 2045

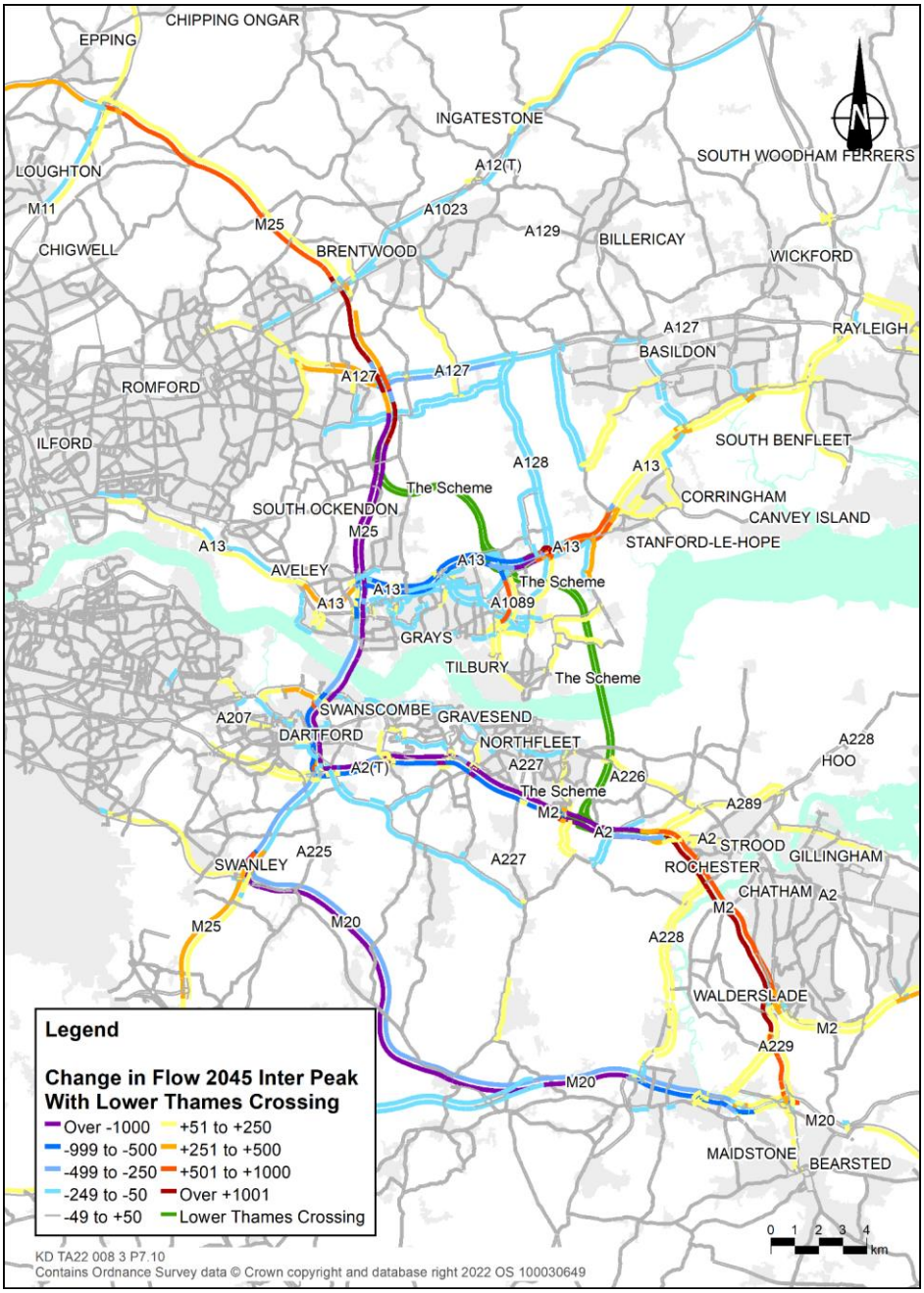


Plate 7.13 Change in flows with the Project: inter-peak, 2045 at the junctions with the A2, A13 and M25

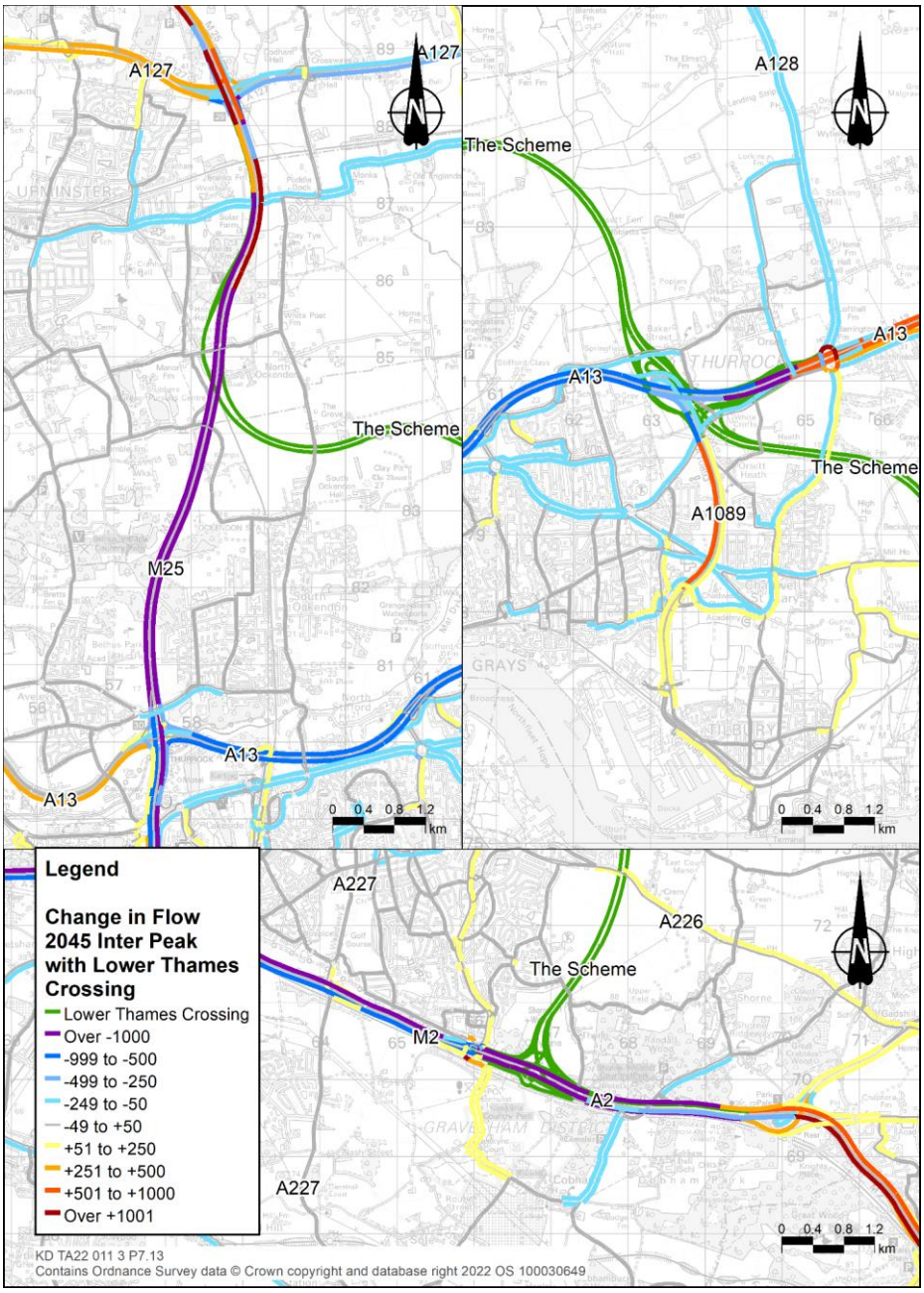


Plate 7.14 Change in flows with the Project: PM peak (17:00–18:00), 2045

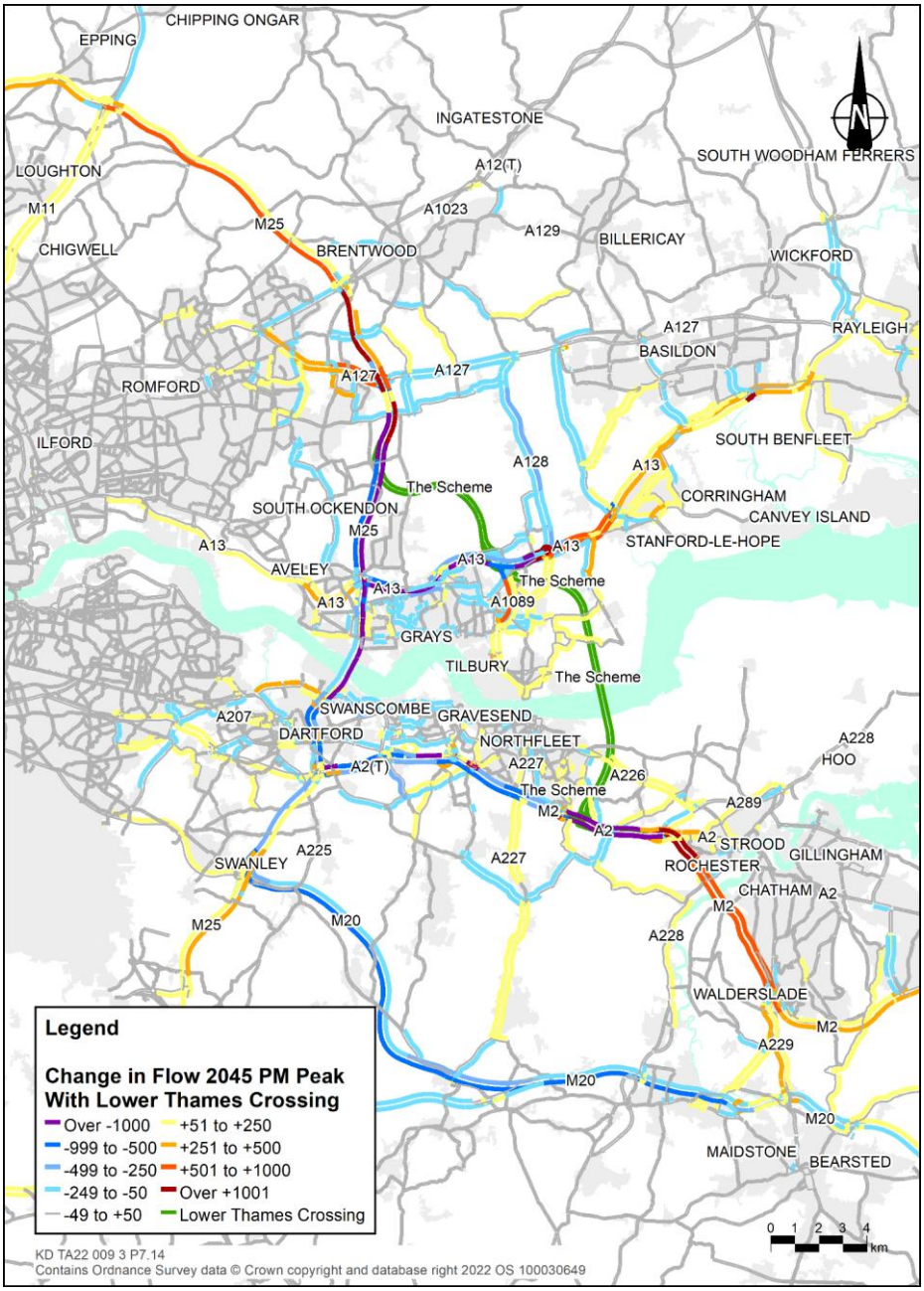
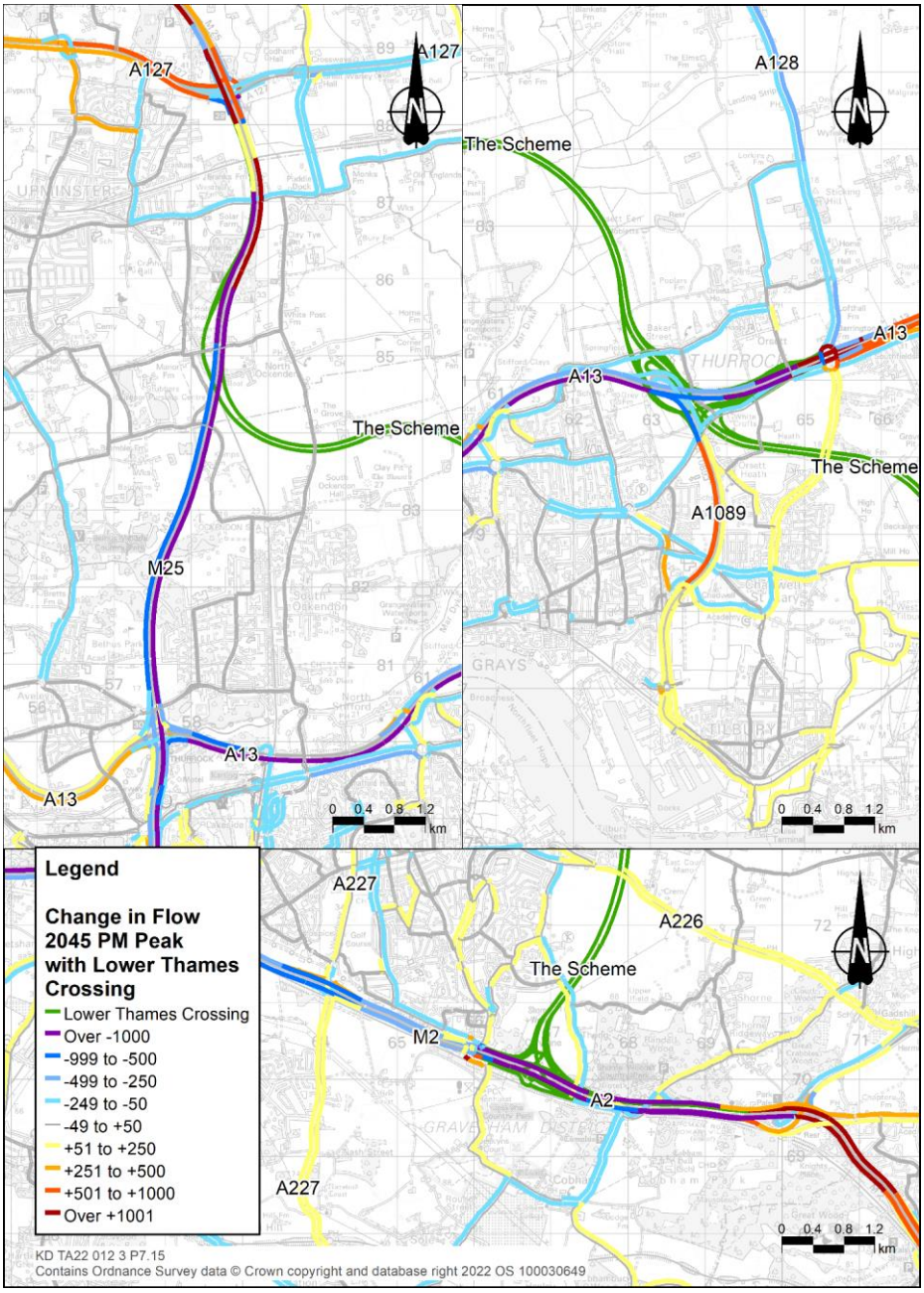


Plate 7.15 Change in flows with the Project: PM peak (17:00–18:00), 2045 at the junctions with the A2, A13 and M25



Percentage change in flow

7.5.9 Alongside the change in flow figures, the change in flow forecast by the LTAM as a percentage of the flow without the Project (Do Minimum) is presented in this section. This shows the relative effect of the change in flow, in relation to the flow that would be present without the Project.

7.5.10 Plate 7.16 to Plate 7.18 show the predicted percentage change in traffic in 2045 between the 'Do Minimum' scenario and the 'Do Something' scenario.

7.5.11 Roads contained within the LTAM are shown in varying shades of blue if a forecast decrease is predicted and in yellow to red if a forecast increase is predicted; the darker the colour, the greater the change. The A122 Lower Thames Crossing and other new links built as part of the Project are shown in green.

7.5.12 For example, if the flow on a section of road was forecast to be 1,000 PCUs in the 2045 AM peak hour without the Project, and 900 PCUs with the Project, that section would be highlighted in light blue, as the forecast change would be between -10% and -20%.

7.5.13 Some roads are shown with different colours on different sections, as a result of the addition/removal of traffic flow to account for the origins and destinations of trips within the transport model.

7.5.14 Overall, the pattern of impacts is similar during the morning, evening and inter-peak hours, although they are more pronounced and extensive during the morning and evening peaks.

7.5.15 Generally, local roads with lower traffic flow without the Project see higher percentage increases and decreases, whilst roads on the SRN which have a higher level of flow without the Project, see lower levels of percentage change.

7.5.16 There are some exceptions, such as parts of the A2 to the west of its junction with the Project, parts of the M25 and the Dartford Crossing, where high percentage reductions are forecast and flows are already high.

Plate 7.16 Percentage change in flows with the Project: AM peak (07:00–08:00), 2045

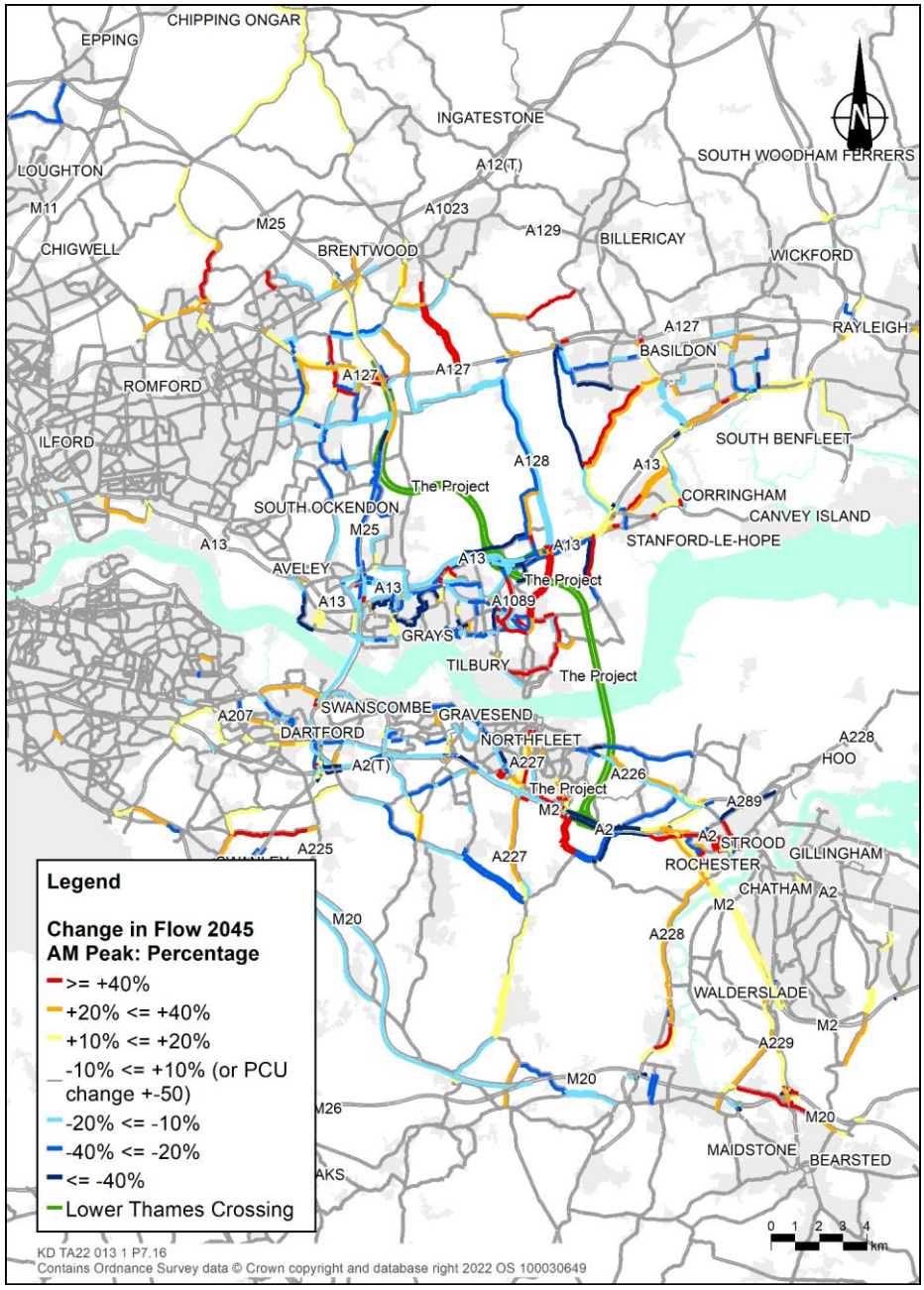


Plate 7.17 Percentage change in flows with the Project: inter-peak, 2045

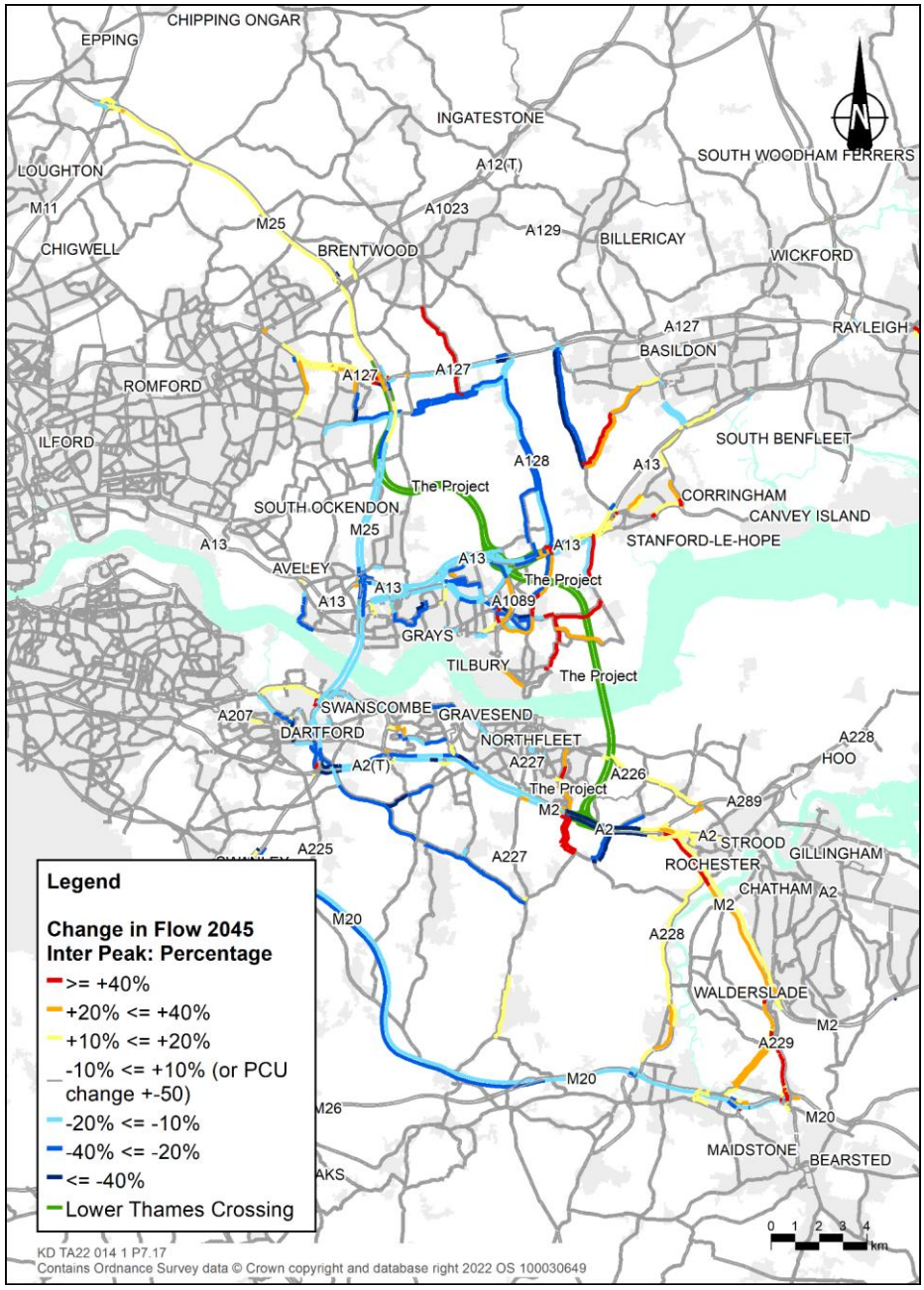
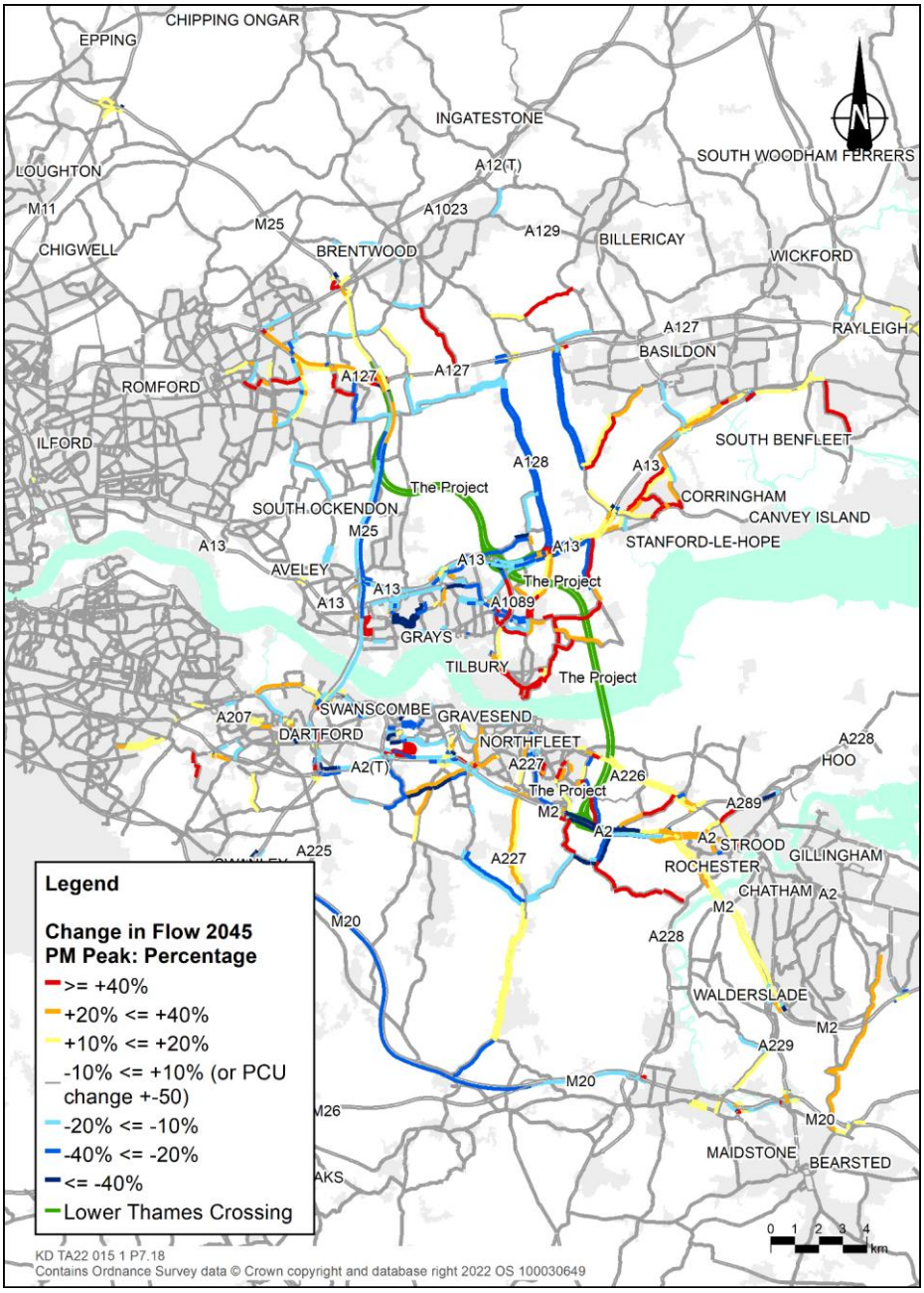


Plate 7.18 Percentage change in flows with the Project: PM peak (17:00–18:00), 2045



Change in volume to capacity

7.5.17 Plate 7.19 to Plate 7.24 show the volume of traffic as a percentage of capacity for the road network in the LTAM without the Project (Do Minimum) and with the Project (Do Something), for the AM peak, inter-peak and PM peak hours.

7.5.18 The plates show there are forecast to be improvements around the Dartford Crossing and on other roads in Gravesham and Thurrock as a result of the Project. On the wider road network, conditions remain largely unchanged. In a number of areas, the percentage of volume to capacity on some roads increases, particularly those close to the Project.

7.5.19 In the AM peak, without the Project (i.e. in the 'Do Minimum' scenario), the road network is forecast to have a number of roads where the percentage of volume to capacity is above 95%, including areas like the Dartford Crossing, sections of the M25, A2, A12, A13 and areas around Maidstone, Rochester/Chatham/Gillingham and Brentwood, as shown in Plate 7.19.

7.5.20 Plate 7.20 shows that the Project is forecast (i.e. in the 'Do Something' scenario) to improve the operation of the road network in the AM peak around the Dartford Crossing, as well as on the M20 and on parts of the M25, A13 and A2. However, some increases are shown in the percentage of volume to capacity on sections of the M25 north of the River Thames, on the A13 to the east of the Project and on the M2 as traffic switches away from the M20 to use the Project.

7.5.21 In the inter-peak there are fewer places, particularly on the SRN, where the percentage of volume to capacity is forecast to be above 75% without the Project (see Plate 7.21 and Plate 7.22). The major exception to this is on the Dartford Crossing northbound, which is forecast to be over 95% without the Project, as shown in red in Plate 7.21. However, the introduction of the Project reduces this forecast to below 75%, as shown in Plate 7.22.

7.5.22 The PM peak shows a similar pattern to that of the AM peak, in that with the introduction of the Project, the percentage of volume to capacity is forecast to reduce on sections of the network close to the Dartford Crossing (see Plate 7.23 and Plate 7.24).

Plate 7.19 Traffic volumes as percentage of road capacity, Do Minimum: AM peak, 2045

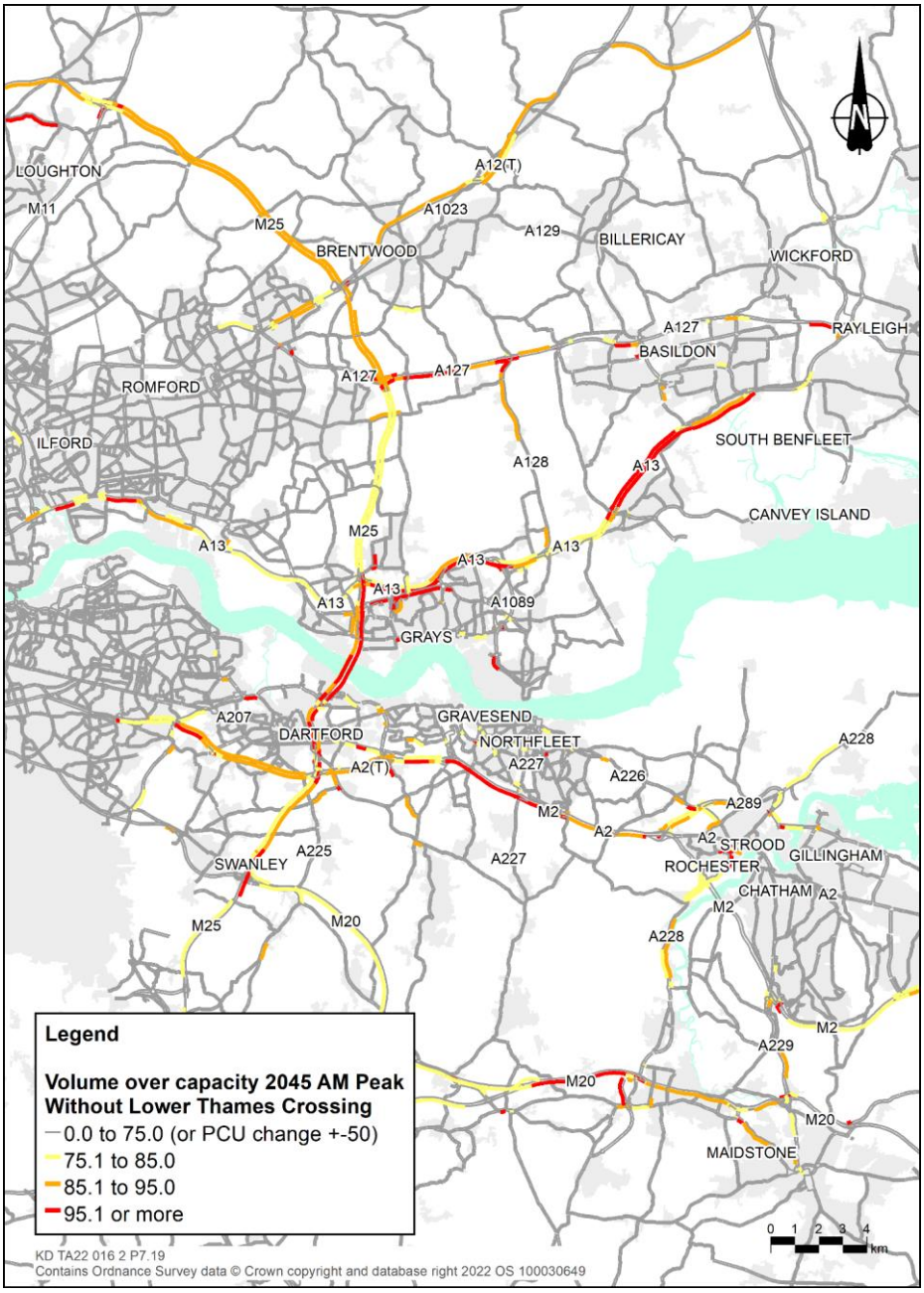


Plate 7.20 Traffic volumes as percentage of road capacity, Do Something: AM peak, 2045

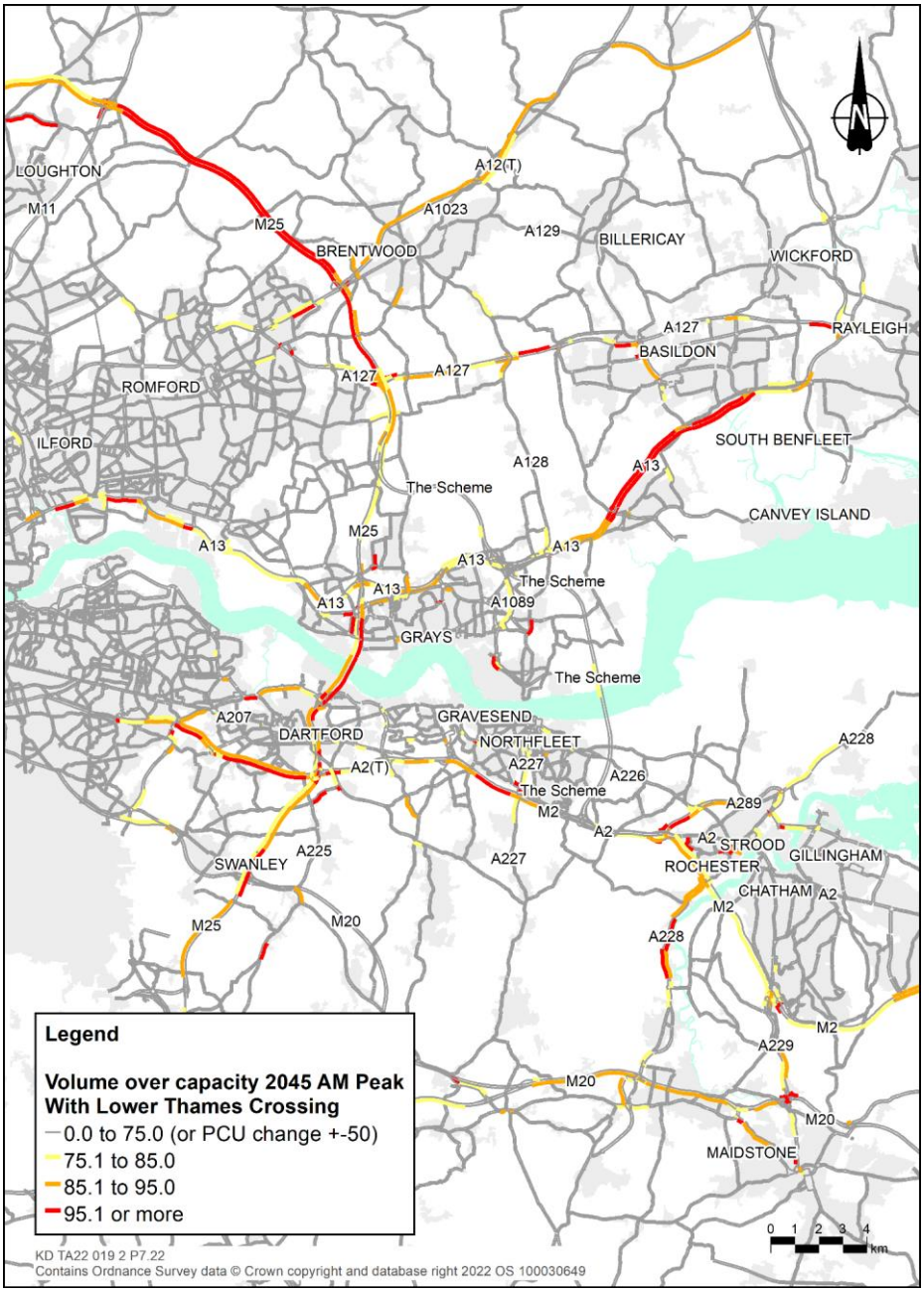


Plate 7.21 Traffic volumes as percentage of road capacity, Do Minimum: inter-peak, 2045

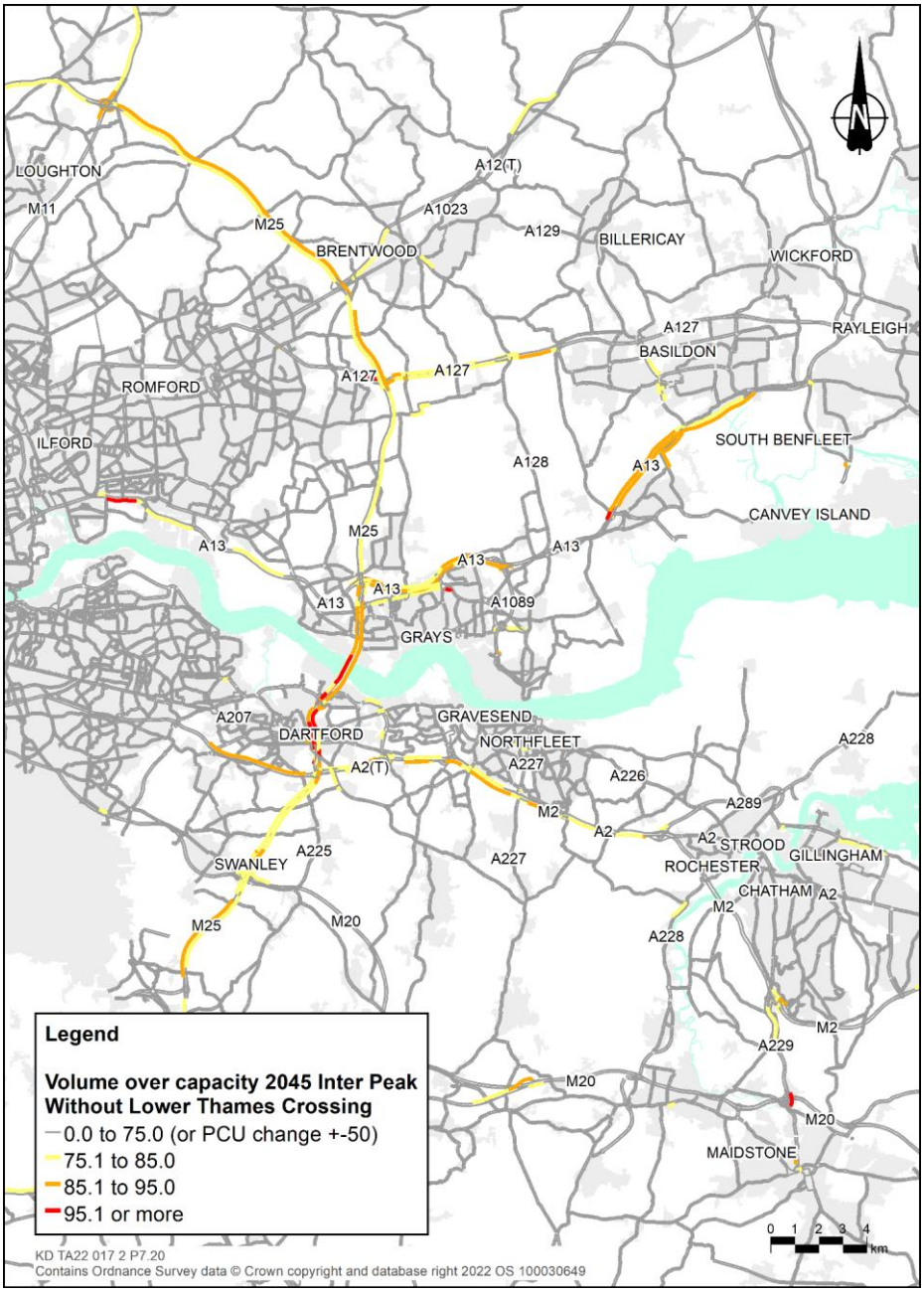


Plate 7.22 Traffic volumes as percentage of road capacity, Do Something: inter-peak, 2045

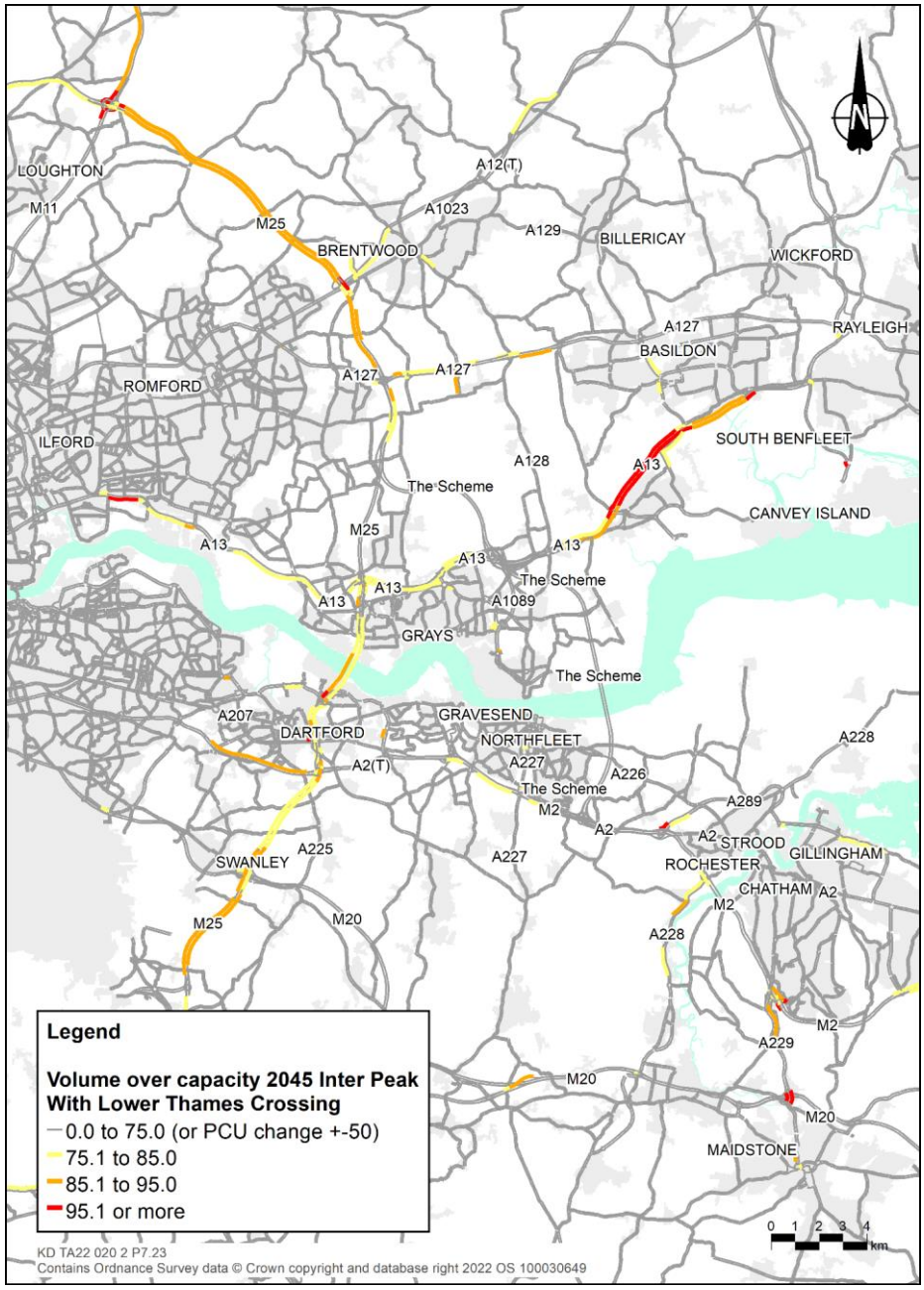


Plate 7.23 Traffic volumes as percentage of road capacity, Do Minimum: PM peak, 2045

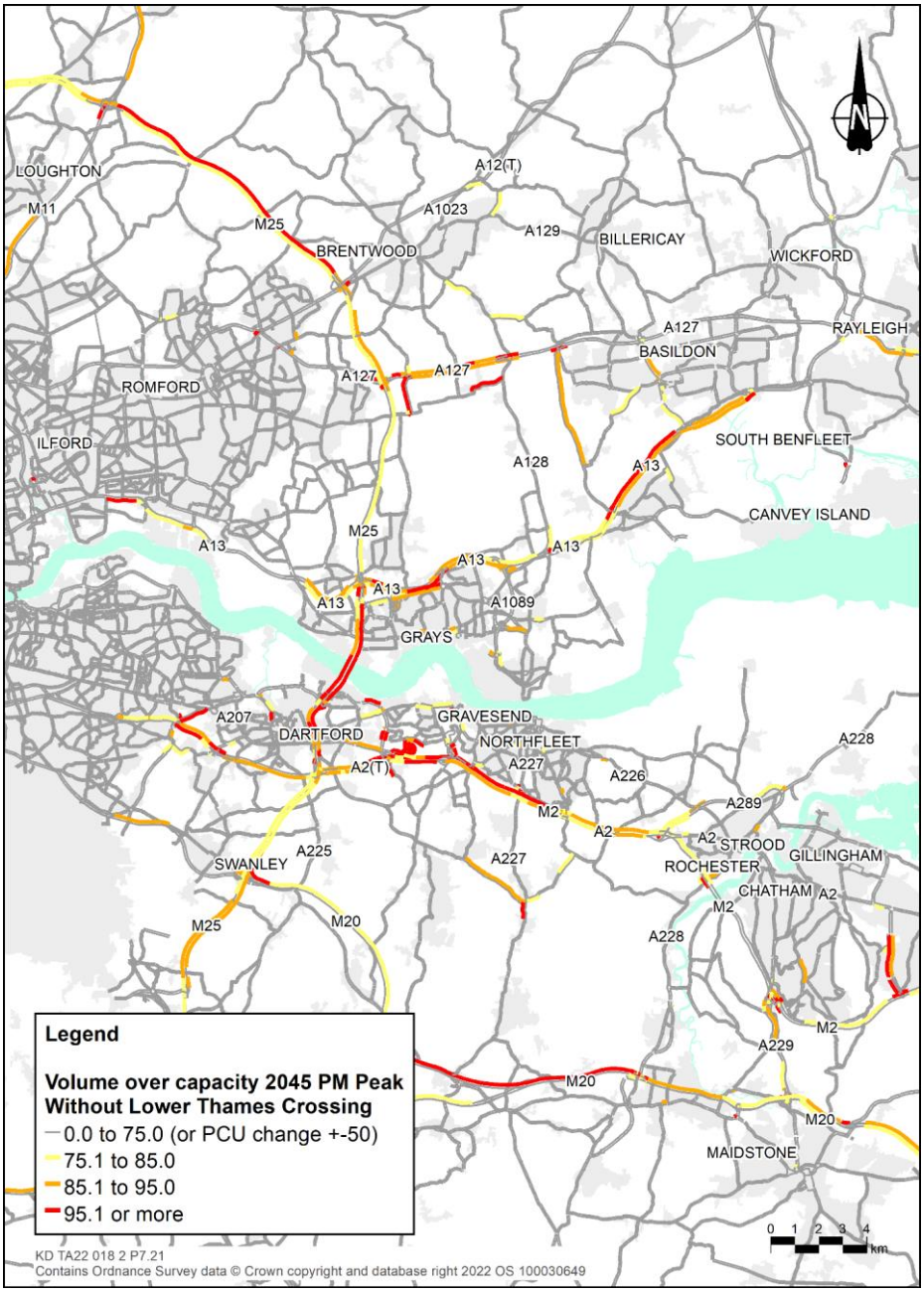
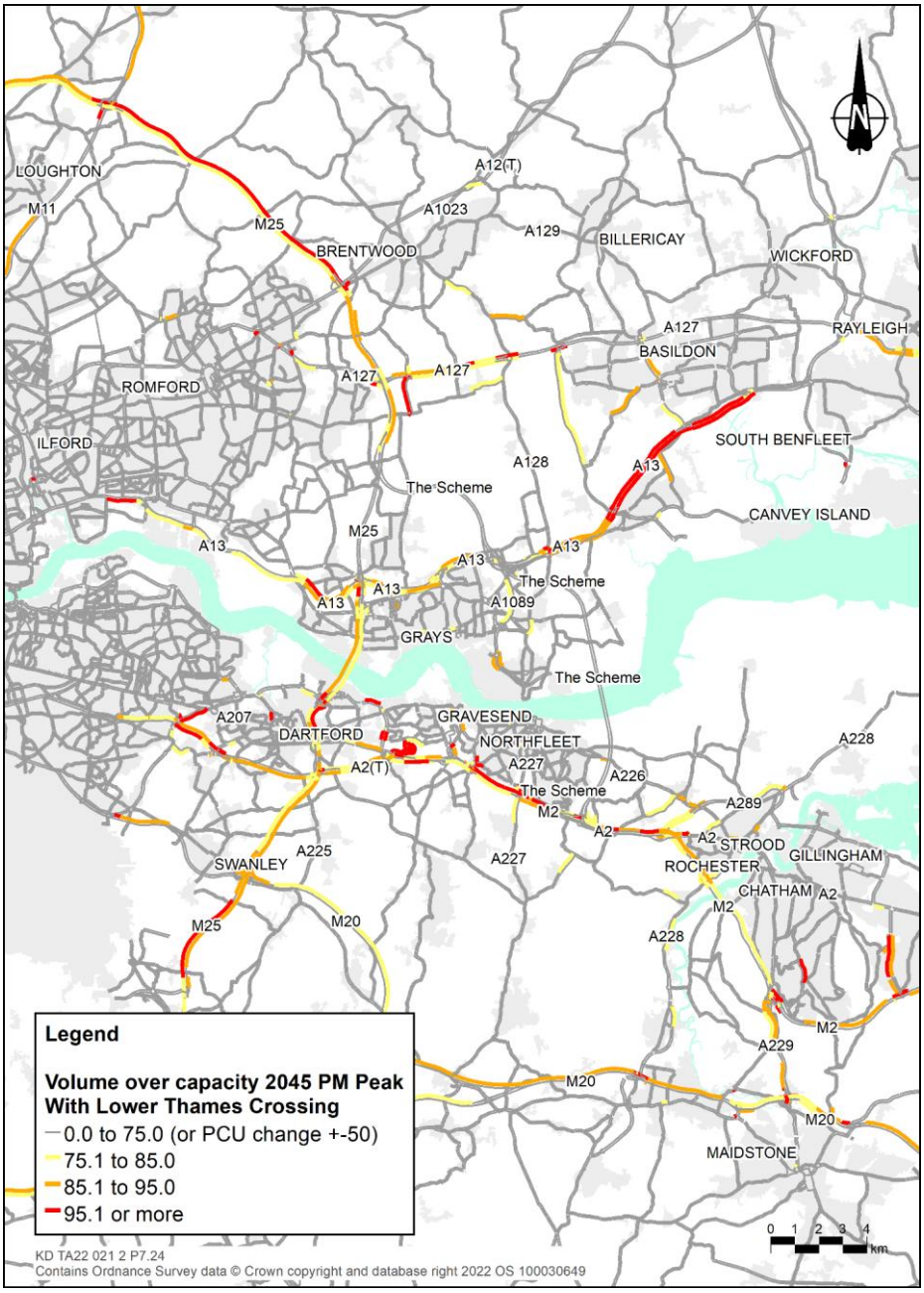


Plate 7.24 Traffic volumes as percentage of road capacity, Do Something: PM peak, 2045



7.6 Scale of impacts

7.6.1 A scoring criterion was used to assess the impact of the Project on each part of the wider road network. As a change in flow is not directly correlated with network performance and may not result in a noticeable change in network performance (an increase in flow if the link is operating well below capacity will not affect journey times), the volume to capacity measure was used to assess the impact of traffic flow changes on the performance of the network.

7.6.2 The analysis was carried out for all links and turning movements in a wide area around the Project. The area analysed is the area shown in Plate 7.24 to Plate 7.35, which shows the results of the impact assessment.

7.6.3 A score was calculated for each link/turning movement using the following method:

a. All links/turning movements where the volume to capacity is below 85% on both the 'Do Minimum' and 'Do Something' were screened out.

b. The absolute difference in volume to capacity between the 'Do Minimum (DM)' and 'Do Something (DS)' is calculated and assigned a score, using the scoring system in Table 7.8. If the percentage of volume to capacity in the 'Do Something' was greater than the 'Do Minimum', the score was positive; otherwise, the score was negative. A negative score indicates a decrease in the volume to capacity percentage which is an indicator of a decrease in journey time and increase in reliability.

Table 7.8 Scoring system for change in volume to capacity

Difference in volume to capacity	Score (if DS greater than DM)	Score (if DM greater than DS)
0-2	2	-2
2-4	4	-4
4-6	6	-6
6-8	8	-8
8-10	10	-10
10-12	12	-12
12-14	14	-14
14-16	16	-16
16-18	18	-18
18-20	20	-20
Over 20	22	-22

7.6.4 In order to allow for this, each link was assigned a score depending on the highest volume to capacity percentage in either the 'Do Minimum' or 'Do Something' scenario. This banding is shown in Table 7.9.

Table 7.9 Score for volume to capacity

Volume to capacity (%)	Score
Under 85	1
85 - 90	2
90 - 95	3
95 - 100	4
100 - 105	5
105 - 110	6
110 - 115	7
Above 115	8

7.6.5 The final score for each link/turning movement was calculated by multiplying the two scores together.

7.6.6 Each link/turning movement was then assigned a category using the thresholds set out in Table 7.10.

Table 7.10 Category thresholds

Score (%)	Scale of impacts
More than or equal to 80	Major adverse
40 to 79	Moderate adverse
16 to 39	Minor adverse
-15 to 15	Negligible
-16 to -39	Minor beneficial
-40 to -79	Moderate beneficial
Less than or equal to -80	Major beneficial

7.6.7 The assessment was carried out for the core, high growth and low growth scenarios for 2030.

7.6.8 Plate 7.24 to Plate 7.29 shows the links/turning movements where there is a minor, moderate or major adverse impact forecast. Links where the impact is forecast as minor adverse are shown in green, links where the impact is forecast as moderate adverse are shown in blue and links where the impact is forecast as major adverse are shown in red. The same colour convention is used for turning movements at junctions, although these are shown as circles. The largest impact at a junction is shown in the maps. The plates are presented for north and south of the River Thames separately to allow for readability.

7.6.9 Plate 7.30 to Plate 7.35 shows the links/turning movements where there is a beneficial (minor, moderate, major) impact. Links where the impact is forecast as minor beneficial are shown in green, links where the impact is forecast as moderate beneficial are shown in blue and links where the impact is forecast as major beneficial are shown in red. The same colour convention is used for turning movements at junctions, although these are shown as circles.
The largest impact at a junction is shown in the maps. The plates are presented for north and south of the River Thames separately to allow for readability.

7.6.10 The plates below show the results for the core scenario. Maps for the low and high growth scenarios are within Appendix D.

7.6.11 The maps show that there would be widespread changes in traffic flows across the region and the impact on some links would be noticeable; overall however, the Project would result in beneficial impacts to the road network.

7.6.12 Some roads would see adverse impacts; the largest of these would occur on the major routes leading to the Project such as the sections of the A13 from the east. There would be a moderate adverse impact on the M25 north of the Project.

7.6.13 South of the River Thames, the main adverse impacts would be at junctions, such as M25 junctions 3 and 29, M2 junctions 3 and 4 and M20 junction 6, which forms part of the Bluebell Hill link between the two motorways. There would also be adverse impacts on the local road network as a result of the re-routing of traffic, for example at Hall Road in Northfleet, and the Southend Road/Lampits Hill junction in Thurrock.

7.6.14 There would be a major beneficial impact on the Dartford Crossing, which aligns with one of the Scheme Objectives. The A13 between the Project and the M25, and the A2 between the Project and the M25, would also see a reduction in traffic and an improvement in the performance of the road network.

7.6.15 Chapter 10 of this TA provides details of the Project's proposed approach to managing impacts on the wider road network.

Plate 7.25 Adverse impacts, north, core scenario, AM peak 2030

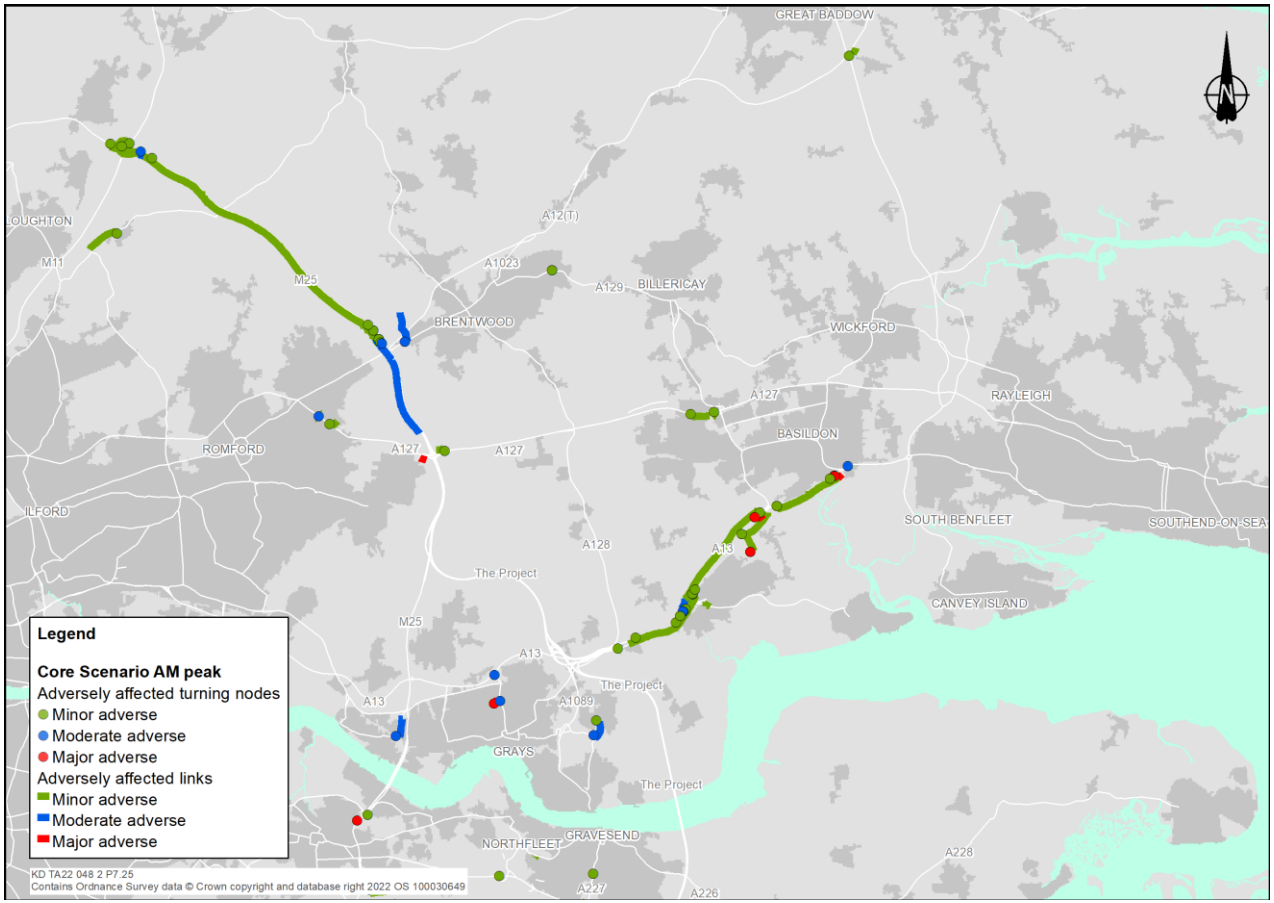


Plate 7.26 Adverse impacts, north, core scenario, inter-peak 2030

Plate 7.27 Adverse impacts, north, core scenario, PM peak 2030

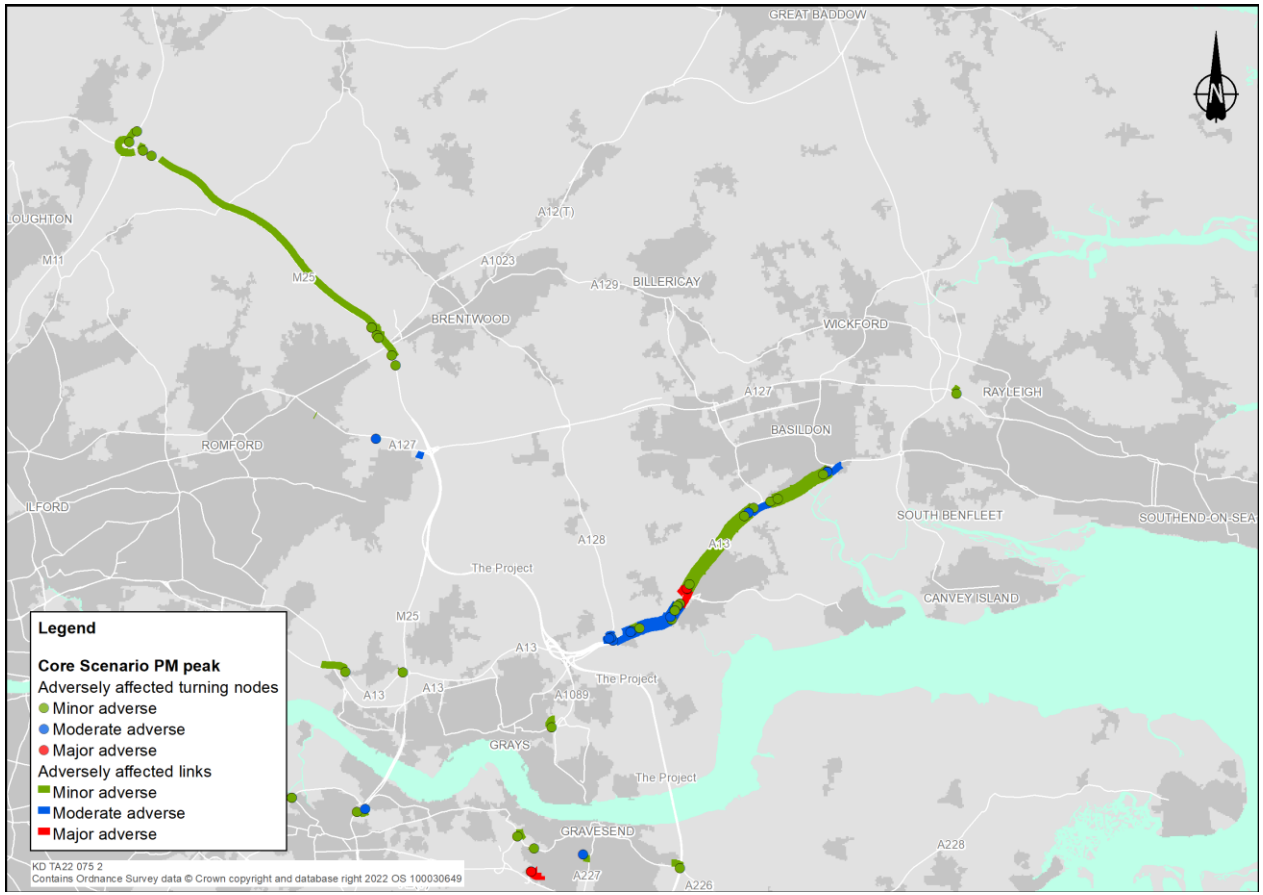


Plate 7.28 Adverse impacts, south, core scenario, AM peak 2030

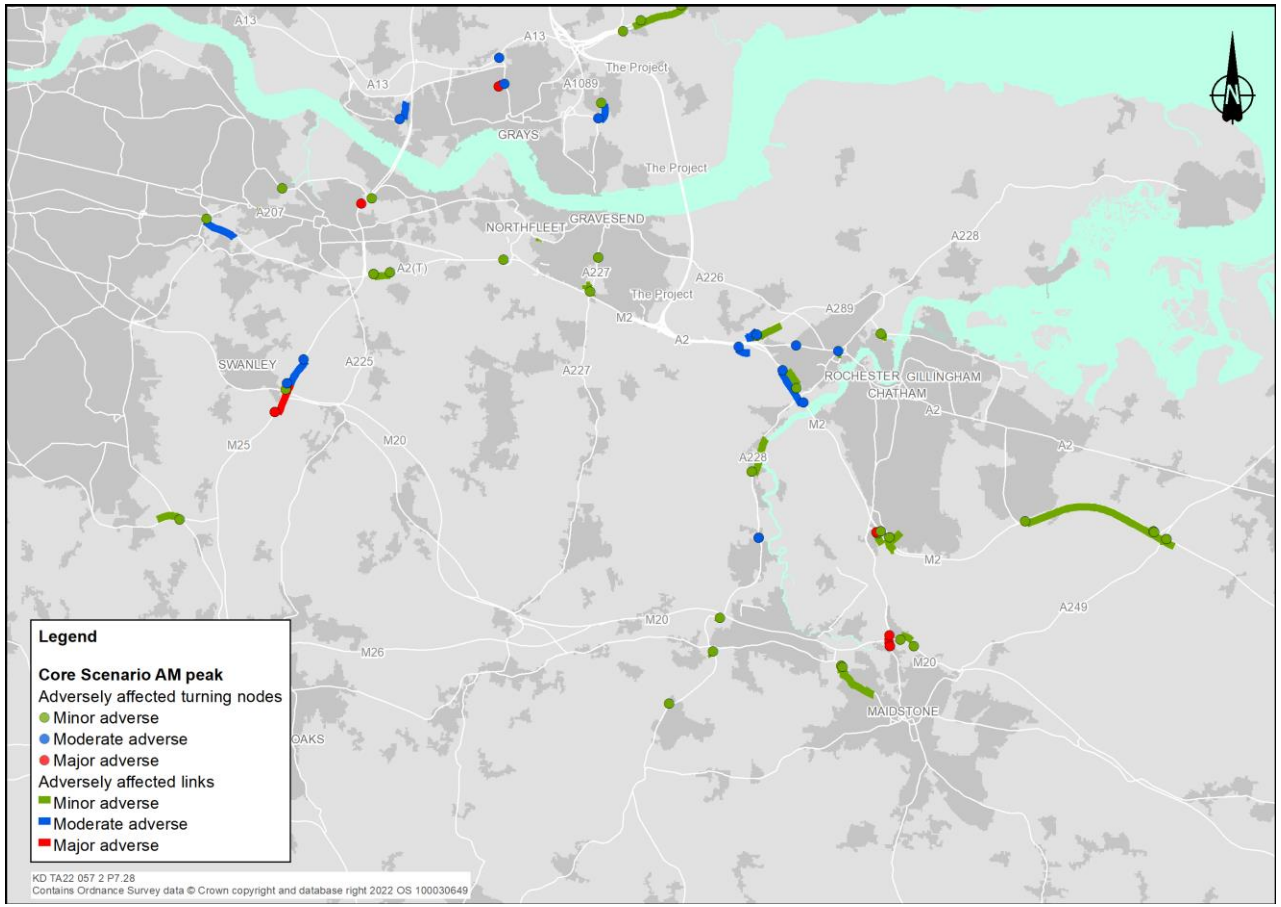


Plate 7.29 Adverse impacts, south, core scenario, inter-peak 2030

Plate 7.30 Adverse impacts, south, core scenario, PM peak 2030

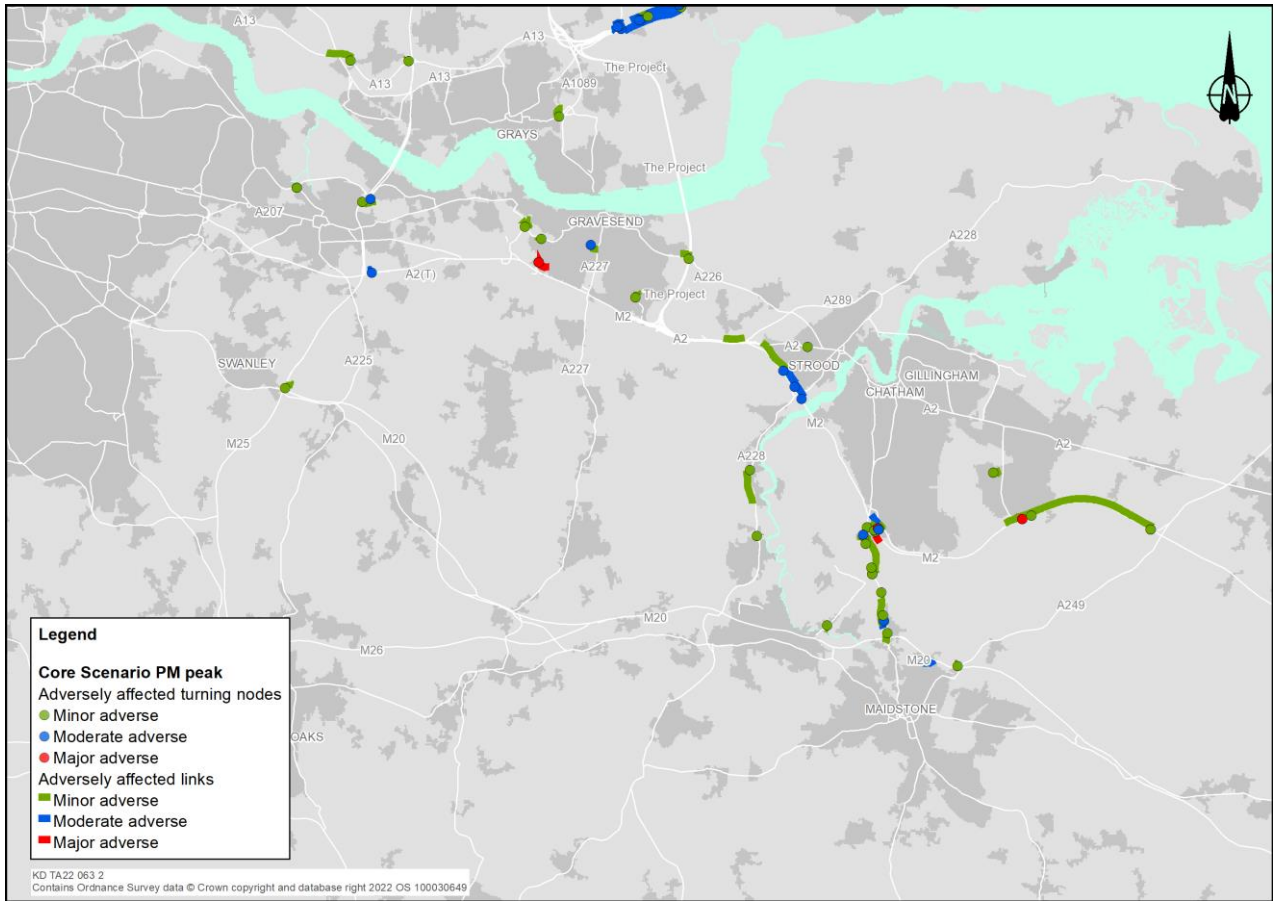


Plate 7.31 Beneficial impacts, north, core scenario, AM peak 2030

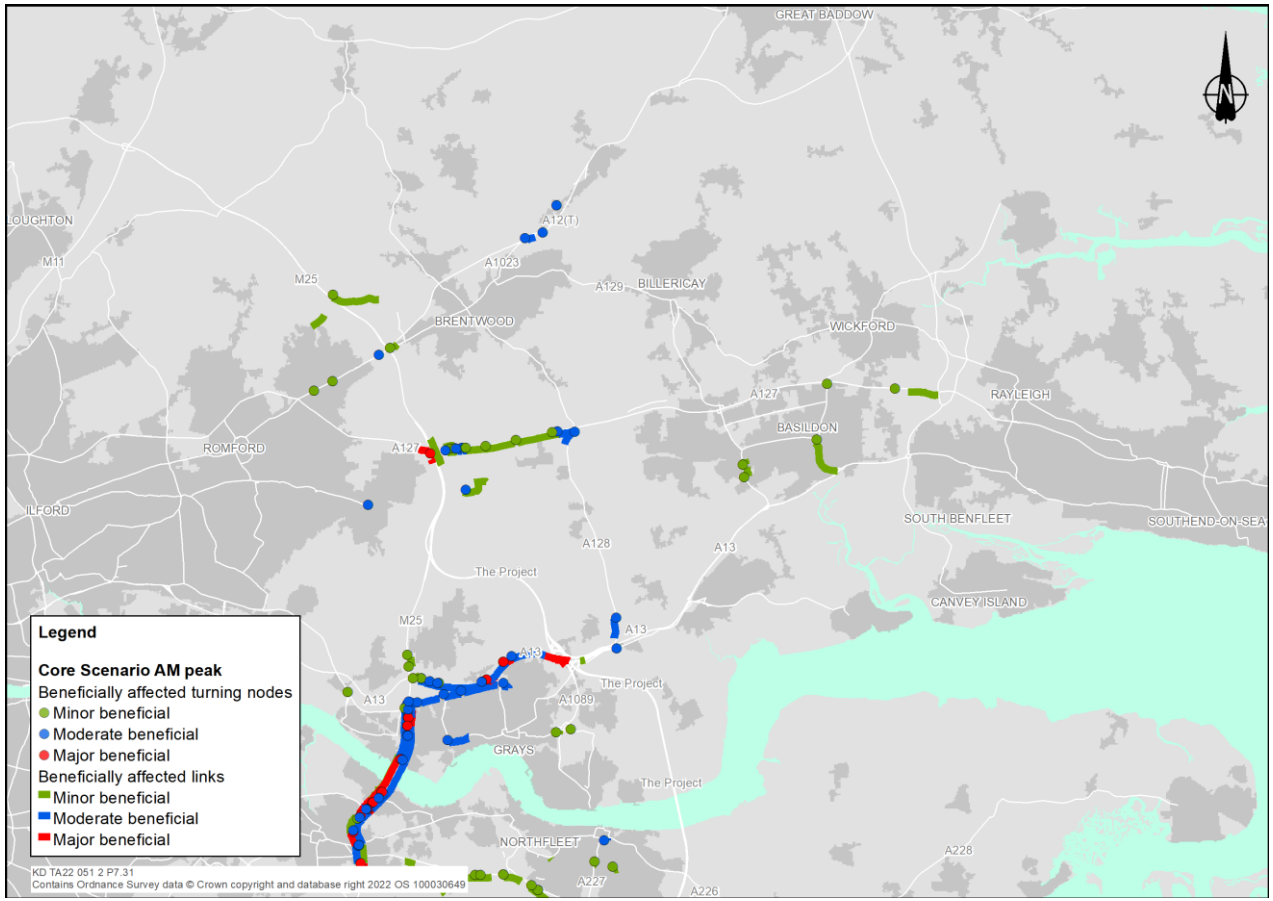


Plate 7.32 Beneficial impacts, north, core scenario, inter-peak 2030

Plate 7.33 Beneficial impacts, north, core scenario, PM peak 2030

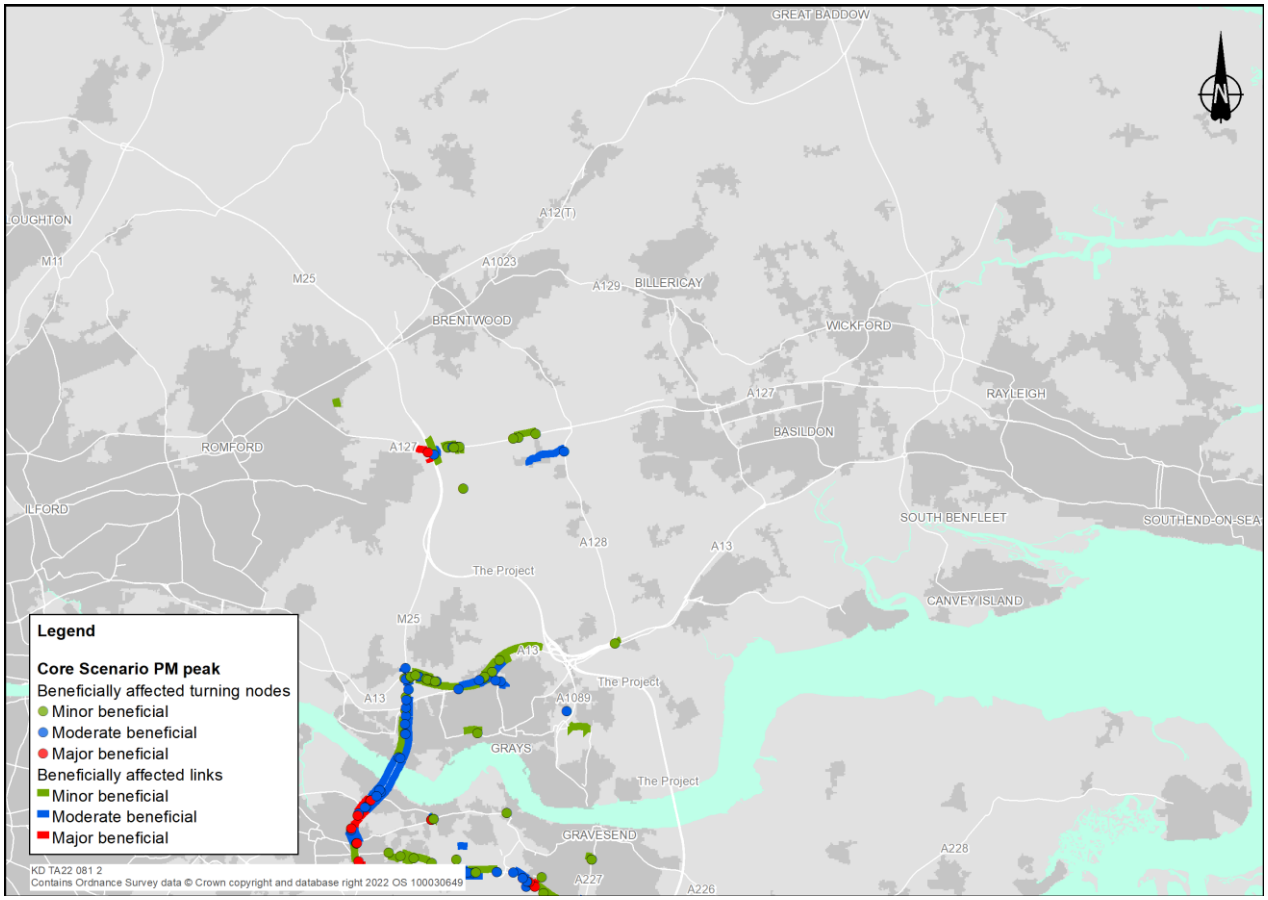


Plate 7.34 Beneficial impacts, south, core scenario, AM peak 2030

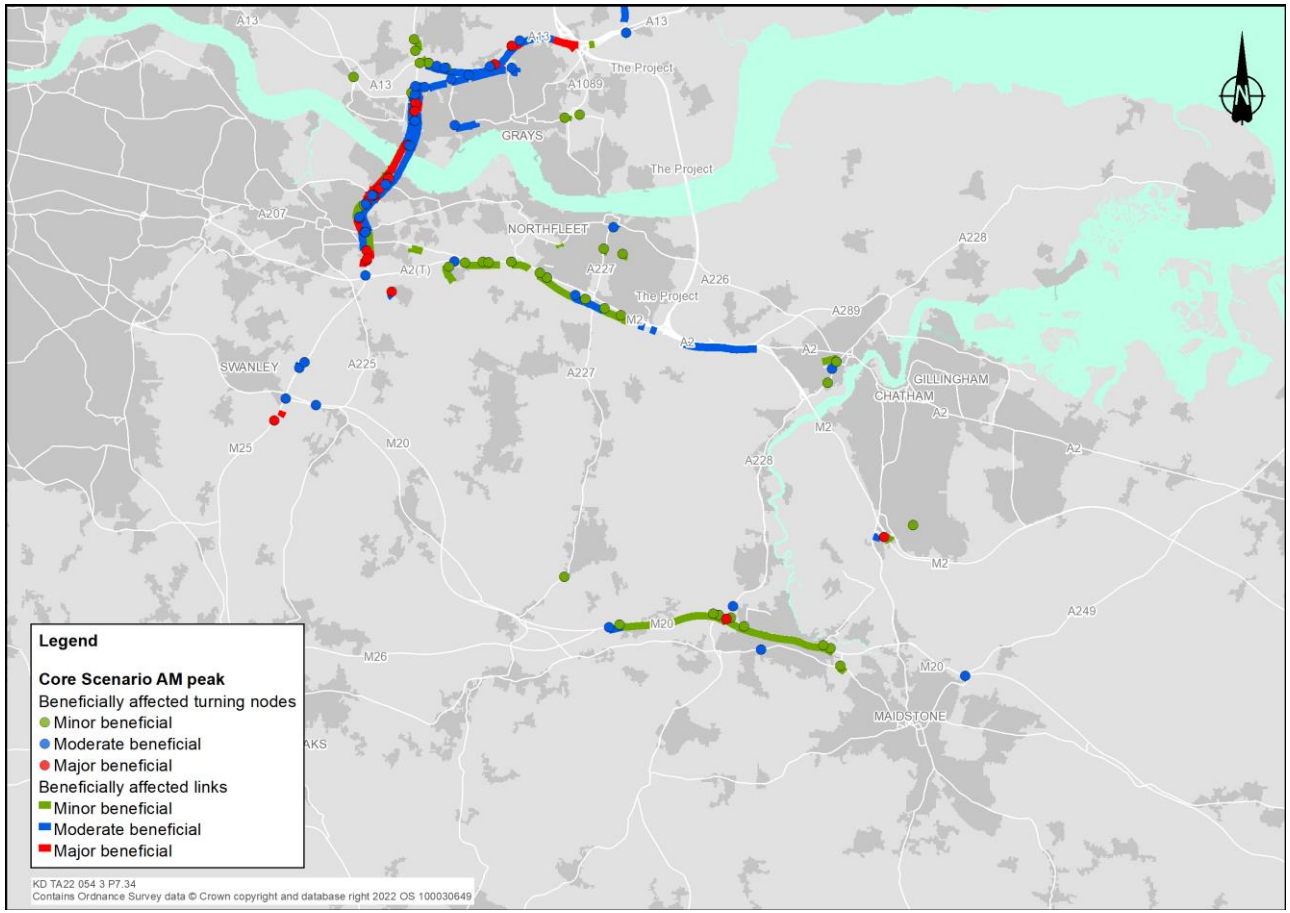


Plate 7.35 Beneficial impacts, south, core scenario, inter-peak 2030

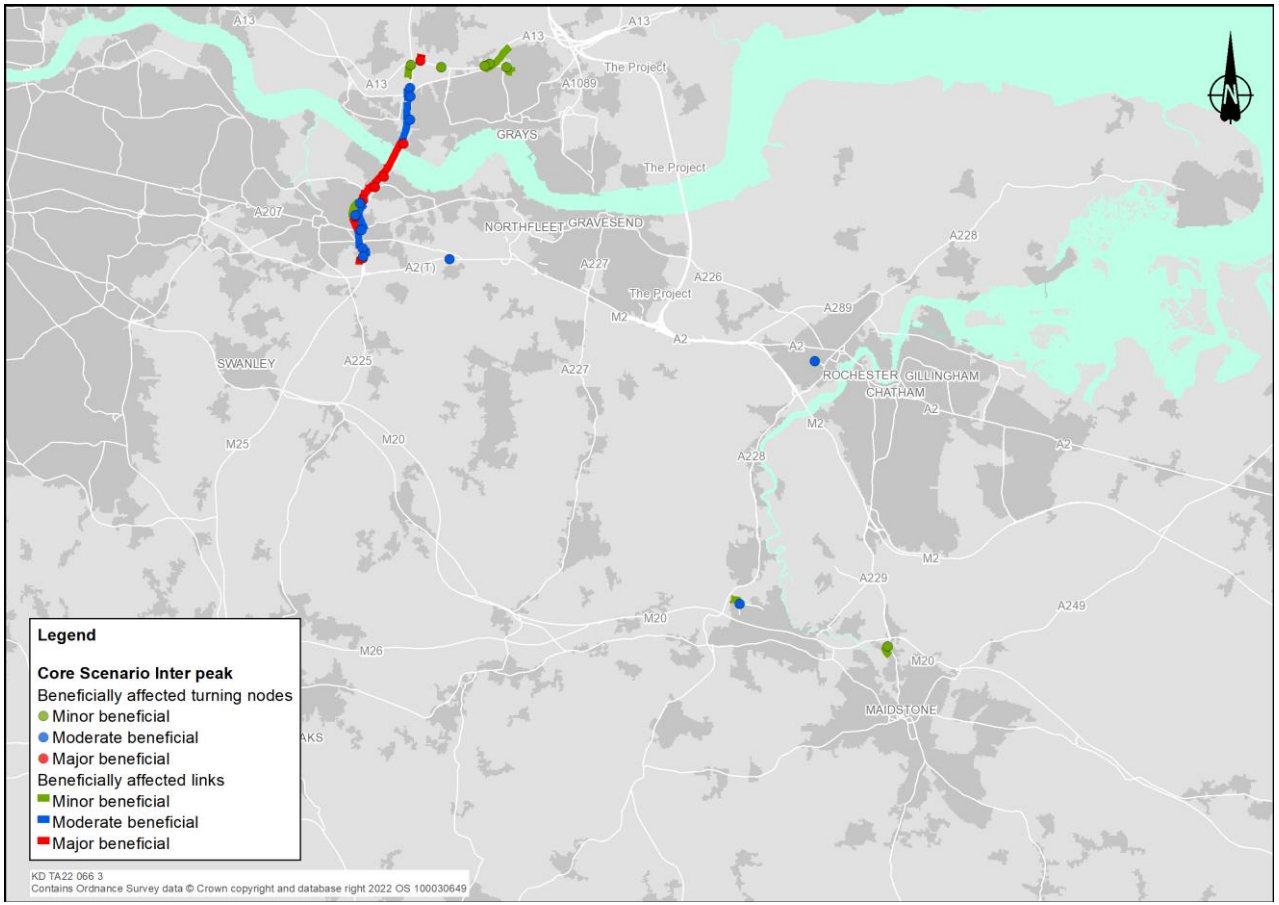
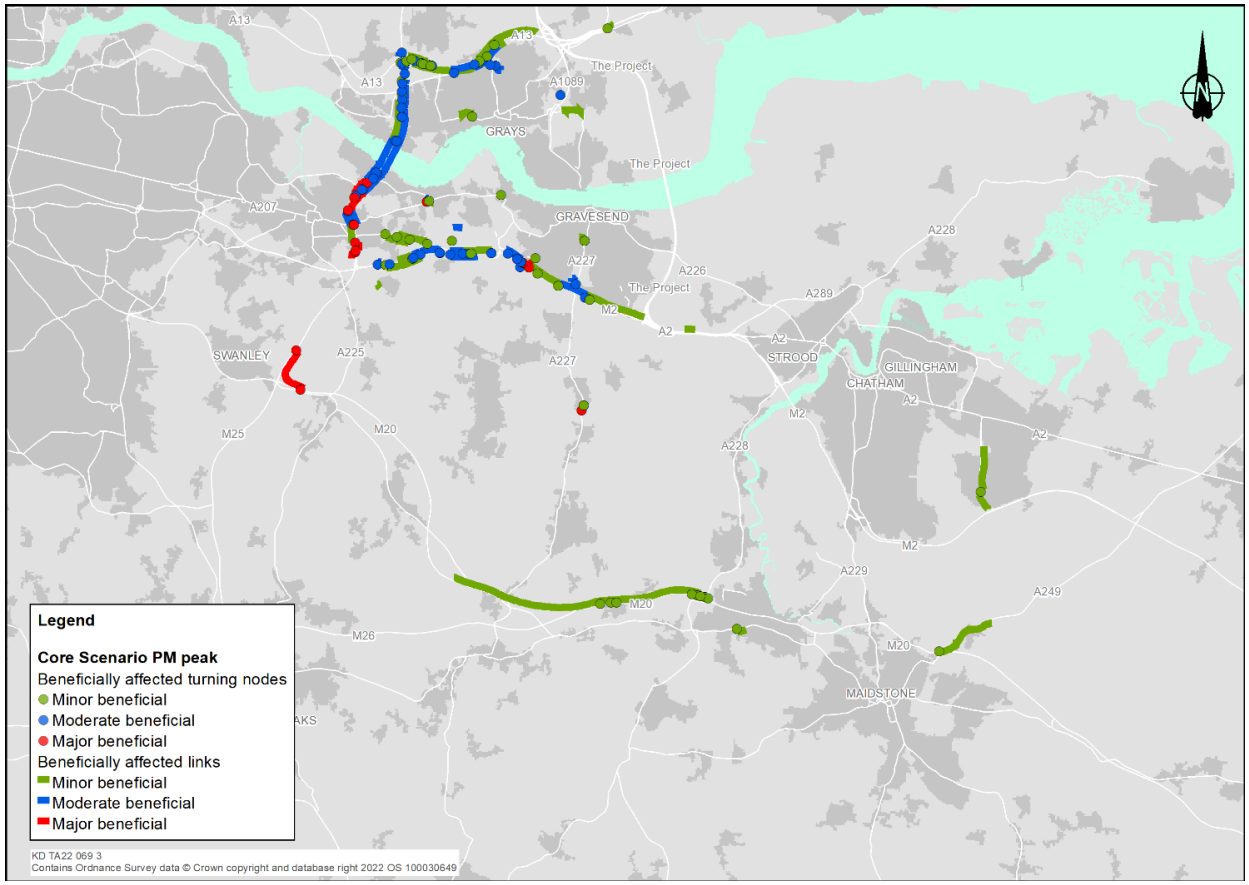


Plate 7.36 Beneficial impacts, south, core scenario, PM peak 2030



7.7 Highway journey times

7.7.1 A set of 28 journey times (JT) were extracted from the LTAM to show the impact of the Project on a variety of longer and shorter journey times in the area. Plate 7.37 shows the journey time routes used in the analysis. The full journey time extract data is tabulated for 2030 and 2045 in Appendix B and Appendix C respectively.

7.7.2 The journey times, by time period, for the core, high and low growth scenarios are shown in Table 7.11 to Table 7.13. The rows in the tables are colour-matched with Plate 7.37 to aid identification. Journey times are presented by direction, be that northbound (NB), southbound (SB), eastbound (EB) or westbound (WB).

7.7.3 Where journey times are forecast to decrease, these are highlighted in green. Where there is a forecast percentage increase of between 0.0% and 5.0% these are highlighted yellow. Those journey time routes where a percentage increase between 5.0% and 10.0% are forecast are highlighted orange, and those above 10.0% are highlighted red.

Plate 7.37 Journey time routes

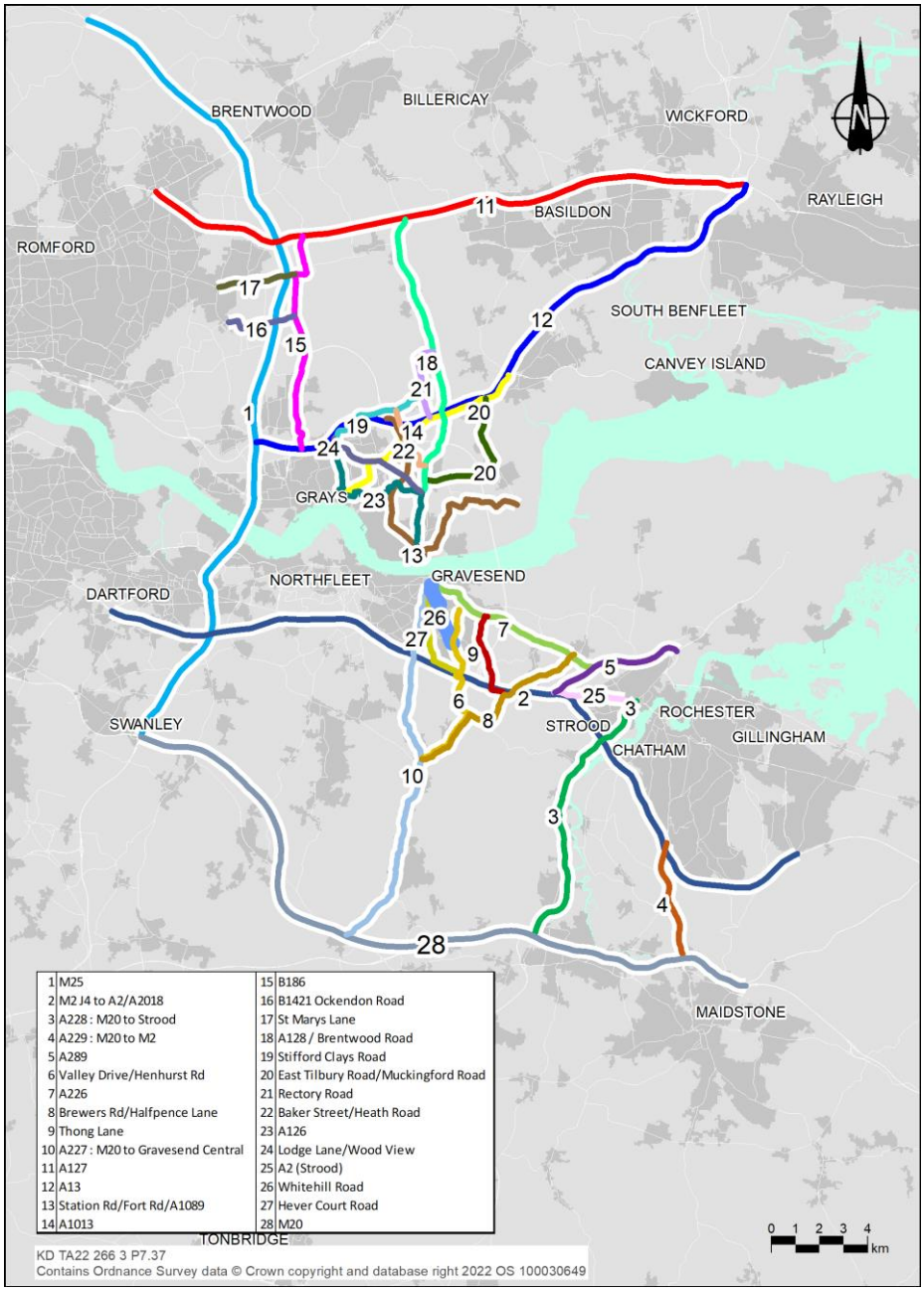


Table 7.11 Journey time comparison, Do Minimum and Do Something scenarios, AM peak, 2030

Route	Road	Dir	Core growth				High growth				Low growth			
			DM	DS	DS-DM	% change	DM	DS	DS-DM	% change	DM	DS	DS-DM	% change
			Time (mins)	Time (mins)	Time (mins)		Time (mins)	Time (mins)	Time (mins)		Time (mins)	Time (mins)	Time (mins)	
JT01	M25	NB	33.1	29.2	-3.9	-11.8%	34.6	30.5	-4.1	-11.8%	31.6	28.1	-3.5	-11.2%
		SB	33.5	30.1	-3.4	-10.1%	35.1	31.5	-3.6	-10.2%	31.7	28.9	-2.8	-8.9%
JT02	M2 junction 4 to A2/A2018	EB	20.7	20.6	-0.1	-0.7%	20.9	20.7	-0.2	-0.8%	20.6	20.4	-0.2	-0.9%
		WB	30.5	26.9	-3.7	-12.0%	31.5	27.8	-3.7	-11.7%	29.1	25.9	-3.3	-11.2%
JT03	A228: M20 to Strood	NB	14.3	15.3	1.0	6.9%	14.6	15.8	1.2	8.2%	14.0	14.8	0.8	5.7%
		SB	18.1	19.8	1.7	9.3%	19.2	20.7	1.4	7.5%	17.4	18.9	1.5	8.5%
JT04	A229: M20 to M2	NB	5.9	7.5	1.6	26.8%	6.0	7.9	1.9	31.6%	5.9	7.4	1.6	26.5%
		SB	10.5	11.9	1.4	13.2%	11.1	12.5	1.4	12.5%	10.1	11.2	1.0	10.0%
JT05	A289	EB	4.0	4.3	0.3	7.1%	4.1	4.5	0.4	10.7%	3.9	4.1	0.2	4.3%
		WB	7.6	6.5	-1.2	-15.3%	8.3	6.8	-1.5	-18.3%	7.1	6.2	-0.9	-12.7%
JT06	Valley Drive/ Henhurst Road	NB	11.3	11.9	0.6	5.0%	11.5	12.1	0.6	5.2%	11.3	11.8	0.5	4.6%
		SB	11.6	12.0	0.4	3.5%	11.9	12.2	0.3	2.8%	11.4	11.8	0.4	3.8%
JT07	A226	EB	9.7	9.9	0.2	2.1%	9.8	10.1	0.2	2.2%	9.6	9.8	0.2	1.7%
		WB	11.7	11.0	-0.7	-6.0%	12.2	11.4	-0.8	-6.8%	11.2	10.8	-0.5	-4.2%
JT08	Brewers Road/ Halfpence Lane	NB	9.4	9.8	0.4	4.1%	9.5	9.8	0.4	3.7%	9.4	9.7	0.4	4.1%
		SB	10.0	10.1	0.0	0.5%	10.3	10.2	-0.1	-0.6%	9.8	9.9	0.1	1.2%
JT09	Thong Lane	NB	5.4	5.5	0.1	2.2%	5.5	5.6	0.1	2.4%	5.4	5.5	0.1	1.9%

Route	Road	Dir	Core growth				High growth				Low growth			
			DM	DS	DS-DM	% change	DM	DS	DS-DM	% change	DM	DS	DS-DM	% change
			Time (mins)	Time (mins)	Time (mins)		Time (mins)	Time (mins)	Time (mins)		Time (mins)	Time (mins)	Time (mins)	
		SB	5.5	5.6	0.1	1.2%	5.6	5.6	0.0	0.6%	5.4	5.5	0.1	1.2%
JT10	A227: M20 to Gravesend Central junction	NB	18.0	18.5	0.6	3.1%	18.0	18.8	0.8	4.3%	17.8	18.2	0.4	2.2%
		SB	18.8	19.4	0.6	3.1%	19.4	20.0	0.6	2.9%	18.3	18.8	0.5	2.7%
JT11	A127	EB	26.3	25.8	-0.5	-2.0%	26.9	26.4	-0.5	-2.0%	25.8	25.3	-0.5	-2.1%
		WB	35.7	35.6	-0.1	-0.2%	37.8	37.6	-0.2	-0.6%	33.4	33.6	0.2	0.6%
JT12	A13	EB	19.8	20.2	0.3	1.8%	20.2	20.5	0.3	1.6%	19.4	19.7	0.3	1.7%
		WB	25.9	24.3	-1.7	-6.4%	26.6	25.5	-1.2	-4.4%	24.8	23.4	-1.4	-5.5%
JT13	Station Road/ Fort Road /A1089	EB	11.5	11.5	0.0	0.3%	12.0	12.0	0.0	-0.1%	11.1	11.2	0.1	0.9%
		WB	12.0	12.1	0.1	0.7%	12.9	14.5	1.6	12.1%	11.5	11.4	-0.2	-1.6%
JT14	A1013	EB	14.6	15.0	0.3	2.3%	15.0	15.4	0.5	3.0%	14.3	14.6	0.2	1.6%
		WB	16.1	16.0	-0.1	-0.8%	16.6	16.5	-0.2	-1.0%	15.8	15.6	-0.2	-1.1%
JT15	B186	NB	14.6	13.4	-1.2	-8.4%	15.0	14.0	-1.0	-6.9%	13.7	13.0	-0.8	-5.5%
		SB	12.6	12.4	-0.2	-1.6%	12.8	12.7	-0.1	-1.0%	12.3	12.2	-0.2	-1.2%
JT16	B1421 Ockendon Road	EB	4.0	4.0	0.0	-0.4%	4.0	4.0	0.0	-0.4%	4.0	4.0	0.0	-0.4%
		WB	3.8	3.8	0.0	-0.4%	3.8	3.8	0.0	0.0%	3.8	3.8	0.0	0.0%
JT17	St Marys Lane	EB	4.7	4.6	0.0	-0.7%	4.7	4.7	0.0	-1.1%	4.6	4.6	0.0	-0.7%
		WB	5.2	4.9	-0.3	-5.7%	5.3	5.0	-0.3	-5.4%	5.2	4.9	-0.2	-4.5%

Route	Road	Dir	Core growth				High growth				Low growth			
			DM	DS	DS-DM	% change	DM	DS	DS-DM	% change	DM	DS	DS-DM	% change
			Time (mins)	Time (mins)	Time (mins)		Time (mins)	Time (mins)	Time (mins)		Time (mins)	Time (mins)	Time (mins)	
JT18	A128/ Brentwood Road	NB	16.2	14.4	-1.8	-10.9%	17.2	14.8	-2.4	-14.0%	15.6	14.1	-1.5	-9.3%
		SB	13.9	14.5	0.6	4.4%	14.1	14.8	0.7	5.1%	13.7	14.1	0.5	3.5%
JT19	Stifford Clays Road	EB	4.8	4.7	0.0	-0.7%	4.8	4.7	-0.1	-1.4%	4.7	4.7	0.0	-0.4%
		WB	5.5	5.5	-0.1	-1.5%	5.6	5.5	-0.1	-1.2%	5.5	5.4	-0.1	-1.8%
JT20	East Tilbury Road/ Muckingford Road	EB	6.7	6.7	0.0	0.2%	6.8	6.8	0.0	-0.2%	6.6	6.6	0.0	0.0%
		WB	7.4	7.6	0.2	2.7%	7.5	7.8	0.3	3.8%	7.3	7.4	0.1	1.1%
JT21	Rectory Road	NB	3.2	3.4	0.1	3.6%	3.3	3.4	0.1	3.6%	3.2	3.3	0.1	3.6%
		SB	3.5	3.8	0.3	7.5%	3.6	3.9	0.3	8.8%	3.5	3.7	0.2	6.7%
JT22	Baker Street/ Heath Road	NB	3.8	3.6	-0.2	-4.9%	3.9	3.6	-0.3	-7.2%	3.7	3.5	-0.2	-6.3%
		SB	3.6	3.5	-0.1	-2.3%	3.7	3.6	-0.1	-2.3%	3.5	3.5	-0.1	-1.9%
JT23	A126	NB	16.4	16.9	0.4	2.7%	16.9	17.8	0.9	5.3%	16.1	16.1	0.0	0.2%
		SB	16.8	16.8	0.0	0.0%	17.2	17.3	0.1	0.3%	16.5	16.5	0.0	0.1%
JT24	Lodge Lane/ Wood View	NB	8.8	8.2	-0.6	-6.4%	9.0	8.4	-0.6	-6.7%	8.6	8.1	-0.5	-6.0%
		SB	7.2	7.1	-0.1	-1.2%	7.3	7.2	-0.1	-0.9%	7.1	7.0	-0.1	-0.9%
JT25	A2 (Strood)	EB	7.5	7.7	0.3	3.3%	7.6	7.9	0.3	3.7%	7.4	7.6	0.2	2.2%
		WB	8.9	8.4	-0.5	-5.8%	9.5	8.7	-0.8	-8.6%	8.5	8.1	-0.4	-4.7%
JT26	Whitehill Road	NB	6.5	6.4	-0.1	-1.5%	6.7	6.6	-0.1	-1.5%	6.3	6.2	-0.1	-1.3%

Route	Road	Dir	Core growth				High growth				Low growth			
			DM	DS	DS-DM	% change	DM	DS	DS-DM	% change	DM	DS	DS-DM	% change
			Time (mins)	Time (mins)	Time (mins)		Time (mins)	Time (mins)	Time (mins)		Time (mins)	Time (mins)	Time (mins)	
		SB	5.6	5.6	-0.1	-1.2%	5.7	5.6	-0.1	-1.2%	5.6	5.5	0.0	-0.6%
JT27	Hever Court Road	**NB**	7.9	7.6	-0.2	-3.0%	8.1	7.9	-0.3	-3.5%	7.7	7.4	-0.2	-2.8%
		SB	7.2	7.0	-0.2	-3.0%	7.3	7.1	-0.2	-2.8%	7.2	7.0	-0.2	-2.8%
JT28	M20	**EB**	18.7	18.4	-0.3	-1.5%	18.9	18.6	-0.3	-1.5%	18.5	18.2	-0.3	-1.4%
		WB	26.2	24.1	-2.1	-8.0%	27.0	24.7	-2.4	-8.7%	24.6	22.7	-1.9	-7.7%

Table 7.12 Journey time comparison, Do Minimum and Do Something scenarios, inter-peak, 2030

Route	Road	Dir	Core growth				High growth				Low growth			
			DM	DS	DS-DM	% change	DM	DS	DS-DM	% change	DM	DS	DS-DM	% change
			Time (mins)	Time (mins)	Time (mins)		Time (mins)	Time (mins)	Time (mins)		Time (mins)	Time (mins)	Time (mins)	
JT01	M25	NB	29.6	26.0	-3.6	-12.2%	31.3	26.8	-4.5	-14.3%	28.1	25.1	-2.9	-10.5%
		SB	26.7	25.9	-0.8	-3.2%	27.8	26.7	-1.1	-4.1%	25.7	25.0	-0.7	-2.8%
JT02	M2 junction 4 to A2/A2018	EB	20.5	20.3	-0.2	-1.1%	20.8	20.5	-0.3	-1.3%	20.3	20.1	-0.2	-1.0%
		WB	22.0	20.4	-1.6	-7.4%	22.5	20.6	-1.9	-8.5%	21.3	20.1	-1.2	-5.5%
JT03	A228: M20 to Strood	NB	14.1	14.7	0.6	4.0%	14.4	15.0	0.6	4.4%	13.9	14.4	0.5	3.7%
		SB	14.7	15.3	0.5	3.6%	15.4	15.9	0.5	3.4%	14.3	14.9	0.6	4.0%
JT04	A229: M20 to M2	NB	5.7	6.1	0.3	5.8%	5.8	6.3	0.6	9.9%	5.7	5.9	0.2	3.2%
		SB	6.2	6.3	0.1	2.4%	6.3	6.5	0.2	2.6%	6.1	6.2	0.1	1.9%
JT05	A289	EB	3.9	3.9	0.0	1.3%	3.9	4.0	0.1	1.3%	3.8	3.9	0.0	0.9%
		WB	4.4	5.2	0.7	16.6%	4.5	5.2	0.7	15.9%	4.4	5.1	0.7	16.9%
JT06	Valley Drive/ Henhurst Road	NB	11.3	11.8	0.5	4.7%	11.5	12.0	0.6	4.9%	11.2	11.7	0.5	4.2%
		SB	10.9	11.3	0.4	3.5%	11.0	11.4	0.4	3.8%	10.8	11.2	0.4	3.4%
JT07	A226	EB	9.9	10.1	0.2	2.2%	10.0	10.2	0.2	1.8%	9.8	10.0	0.2	2.1%
		WB	9.7	9.7	0.0	0.3%	9.8	9.8	0.0	0.2%	9.5	9.6	0.0	0.5%
JT08	Brewers Road/ Halfpence Lane	NB	9.4	9.6	0.3	2.7%	9.4	9.7	0.3	2.8%	9.3	9.6	0.3	2.7%
		SB	9.3	9.6	0.2	2.5%	9.4	9.6	0.2	2.3%	9.3	9.5	0.2	2.5%

Route	Road	Dir	Core growth				High growth				Low growth			
			DM	DS	DS-DM	% change	DM	DS	DS-DM	% change	DM	DS	DS-DM	% change
			Time (mins)	Time (mins)	Time (mins)		Time (mins)	Time (mins)	Time (mins)		Time (mins)	Time (mins)	Time (mins)	
JT09	Thong Lane	NB	5.4	5.5	0.1	1.2%	5.4	5.5	0.1	1.5%	5.4	5.4	0.1	1.6%
		SB	5.4	5.4	0.0	0.6%	5.4	5.5	0.0	0.3%	5.4	5.4	0.0	0.6%
JT10	A227: M20 to Gravesend Central junction	NB	17.6	17.9	0.3	1.5%	17.8	18.2	0.4	2.1%	17.3	17.5	0.2	1.3%
		SB	17.6	17.8	0.3	1.4%	17.9	18.2	0.3	1.6%	17.3	17.5	0.2	1.3%
JT11	A127	EB	22.8	22.4	-0.4	-1.8%	23.3	22.9	-0.4	-1.9%	22.3	21.9	-0.4	-1.6%
		WB	22.2	22.3	0.0	0.1%	23.0	23.0	0.0	-0.1%	21.6	21.6	0.0	0.2%
JT12	A13	EB	19.7	19.4	-0.4	-1.9%	20.3	19.9	-0.3	-1.6%	19.3	18.9	-0.4	-2.2%
		WB	19.7	19.3	-0.4	-1.9%	20.4	19.9	-0.5	-2.4%	19.0	18.8	-0.2	-1.1%
JT13	Station Road/Fort Road/A1089	EB	10.7	10.7	0.0	-0.3%	10.8	10.8	0.0	-0.3%	10.6	10.6	0.0	-0.3%
		WB	10.8	10.7	-0.1	-0.8%	11.1	10.9	-0.2	-1.5%	10.6	10.6	0.0	-0.2%
JT14	A1013	EB	13.8	14.1	0.3	2.0%	14.1	14.4	0.3	2.4%	13.6	13.8	0.2	1.5%
		WB	14.8	14.8	0.0	0.3%	15.0	15.0	0.1	0.3%	14.6	14.6	0.0	0.0%
JT15	B186	NB	12.2	12.1	-0.1	-1.2%	12.4	12.3	-0.2	-1.3%	12.0	11.9	-0.1	-0.8%
		SB	12.6	12.5	-0.1	-0.5%	12.9	12.8	-0.1	-1.2%	12.4	12.3	0.0	-0.3%
JT16	B1421 Ockendon Road	EB	4.0	4.0	0.0	0.0%	4.0	4.0	0.0	-0.4%	3.9	3.9	0.0	0.0%
		WB	3.8	3.8	0.0	0.0%	3.8	3.8	0.0	0.0%	3.8	3.8	0.0	0.0%

Route	Road	Dir	Core growth				High growth				Low growth			
			DM	DS	DS-DM	% change	DM	DS	DS-DM	% change	DM	DS	DS-DM	% change
			Time (mins)	Time (mins)	Time (mins)		Time (mins)	Time (mins)	Time (mins)		Time (mins)	Time (mins)	Time (mins)	
JT17	St Marys Lane	EB	4.6	4.5	0.0	-0.4%	4.6	4.6	0.0	-0.4%	4.5	4.5	0.0	-0.4%
		WB	5.0	4.9	0.0	-0.7%	5.0	5.0	-0.1	-1.3%	4.9	4.9	0.0	-0.7%
JT18	A128 / Brentwood Road	NB	13.1	13.2	0.0	0.4%	13.3	13.3	0.0	0.0%	13.0	13.1	0.0	0.4%
		SB	13.4	13.6	0.2	1.6%	13.6	13.8	0.2	1.2%	13.3	13.5	0.2	1.4%
JT19	Stifford Clays Road	EB	4.8	4.8	0.0	0.0%	4.8	4.8	0.0	-0.3%	4.8	4.8	0.0	0.0%
		WB	5.3	5.2	-0.1	-1.3%	5.3	5.3	0.0	-0.9%	5.2	5.2	0.0	-1.0%
JT20	East Tilbury Road/ Muckingford Road	EB	6.7	6.7	0.0	-0.7%	6.7	6.7	0.0	-0.5%	6.7	6.6	-0.1	-0.8%
		WB	6.9	7.0	0.1	1.0%	7.0	7.1	0.1	1.4%	6.9	7.0	0.0	0.7%
JT21	Rectory Road	NB	3.1	3.3	0.1	3.7%	3.2	3.3	0.1	3.7%	3.1	3.3	0.1	4.3%
		SB	3.4	3.5	0.2	4.5%	3.4	3.6	0.2	4.4%	3.4	3.5	0.1	3.5%
JT22	Baker Street/ Heath Road	NB	3.3	3.4	0.0	0.5%	3.4	3.4	0.0	0.5%	3.3	3.3	0.0	0.5%
		SB	3.4	3.4	0.0	-0.5%	3.4	3.4	0.0	-1.0%	3.3	3.3	0.0	0.0%
JT23	A126	NB	16.5	16.4	-0.1	-0.6%	17.1	17.1	0.0	-0.1%	15.6	15.5	-0.1	-0.7%
		SB	16.1	16.2	0.1	0.6%	16.5	16.6	0.2	1.1%	15.8	15.9	0.0	0.3%
JT24	Lodge Lane/ Wood View	NB	8.1	7.9	-0.2	-2.5%	8.2	7.9	-0.3	-3.8%	7.9	7.8	-0.2	-1.9%
		SB	7.1	6.9	-0.2	-2.8%	7.2	7.0	-0.2	-2.8%	7.0	6.8	-0.2	-3.3%

Route	Road	Dir	Core growth				High growth				Low growth			
			DM	DS	DS-DM	% change	DM	DS	DS-DM	% change	DM	DS	DS-DM	% change
			Time (mins)	Time (mins)	Time (mins)		Time (mins)	Time (mins)	Time (mins)		Time (mins)	Time (mins)	Time (mins)	
JT25	A2 (Strood)	EB	7.0	7.1	0.1	1.9%	7.2	7.3	0.1	1.9%	6.9	7.0	0.1	1.5%
		WB	6.2	7.1	0.9	14.3%	6.3	7.1	0.8	13.0%	6.2	7.0	0.8	13.6%
JT26	Whitehill Road	NB	6.0	5.9	-0.1	-1.4%	6.1	6.0	-0.1	-2.5%	5.9	5.8	-0.1	-1.1%
		SB	5.5	5.5	0.1	1.2%	5.5	5.6	0.1	1.5%	5.4	5.5	0.0	0.6%
JT27	Hever Court Road	NB	7.4	7.2	-0.1	-2.0%	7.5	7.3	-0.2	-2.7%	7.2	7.1	-0.1	-1.2%
		SB	7.4	7.1	-0.3	-3.8%	7.5	7.2	-0.3	-4.4%	7.3	7.1	-0.2	-3.2%
JT28	M20	EB	18.4	18.2	-0.2	-1.0%	18.5	18.4	-0.2	-1.0%	18.2	18.0	-0.2	-0.9%
		WB	18.8	18.4	-0.4	-2.3%	19.2	18.6	-0.6	-3.1%	18.5	18.2	-0.3	-1.7%

Table 7.13 Journey time comparison, Do Minimum and Do Something scenarios, PM peak, 2030

Route	Road	Dir	Core growth				High growth				Low growth			
			DM	DS	DS-DM	% change	DM	DS	DS-DM	% change	DM	DS	DS-DM	% change
			Time (mins)	Time (mins)	Time (mins)		Time (mins)	Time (mins)	Time (mins)		Time (mins)	Time (mins)	Time (mins)	
JT01	M25	NB	30.0	26.3	-3.7	-12.3%	30.9	26.9	-4.0	-12.9%	28.9	25.7	-3.3	-11.2%
		SB	30.9	28.6	-2.3	-7.4%	32.3	29.7	-2.6	-8.0%	29.5	27.5	-2.0	-6.7%
JT02	M2 junction 4 to A2/A2018	EB	26.8	25.3	-1.5	-5.5%	27.6	27.0	-0.5	-1.9%	25.9	24.0	-1.9	-7.5%
		WB	24.8	22.5	-2.3	-9.1%	25.4	22.9	-2.5	-9.8%	24.2	22.2	-2.0	-8.2%
JT03	A228: M20 to Strood	NB	19.9	20.3	0.4	1.8%	20.9	21.4	0.5	2.3%	18.6	19.0	0.4	2.2%
		SB	15.2	15.7	0.5	3.3%	15.6	16.0	0.4	2.9%	14.9	15.5	0.6	3.9%
JT04	A229: M20 to M2	NB	6.4	8.2	1.8	28.2%	6.5	9.0	2.5	37.5%	6.3	7.6	1.3	19.8%
		SB	9.0	11.9	2.8	31.4%	9.8	12.5	2.7	27.9%	8.4	10.9	2.5	29.9%
JT05	A289	EB	6.7	7.4	0.7	9.9%	7.0	7.6	0.6	8.6%	6.6	7.2	0.6	8.9%
		WB	5.0	5.4	0.4	7.3%	5.1	5.4	0.3	6.2%	4.9	5.4	0.5	9.9%
JT06	Valley Drive/ Henhurst Road	NB	13.3	14.3	1.0	7.4%	13.7	14.8	1.1	7.9%	12.9	13.6	0.7	5.7%
		SB	11.6	12.0	0.5	4.0%	11.8	12.2	0.5	4.0%	11.3	11.8	0.5	4.3%
JT07	A226	EB	11.3	12.0	0.7	6.1%	11.6	12.3	0.7	6.3%	11.1	11.6	0.5	4.8%
		WB	10.0	10.3	0.2	2.3%	10.2	10.4	0.2	2.1%	9.9	10.1	0.2	2.2%
JT08	Brewers Road/ Halfpence Lane	NB	10.5	10.8	0.3	3.0%	10.6	11.0	0.4	3.8%	10.4	10.6	0.2	1.9%
		SB	9.6	9.7	0.1	1.4%	9.7	9.8	0.1	0.7%	9.5	9.6	0.2	1.6%

Route	Road	Dir	Core growth				High growth				Low growth			
			DM	DS	DS-DM	% change	DM	DS	DS-DM	% change	DM	DS	DS-DM	% change
			Time (mins)	Time (mins)	Time (mins)		Time (mins)	Time (mins)	Time (mins)		Time (mins)	Time (mins)	Time (mins)	
JT09	Thong Lane	NB	5.9	6.4	0.5	8.2%	6.0	6.7	0.7	10.8%	5.8	6.1	0.3	5.2%
		SB	5.7	5.6	-0.1	-1.5%	5.7	5.6	-0.1	-1.7%	5.6	5.5	-0.1	-1.5%
JT10	A227: M20 to Gravesend Central junction	NB	22.0	21.3	-0.7	-3.2%	23.2	22.3	-0.9	-4.1%	20.8	20.6	-0.2	-1.0%
		SB	19.4	20.6	1.2	6.4%	19.6	21.1	1.5	7.6%	19.1	20.0	0.9	5.0%
JT11	A127	EB	30.3	29.5	-0.8	-2.6%	31.3	30.6	-0.8	-2.5%	29.1	28.5	-0.6	-2.1%
		WB	27.0	27.1	0.1	0.5%	28.1	28.2	0.1	0.4%	25.9	26.0	0.1	0.5%
JT12	A13	EB	23.9	22.8	-1.1	-4.4%	24.6	23.5	-1.1	-4.6%	22.9	22.1	-0.9	-3.8%
		WB	20.6	20.8	0.3	1.3%	21.2	21.7	0.5	2.3%	19.9	20.1	0.2	1.0%
JT13	Station Road / Fort Road / A1089	EB	10.7	10.7	0.0	-0.2%	10.8	10.8	0.0	0.2%	10.7	10.6	-0.1	-0.5%
		WB	11.0	10.7	-0.2	-2.0%	11.1	10.9	-0.2	-2.1%	10.8	10.7	-0.1	-1.2%
JT14	A1013	EB	15.9	16.1	0.2	1.5%	16.4	16.7	0.3	2.1%	15.4	15.6	0.2	1.5%
		WB	15.6	15.9	0.3	2.1%	15.8	16.3	0.4	2.8%	15.3	15.5	0.2	1.3%
JT15	B186	NB	14.6	14.1	-0.5	-3.4%	15.2	14.9	-0.2	-1.5%	13.9	13.5	-0.4	-2.6%
		SB	14.3	14.0	-0.4	-2.7%	15.7	14.7	-1.1	-6.7%	13.6	13.5	-0.2	-1.1%
JT16	B1421 Ockendon Road	EB	4.0	4.0	0.0	-0.4%	4.0	4.0	0.0	-0.4%	4.0	4.0	0.0	0.0%
		WB	3.8	3.9	0.0	0.4%	3.9	3.9	0.0	0.0%	3.8	3.8	0.0	0.0%

Route	Road	Dir	Core growth				High growth				Low growth			
			DM	DS	DS-DM	% change	DM	DS	DS-DM	% change	DM	DS	DS-DM	% change
			Time (mins)	Time (mins)	Time (mins)		Time (mins)	Time (mins)	Time (mins)		Time (mins)	Time (mins)	Time (mins)	
JT17	St Marys Lane	EB	4.6	4.6	0.0	-0.7%	4.6	4.6	-0.1	-1.1%	4.7	4.6	0.0	-0.7%
		WB	5.5	5.3	-0.3	-4.8%	5.7	5.5	-0.2	-4.1%	5.3	5.2	-0.1	-2.5%
JT18	A128 / Brentwood Road	NB	13.7	13.9	0.1	1.0%	13.9	14.1	0.1	0.8%	13.5	13.7	0.2	1.5%
		SB	15.2	15.0	-0.1	-0.8%	15.6	15.4	-0.3	-1.6%	14.7	14.7	0.0	0.1%
JT19	Stifford Clays Road	EB	5.0	5.0	0.0	0.0%	5.0	5.0	0.0	1.0%	5.0	5.0	0.0	-0.3%
		WB	5.5	5.4	-0.1	-2.1%	5.6	5.4	-0.2	-3.3%	5.4	5.3	-0.1	-1.8%
JT20	East Tilbury Road/ Muckingford Road	EB	6.9	6.8	0.0	-0.5%	7.0	6.9	0.0	-0.7%	6.8	6.8	0.0	-0.2%
		WB	7.0	7.1	0.1	1.7%	7.0	7.2	0.2	2.1%	6.9	7.1	0.1	1.7%
JT21	Rectory Road	NB	3.2	3.4	0.2	5.2%	3.3	3.4	0.2	5.6%	3.2	3.4	0.2	4.7%
		SB	4.1	4.0	-0.1	-2.4%	4.3	4.2	-0.1	-3.1%	3.9	3.9	0.0	-0.9%
JT22	Baker Street/ Heath Road	NB	3.7	3.5	-0.2	-4.1%	3.8	3.6	-0.2	-5.3%	3.6	3.5	-0.1	-2.8%
		SB	4.9	4.1	-0.9	-17.6%	5.6	4.3	-1.3	-22.8%	4.3	3.8	-0.5	-10.9%
JT23		NB	17.9	17.4	-0.5	-2.7%	18.6	18.2	-0.4	-2.0%	17.2	16.8	-0.4	-2.2%
		SB	17.4	17.5	0.1	0.7%	18.0	18.0	0.0	0.0%	16.9	17.1	0.2	1.1%
JT24	Lodge Lane/ Wood View	NB	8.6	8.1	-0.5	-6.0%	8.9	8.1	-0.7	-8.3%	8.3	7.9	-0.4	-4.4%
		SB	7.9	7.5	-0.4	-5.1%	8.1	7.7	-0.4	-4.8%	7.7	7.3	-0.4	-4.8%
JT25	A2 (Strood)	EB	8.6	9.1	0.5	5.6%	8.8	9.4	0.6	6.8%	8.5	9.0	0.5	5.5%
		WB	8.2	8.8	0.7	8.2%	8.6	9.2	0.6	6.8%	7.6	8.5	0.9	11.9%

Route	Road	Dir	Core growth				High growth				Low growth			
			DM Time (mins)	DS Time (mins)	DS-DM Time (mins)	% change	DM Time (mins)	DS Time (mins)	DS-DM Time (mins)	% change	DM Time (mins)	DS Time (mins)	DS-DM Time (mins)	% change
JT26	Whitehill Road	NB	6.2	6.2	-0.1	-1.3%	6.4	6.3	-0.1	-1.8%	6.2	6.1	-0.1	-1.4%
		SB	6.0	6.1	0.0	0.8%	6.2	6.3	0.1	2.4%	5.9	5.9	0.0	0.0%
JT27	Hever Court Road	NB	8.4	8.2	-0.3	-3.2%	8.7	8.5	-0.2	-2.3%	8.0	7.9	-0.1	-1.7%
		SB	8.6	7.8	-0.8	-9.5%	9.0	8.1	-0.9	-10.2%	8.3	7.7	-0.7	-8.0%
JT28	M20	EB	24.0	23.4	-0.6	-2.5%	25.7	25.2	-0.5	-1.8%	22.3	21.5	-0.8	-3.6%
		WB	19.2	18.7	-0.5	-2.9%	19.7	19.1	-0.6	-3.2%	18.8	18.4	-0.4	-2.2%

7.8 Highway diversions, realignments and closures

7.8.1 The Project has sought to reduce severance of roads and PRoW once the Project is operational. All roads crossing the A122 Lower Thames Crossing would be maintained, with the exception of Hornsby Lane, which would require a section near the new route to be permanently closed. This closure would avoid having to move some overhead lines closer to properties in Chadwell St Mary. Alternative routes to Hornsby Lane would be available via the A1013 and Heath Road. For information regarding other permanent stopping up of roads and PRoW that do not cross the A122 Lower Thames Crossing, see Schedule 4 of the draft Development Consent Order (Application Document 3.1).

7.9 Resilience and reliability

7.9.1 The Project would provide an alternative route east of the Dartford Crossing for local, regional and national traffic. This would give people more choice when deciding how they want to cross the River Thames, but also provide an alternative in the case of incidents or closures at the other River Thames crossings.

7.9.2 The Cabinet Office (2011) guidance, Keeping the Country Running: Natural Hazards and Infrastructure, states that, '*one of Government's key tasks is to improve the resilience of the infrastructure most critical to keeping the country running against attack, damage or destruction*'. This is supported by paragraph 2.7 of the NPSNN (DfT, 2014), which sets out that, '*in some cases there may be a need for development to improve resilience on the networks to adapt to climate change and extreme weather events rather than just tackling a congestion problem*'.

7.9.3 While the Dartford Crossing infrastructure remains available for many years of future service, National Highways has in the past, had to implement longer-term closures of critical infrastructure on the SRN. By providing an additional crossing of the River Thames, the Project would improve the resilience of the road network in the event of a longer-term closure of part of the Dartford Crossing or approach roads. In addition, the provision of an alternative crossing of the River Thames would provide increased flexibility for undertaking maintenance works while continuing to maintain connectivity across the SRN. This would result in shorter and less complex diversion routes for certain closures, particularly for larger vehicles.

7.9.4 Closure of the Dartford Crossing infrastructure can occur through a number of different causes. A particular feature of the Dartford Crossing is the restrictions on vehicle dimensions in the northbound tunnels, as well as restrictions on vehicles carrying hazardous loads. This leads to delays when vehicles do not follow the operational requirements. Hazardous load vehicles are currently required to be escorted through the northbound tunnels due to these restrictions. This requires normal traffic to be held approximately every 15 minutes for the escort to take place. This causes traffic to build up on the approach to the northbound crossings. On the southbound crossing, high winds lead to operational restrictions or closures of the QEII Bridge. The A122 Lower Thames Crossing would provide a more resilient crossing, as it has been designed as a category-A tunnel and would not be affected by these issues.

7.9.5 The crossing at Dartford is serviced by roundabout junctions in close proximity which impact on the traffic movements. By contrast, the A122 Lower Thames Crossing would be more resilient than the Dartford Crossing approach roads, as it has been designed as a free-flow network with no static junctions in close proximity to the tunnel, therefore providing greater unrestricted capacity and reducing the risk of delays on the route.

7.9.6 Currently at the Dartford Crossing when incidents do occur, the fact that it is often operating at, or above, capacity means that it has little resilience and users experience further flow breakdown, resulting in greater delays and even poorer levels of service. The Project would reduce traffic flows at the Dartford Crossing by 19% on average in the opening year. As a result, journey times across the Dartford Crossing would become more reliable. Due to the lower volumes of traffic, the Dartford Crossing and approach roads would recover more rapidly from minor incidents on the crossing.

7.10 Abnormal load routes

7.10.1 The Project would not affect existing abnormal load routes.

7.10.2 The Project would provide a minimum vertical clearance of 5.3m to bridge structures and inside the tunnels, providing increased clearance in comparison to the Dartford Crossing tunnels, which have headroom of 4.8m and 5.0m.

7.10.3 The structures for the Project would be designed to maintain the local high load routes in the area so that headroom of 5.5m is maintained. This maintains the high load routes from Tilbury Docks to the M25 at junction 30.

7.10.4 The high load route along the A226 in Gravesend passes over the Project, which is in tunnel at that point, so no measures are needed by the Project to maintain this route.

7.10.5 The Project crosses one existing heavy load route, route HR93. The design of the A13/A1089/A122 Lower Thames Crossing junction allows for this to continue as a heavy load route.

7.11 Impacts on public transport

7.11.1 Two pairs of bus stops on the local road network near the proposed alignment of the Project would be relocated, both on the A1013 to the east of the A122 Lower Thames Crossing. The first pair (one on each side of the road), located adjacent to Rectory Road, would be moved by a few metres, due to realignment of this section of road. The second pair, currently located adjacent to Heath Road, would be relocated approximately 400m to the east along the A1013.

7.11.2 There may be impacts on the journey times of some bus and coach services if the traffic speeds of the roads they use change once the Project opens.
The impact for an individual passenger would depend upon where they board or alight a particular service. For example, a commuter coach service along the A2 would travel at a lower speed east of the Project but at a higher speed west of the Project.

7.11.3 Plate 7.38 shows the bus and coach routes that were considered in this analysis

7.11.4 Plate 7.39 to Plate 7.41 show the forecast impact on total journey time for bus routes in the area. Most routes would not be affected, and the threshold has been set at a change of two minutes over the entre route in order to identify more than negligibly impacted routes.

7.11.5 In the AM peak, as shown by Plate 7.39, 30 bus routes would be impacted by 5% or more. 14 bus routes would be impacted by a change of two minutes or more in the opening year. Of these, 10 routes experience a decrease in journey time and 4 an increase in journey time. The routes with an increase in total journey time would be the 149 southbound and 151 southbound in Strood and the Z3 westbound and Z4 southbound services in Thurrock.

7.11.6 The services that would experience a shorter journey time north of the River Thames would be the 22 northbound, 77 westbound, 77A westbound, 269 northbound, Z1 westbound, Z2 westbound and the X80 which crosses over the River Thames, in both directions. South of the river the services that would experience a decrease in journey time of more than two minutes are the 700 westbound, the 735 westbound, the X80 in both directions and commuter coaches services westbound into London.

7.11.7 In the inter-peak only two routes would be affected, one with a reduction in journey time (X80 northbound), and one with an increased journey time (S695 westbound between Rochester and Istead Rise). These routes are shown in Plate 7.40

7.11.8 In the PM peak, as shown by Plate 7.41, 13 services would experience a change in overall journey time greater than two minutes. Three services would have an increase in journey time. These are service 149 southbound in Strood and the Z3 westbound and Z4 northbound in Thurrock. The journey time increases would be between two and three minutes.

7.11.9 Ten services would have quicker overall journey times. North of the river Thames, services 9 eastbound, 269 southbound, X80 northbound, Z1 westbound and Z2 eastbound would have quicker journey times, with a decrease of more than two minutes. The greatest decrease is the X80 northbound where the journey time would be over four minutes quicker with the Project.

7.11.10 South of the river, the journey times would be more than two minutes quicker for the 480 eastbound, 735 westbound, 736 westbound, 770 westbound and coach services westbound along the A2 into London.

7.11.11 Table 7.14 shows the routes where the change is over two minutes in any one modelled time period. Where journey times are forecast to decrease, these are highlighted in green. Where journey times are forecast to increase, these are highlighted in red.

Table 7.14: Bus journey time impacts

Area	Route	Direction	AM	Inter-peak	PM
			Change (mins)	Change (mins)	Change (mins)
Brentwood	9	EB	-	-	-2.4
Dartford	480	EB	-	-	-2.1
Gravesham	700	WB	-3.9	-	-
Gravesham	735	WB	-2.1	-	-2.0
Gravesham	736	WB	-	-	-2.3
Gravesham	770	WB	-	-	-3.1
Gravesham	695	WB	-	2.4	-
Strood	149	SB	2.8	-	2.1
Strood	151	SB	2.2	-	-
Thurrock	22	NB	-2.1	-	-
Thurrock	77	WB	-2.8	-	-
Thurrock	77A	WB	-2.8	-	-
Thurrock	269	NB	-2.6	-	-
Thurrock	269	SB	-	-	-2.3
Thurrock	X80	NB	-3.5	-3.5	-4.1
Thurrock	X80	SB	-3.5	-	-
Thurrock	Z1	WB	-2.8	-	-2.3
Thurrock	Z2	EB	-	-	-2.1
Thurrock	Z2	WB	-2.4	-	-
Thurrock	Z3	WB	2.1	-	2.9
Thurrock	Z4	NB	-	-	2.0
Thurrock	Z4	SB	2.3	-	-
NEKent	Coach	To London	-2.9	-	-2.2

7.11.12 There are currently no proposals to run local buses or long distance coaches on the Project. However, the Project can be used by both local buses or longer distance coaches if desired by operators. Any long distance coaches that choose to re-route from the Dartford Crossing to the A122 Lower Thames Crossing may benefit from reduced journey times.

Plate 7.38 Bus/coach routes considered in analysis

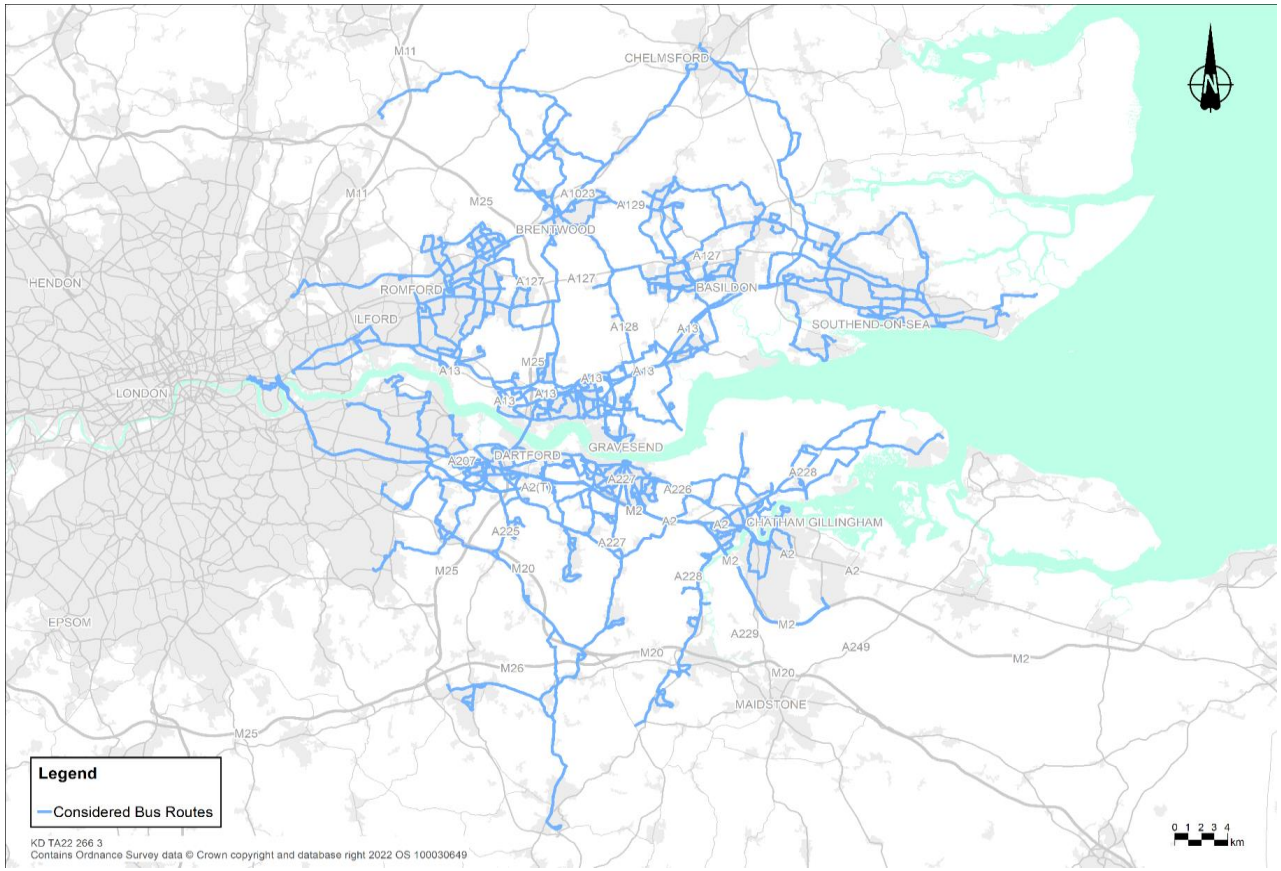


Plate 7.39 Changes in bus/coach journey times, 2030, AM peak

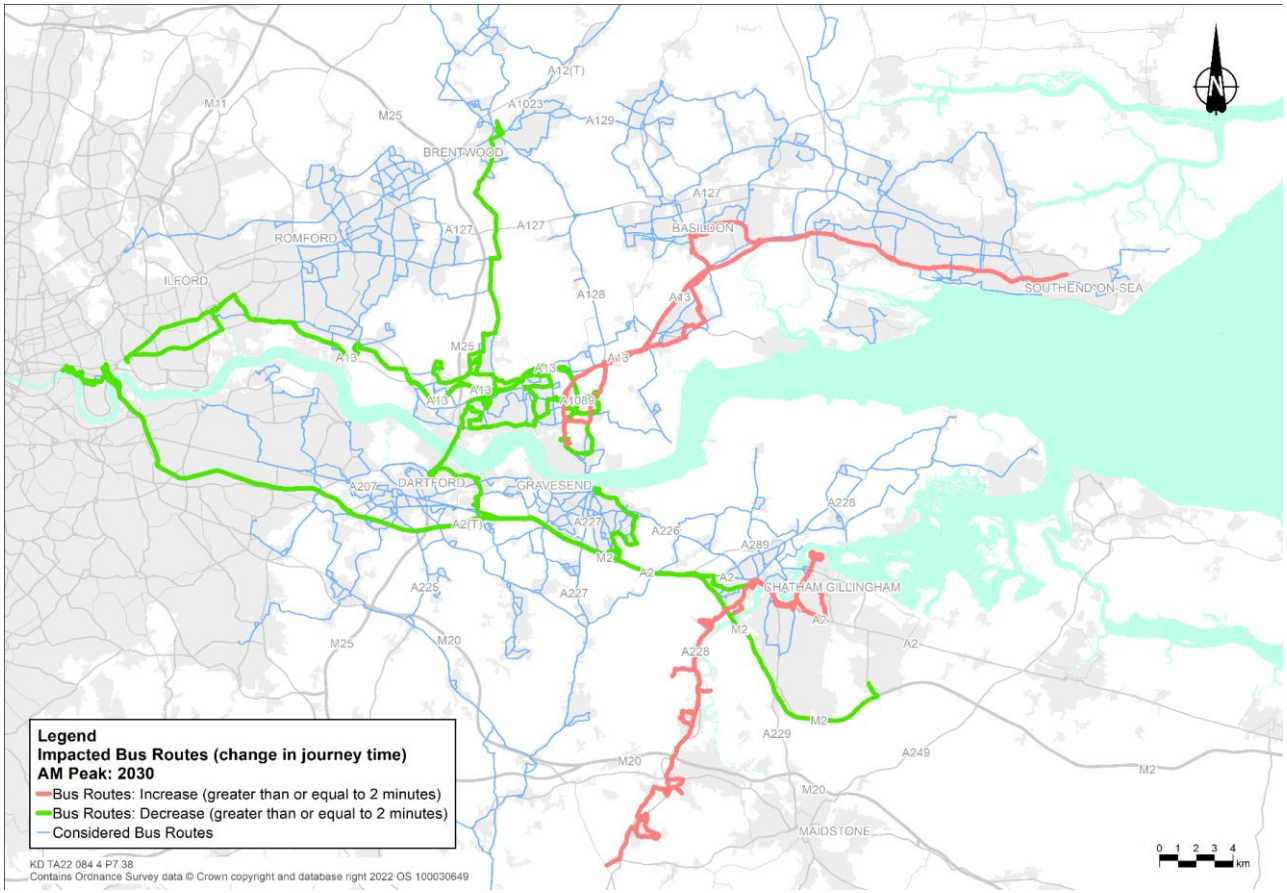


Plate 7.40 Changes in bus/coach journey times, 2030, inter-peak

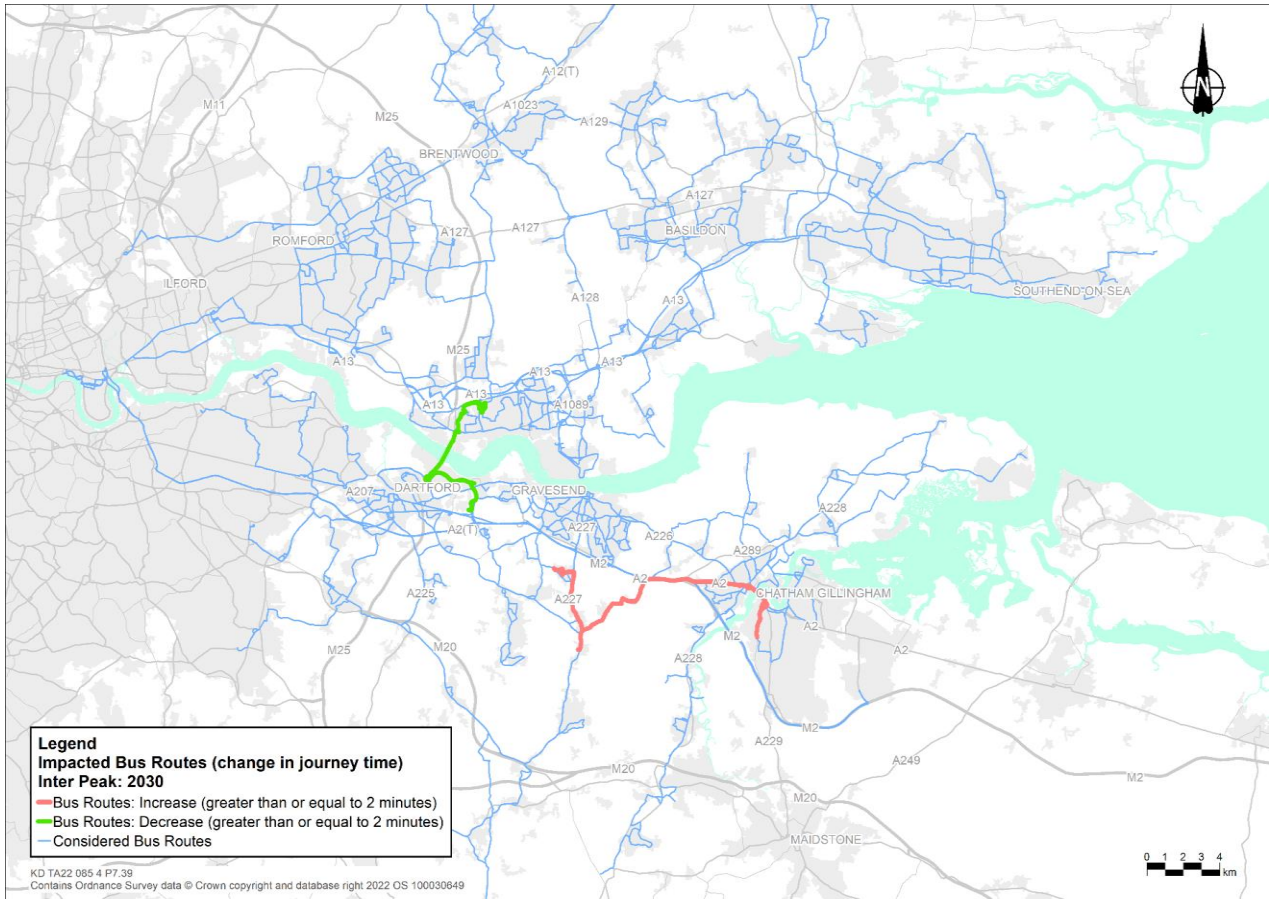
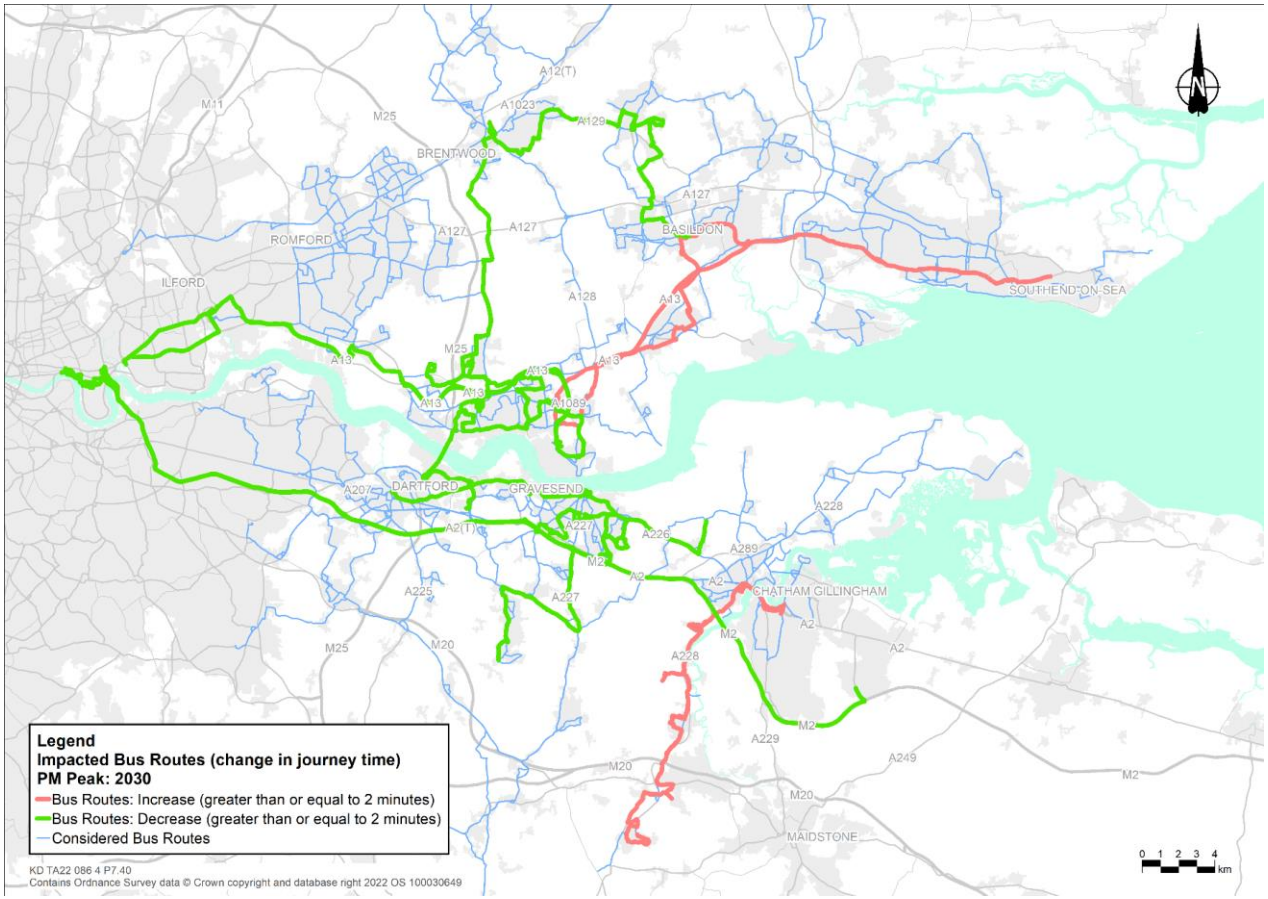


Plate 7.41 Changes in bus/coach journey times, 2030, PM peak



7.12 Impacts on walkers, cyclists and horse riders

7.12.1 The main potential operational impacts on WCH would be traffic-related severance due to any increases or decreases in traffic on roads that walkers may choose to cross and physical severance caused by changes to local roads and PRoW, in order to accommodate the Project.

Traffic-related severance

7.12.2 The Distributional Impact Appraisal Report within Appendix D of the ComMA (Application Document 7.7), provides an analysis of flow changes greater than 10% and a 180 PCU two-way change flow in any one of the modelled time periods for the 2030 opening year for roads included in the LTAM. Only single carriageway roads, likely to be crossed at grade, were assumed to be within the scope of the analysis as WCH would not normally cross other road types.

7.12.3 A two stage assessment of the change in the level of severance was then carried out which firstly identified all the locations where there was forecast to be a change. Stage two comprised a desk-based review which considered the existing provision, the level of population in the locality, an estimation of the number of people affected and the location of amenities.

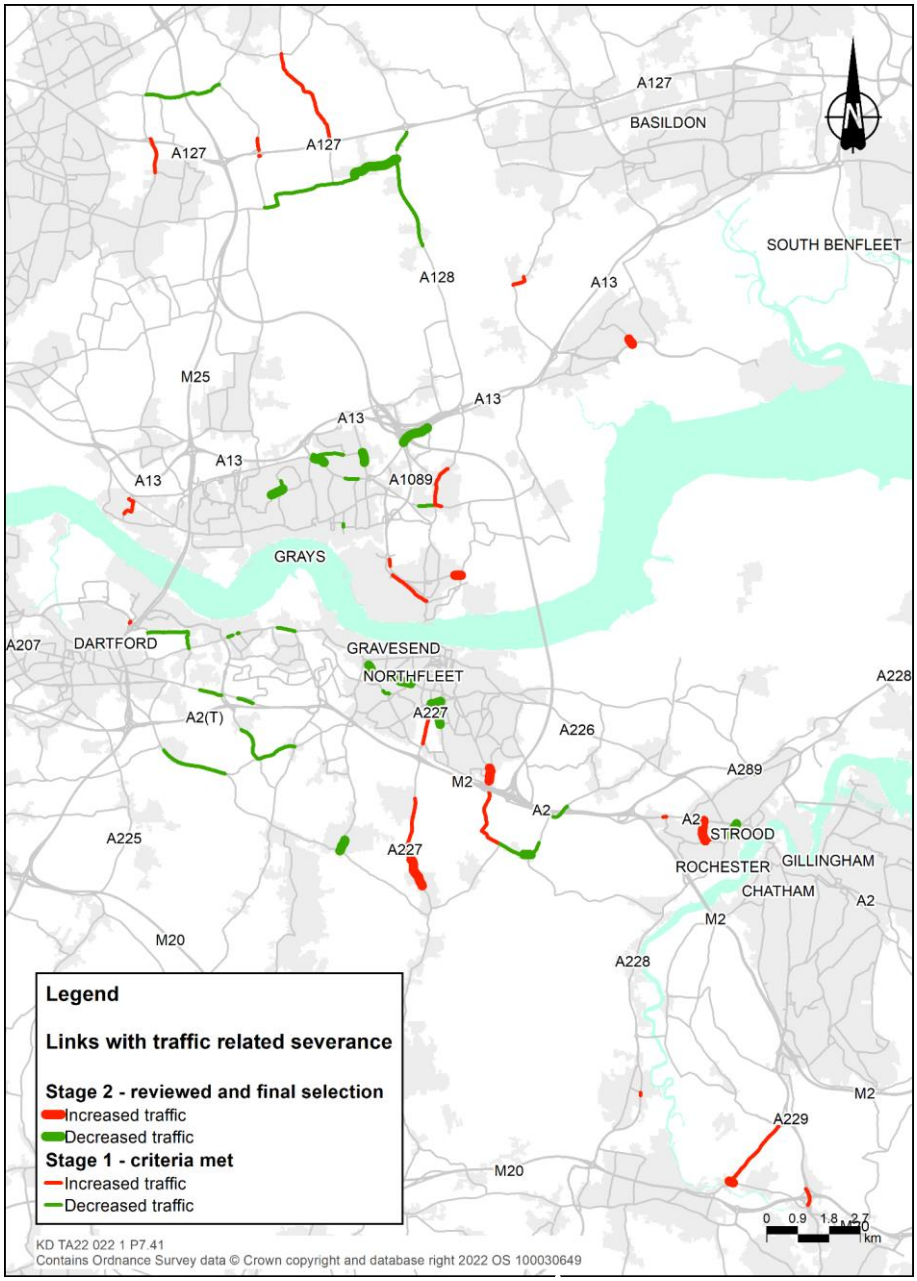
7.12.4 Plate 7.42 shows the impacted road links where there is an increase or decrease in vehicle flows as a result of the Project. The Plate shows seven locations where a moderate increase in severance is predicted, and a further 12 locations where a moderate decrease in severance is predicted. These locations are summarised in Table 7.15.

7.12.5 More information on the assessment undertaken to examine traffic related severance is contained within the Combined Modelling and Appraisal Report (ComMA), Appendix D: Distributional Impact Appraisal Report (Application Document 7.7).

Table 7.15 Severance locations

Severance locations – moderate increase	Severance locations – moderate decrease
• Valley Drive (two locations) • Wrotham Road • Forstal Road • Elaine Avenue • Springhouse Lane • Brennan Road	• Singlewell Road • Cross Lane West • Dover Road East • Dover Road • New Barn Road • The Street • Northcote Road • Stanford Road • Warren Lane • Lodge Lane • Blackshots Lane • Station Road

Plate 7.42 Severance during Project operation – impacted road links



Physical severance

7.12.6 The main physical severance changes would be diversion or realignment of existing PRoW or local roads that cross the proposed route of the Project, together with some closures. These changes may increase the distance travelled by WCH, resulting in increased journey times. There would also be new footpaths, cycleways and shared surfaces created as part of the Project that would create new journey and connection opportunities for WCH.

7.12.7 Locations where PRoW are permanently diverted, realigned or reinstated are shown in Table A.2 to Table A.4 in Appendix A. Table A.5 shows locations where local roads are permanently diverted, realigned or reinstated, together with the likely diversion routes and estimated lengths of diversion.

7.12.8 The Project would affect WCH using Hornsby Lane which would be permanently closed, and WCH would be diverted. Hornsby Lane has been surveyed and was found to be used by 32 walkers and 15 cyclists per day.

7.12.9 From the west, the diversion would be to travel north on Heath Road along the footpath, then east along Stanford Road shared surface. This would result in a minimal change in length. Access to existing properties would be maintained.

7.12.10 The Project would also include improvements to existing connections used by WCH and new WCH routes. These are shown in Table A.6, Table A.7 and Table A.8 within Appendix A. The Project would generate approximately 19km of new or improved routes for WCH north of the River Thames and 18km of new or improved routes south of the River Thames.

WCH network improvements

7.12.11 The existing PRoW network linking local communities would be impacted by the Project with routes severed by the construction of major roads, which include the M25, A13 and the A2

7.12.12 A WCH Strategy has been developed which proposes over 40 miles (60km) of new or improved pathways in total across the route of the Project, which equates to three miles of pathway for every one mile of new road. The Strategy would not only repair the severance to the existing PRoW network, but would also create new WCH pathways and bridges, as well as improving existing pathways, to offer a combination of recreational and commuter routes.

7.12.13 To the south of the River Thames, the Project would create new pathways and bridges, as well as improving existing pathways, to offer a combination of shorter looping trails and longer routes. This network of pathways would connect to the area's rich mosaic of parks and woodland are three new green bridges, including an 84m green bridge over Thong Lane – one of the largest in Europe.

7.12.14 To the north of the River Thames in Thurrock, Brentwood, and Havering, the Project would create new pathways and bridges, as well as improving existing pathways, to better connect the community to heritage areas, equestrian centres, places of employment, parks, and woodlands. Four new green bridges would sit throughout this network of pathways, helping to connect the community to the areas rich mosaic of parks and woodlands.

7.12.15 A summary of the proposed WCH Strategy is provided below:

a. Existing - Diverted
    i. 3.45km of Footpath diverted
    ii. 2.14km Bridleway diverted
b. Existing – Improved
    i. 0.48km of improved Byway
    ii. 3.02m of improved bridleway
    iii. 1.5km of improved footpaths
    iv. 4.08km of improved ped-cycle track
c. Existing - Designation upgrades
    i. 10.69km of footpaths upgraded to bridleway
    ii. 0.87km of footpaths upgraded to ped-cycle track
d. New
    i. 3.2km of New footpath
    ii. 15.95km of new bridleway
    iii. 7.2km of new ped-cycle track
    iv. 5.6km of new ped-cycle-equestrian track
    v. 4.5km of new permissive footpath
    vi. 1.4km of new permissive bridleway
    vii. 0.95km of new permissive ped-cycle track
e. Seven new green bridges
f. Three WCH footbridges
g. Eight Pegasus crossings
h. Seven Signalised crossings

South of the River – Kent

7.12.16 A summary of the changes to the WCH network in Kent are summarised below.

Bridleways

7.12.17 In Kent, the Project is proposing over 7.8km of new bridleways and over 4.2 km of existing footpaths that would be redesignated to bridleways status, of which 2.2km would be diverted from their original alignment.

7.12.18 In addition to this, a new permissive bridleway of 0.7km in length is proposed within Jeskyns Community woodland, along with a 1km section of footpath NS177 which would be resurfaced and redesignated to permissive bridleway status.

Footpaths

7.12.19 The Project is proposing over 1.1km of new footpaths, 1.7km of unmade footpaths and 1.6km of footpaths which would be diverted from their original alignment.

Shared Tracks (walkers and cyclists)

7.12.20 The Project is proposing over 3.6km of new, extended or improved shared tracks for (walkers and cyclists). In addition to this, 0.4km of existing footpaths will be redesignated as a shared track (walkers and cyclists) and 1km of footpaths will be redesignated as permissive cycle routes.

Shared Tracks (walkers, cyclists and horse riders)

7.12.21 The Project is proposing over 1.2km of new shared tracks (walkers, cyclists and horse riders) and 0.3km of shared track (walkers and cyclists) to include horse riders.

Green Bridges

7.12.22 Three green bridges are proposed south of the river in Kent. The Thong Lane north green bridge would be located over the A122 Lower Thames Crossing and two green bridges would be located over the existing M2/A2 at Brewers Road and Thong Lane south. These would create safe routes for walkers, cyclists, horse riders and wildlife, and would include an 84m wide bridge – one of the widest green bridges in Europe.

Byways

7.12.23 Byways NS195 and NS311 would be resurfaced to safely accommodate the temporary diversion of NCR177 connecting to the permissive bridleway through Ashenbank Woods and proposed permissive cycle and bridleway routes through Jeskyns Community woodland.

Crossings

7.12.24 To provide safe connections between the proposed WCH routes, five Pegasus crossings and five signalised crossings (for walkers and cyclists) would be provided at the following locations:

Pegasus Crossings:

a. Thong Lane north of the Thong Lane south green bridge

b. Brewers Road north of the bridge

c. Connector Road east of Thong Lane south bridge

d. A226 south of St Mary Church Chalk

e. Henhurst Road near Church Lane

Signalised crossings:

a. A226 near Filborough Way

b. Hever Court Road roundabout

c. Gravesend East north

d. Gravesend East south

e. Henhurst Road roundabout

North of the River – Thurrock

7.12.25 A summary of the changes to the WCH network within Thurrock are summarised below.

Bridleways

7.12.26 In Thurrock, the Project is proposing over 6.4km of new bridleways, over 5.1 km of existing footpaths redesignated to bridleway status and over 3.9km of existing bridleway would be diverted and improved.

Footpaths

7.12.27 The Project is proposing over 1.8km of new footpaths, over 1.5km of footpaths diverted from their original alignment, and an additional 4.9km of permissive footpaths.

Shared Tracks (walkers and cyclists)

7.12.28 The Project is proposing over 2,7km of new shared tracks for walkers and cyclists and over 3.5km of improved or extended shared tracks. In addition to this, 0.4km of existing footpaths would be redesignated as a shared track for walkers and cyclists and 1km of footpaths will be redesignated as permissive cycle routes.

7.12.29 These new and extended shared tracks would connect the residential areas of Gravesend, Strood, and communities south of the A2, to the parks and woodlands between them.

Shared Tracks (walkers, cyclists and horse riders)

7.12.30 The Project is proposing over 4.2km of new shared tracks for walkers, cyclists and horse riders.

Bridges

7.12.31 A new footbridge would be provided over the Mardyke for pedestrians using footpath FP136. A shared use bridge for walkers, cyclists and horse riders would also be provided across the Mardyke for users of Bridleway BR219 and the redesignated FP136.

7.12.32 Road bridges would be diverted and improved to provide improved shared WCH routes over the Project. This would include North Road, Rectory Road, Muckingford Road, Stifford's Clay Road, bridges over the A1013.

Crossings

7.12.33 To provide safe connections between the proposed WCH routes, three Pegasus crossings and two signalised crossings (for walkers and cyclists) would be provided at the following locations:

Pegasus Crossings:

a. North Road connecting to FP151 redesignated as bridleway

b. A1013 at the junction with Rectory Road

c. Brentwood Road connecting to FP78 and FP95 redesignated as bridleways

Signalised crossings:

a. Dennis Road/West Road connecting to a new WCH off road track

b. A1013 at the junction with Baker Street

North of the River – Brentwood

7.12.34 A summary of the changes to the WCH network within Brentwood are summarised below.

Bridleways

7.12.35 A bridleway over the A127 via a new WCH bridge to the east of M25 junction 29 would be provided, with WCH ramps connecting to the existing Bridleway BR 183 to the north and south. To the south of the A127, a 1.1km section of bridleway BR183 would be partially diverted and the surface upgraded.

Shared Tracks (walkers and cyclists)

7.12.36 The existing shared track for pedestrians and cyclists along the southern side of the A127 would be widened over a 0.8km length. In addition, a new ramp for walkers and cyclists would be provided both to the north and south of the A127 connecting to the proposed WCH bridge.

WCH Bridge

7.12.37 A new equestrian standard bridge over A127 to the east of M25 junction 29 would be provided for walkers, cyclists and horse riders, with bridleway BR213 redirected to this crossing.

North of the River – Havering

7.12.38 A summary of the changes to the WCH network within Havering are summarised below.

Bridleways

7.12.39 In Havering, the Project is proposing over 1.2km of new bridleways, 1.7km of footpaths would be redesignated as bridleway and a short section of bridleway BR183 will diverted and the surface improved.

7.12.40 Footpath FP230 would be diverted to make way for the northbound Proiect road to M25 slip and routed across new bridge and across the southern edge of the eastern side of the construction site. The footpath would be given permissive bridleway status.

Footpaths

7.12.41 Existing footpath FP231 to the east of the M25 would be diverted by 0.2km length to avoid the clash with slip road South of Ockendon Road bridge.

Shared Tracks (walkers and cyclists)

7.12.42 The Project is proposing 0.3km of new shared tracks for walkers and cyclists. This would include a new link from A127 footway to Folkes Lane at the proposed WCH bridge west of M25 junction 29. A new pedestrian-cycle link through the north of the junction 29 roundabout connecting to the existing shared track for pedestrians and cyclists.

Shared Tracks (walkers, cyclists and horse riders)

7.12.43 A new roadside ped-cycle-equestrian route adjacent Dennises Lane connecting FP 252 and FP 259 would be provided over a length of 0.2km. This route continues into Thurrock.

WCH Bridges

7.12.44 A new equestrian standard bridge over the M25 between the two sides of the Thames Chase forest would be provided, as well as over the A127 to the west of M25 junction 29, connecting Moor Lane and Folkes Lane.

7.12.45 New bridges over the HS1 railway line and the Project would be provided for the diverted footpath FP252 redesignated as bridleway from Dennis Road to St Mary Magdelene.

Overview of the proposals

7.12.46 The WCH Strategy was developed to encourage active travel and promote health and wellbeing across the Lower Thames area by the provision of these new or improved pathways. Proposals include new or improved bridges and pathways for walkers, cyclists and horse riders, to encourage active travel between parks, woodlands, heritage sites and employment centres in Kent, Thurrock, Brentwood and Havering.

7.12.47 The proposals include the following improvements:

a. Seven new green bridges – providing safe and easy crossings for people and wildlife, including an 84m wide bridge in Kent, one of the widest green bridges in Europe.

b. New footbridges – with two over the A127 either side of M25 junction 29 and one over the M25 at the Thames Chase forest would create safe, easy crossing points and restore links severed by historic road building.

c. A network of bridleways and permissive bridleways – giving horse riders an uninterrupted route between woodlands such as Thames Chase Forest, Hole Farm community woodland and the Mardyke in Essex, and Ranscombe Farm Reserve, Ashenbank Wood and Shorne Woods Country Park in Kent.

d. A new 1.8 mile shared route for walkers and cyclists– separated from road traffic, will provide a safer and easier way to commute between East Tilbury, Linford and Chadwell St Mary.

e. New or improved bridleways, footpaths and permissive footpaths - improving links between the local community and heritage sites such as Coalhouse Fort and East Tilbury Battery.

Proposals by location

7.12.48 The WCH Strategy for the Project has been developed through ongoing engagement with the relevant local authorities and interested WCH stakeholder groups who have provided local knowledge with regards to key routes and links. Further feedback on the proposed WCH routes has been received during the consultation process, which included a Community Impacts Consultation and a public WCH campaign. All feedback was reviewed and changes to the WCH Strategy were made where deemed beneficial and viable.

7.12.49 Further details on the WCH Strategy and proposed routes to the south and north of the river can be found in the Project Design Report: Part E (Application Document 7.5) and in the Rights of Way and Access Plans (Application Document 2.7).

The localised benefits and connectivity enhancements proposed south of the River in Kent, and north of the river in Thurrock, Brentwood and Havering are set out in turn, below. .

South of the River Thames - Kent

7.12.50 In Kent, the Project is proposing over 20km of new or improved pathways. This includes:

a. A network of footpaths and bridleways proving easy connections to and through Chalk Park a proposed landscaped park, that would offer views over the Thames estuary.

b. New and improved footpaths, bridleways and shared tracks connecting the residential areas of Gravesend, Strood, and communities south of the A2, to the parks and woodlands between them.

c. New shared tracks and permissive bridleways and cycle routes creating a new cycle route south of the A2 running through Ashenbank Wood, Jeskyns Community Woodland from Park Pale in the east to Hares Bridge in the west.

d. Realignment of National Cycle Route (NCR) 177 realignment to provide a permanently realigned east-west route south of HS1 minimising the need for over and underpasses across the Project route, HS1 and the A2/M2 Corridor.

North of the River - Thurrock, Brentwood and Havering

7.12.51 In Thurrock, Brentwood and Havering, the Project is proposing over 40km of new or improved pathways. This includes:

a. Two new footbridges over the A127 to the east and west of the M25 J29 to create safe and easy crossing points and restore links severed by the road over 100 years ago.

b. A new footbridge and permissive bridleway over the M25 to complete an off-road route between a new community woodland on Hole Farm, Thames Chase Forest, the Mardyke and beyond.

c. Providing better WCH access to the fenland and Mardyke by providing new footpaths and bridleways, and redesignation of footpaths to bridleways with surface improvements.

d. Replacing the Rectory Road bridge over the A13 with a wider bridge with a segregated horse track and footpath

e. Improve commuter cycle routes along A1013 between Stanford-leHope, Orsett and Little Thurrock and provide equestrian standard link across the A13.

f. Improving and extending the shared track for walkers and cyclists along Stifford Clays Road.

g. Shared track for walkers, cyclists and horse rider along North Road to mitigate the severance of informal off-road routes between North and South Ockendon, anticipating future development of the area and improved connections between North and South Ockendon.

h. Four new green bridges to provide an easier and safer crossing for people, horses, and wildlife.

i. New or improved bridleways, footpaths and permissive footpaths improving links between the local community and heritage sites such as Coalhouse Fort and East Tilbury Battery and providing recreational loops.

j. A shared track for walkers and cyclists separated from road traffic along Muckingford Road, that would provide a safe and easy way to commute between East Tilbury, Linford and Chadwell St Mary.

7.13 Impacts on river users

7.13.1 There are not expected to be any impacts on river users once the Project is operational.

7.14 Monitoring

7.14.1 The proposed approach to monitoring the impacts of the Project once operational is set out in the Wider Network Impacts Management and Monitoring Plan (Application Document 7.12) and is summarised in Chapter 10 of this report.

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